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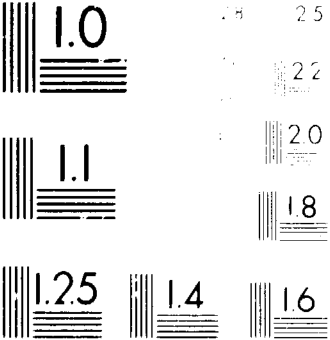
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# THE GLASS CONTAINER PROJECT

## A PRE-FEASIBILITY STUDY

## FOR

## THE EMIRATE OF FUJAIRAH, UNITED ARAB EMIRATES

PREPARED BY

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CONTENTS

# I EXECUTIVE SUMMARY

## I.1 Project Background and History

The promoter of the project is the Government of Fujairah, Department of IMdustry and Economy, P.O. Box 1 Fujairah, United Arab Emirates.

The Government of Fujairah has decided to join with the Arab Mining Company, Amman, Jordan, when establishing the glass container company. The Arab Mining Company (Armico) is interested in investment opportunities in the mining sector of different Arab countries.

The Emirate of Fujairah is one of seven emirates in the United Arab Emirates.

To a large extent the economy of U.A.E. is depending on oil and natural gas. There are also various new industries in the country, such as industries for construction materials, chemical and petrochemical products and some food industries.

The rate of industrial growth is increasing. The market in the country is small, however, and there is a shortage of domestic labour skilled in industrial operations.

The Emirate of Fujairah has no oil or gas deposits. The people are active in agriculturing and fishing. There are also some small scale industries in the Emirate. Factories for production of ceramic files and rock wool have been started recently.

Glass containers are being imported by the local bottling plants. A market study carried out by GOIC (the Gulf Organization for Industrial Consulting) has shown, that approximately 11 000 tons of glass containers are being imported per year by U.A.E, Bahrain and Qatar. It was found by the market team, that a glass factory in Fujairah could possibly supply bottles in U.A.E as well as exporting some to Bahrain and Qatar.

The Geoconsult company of the Netherlands was asked in 1980 by the Government of Fujairah to carry out geological surveys in order to look for suitable glass raw materials.

Siliceous rock, limestone, dolomite and pegmatite were found in satisfactory quantities in Fujairah. The quality, especially that of the siliceous rock, was not quite satisfactory, however. It will therefore be necessary to arrange for some beneficiation processes of the local raw materials. Further investigations including petrographic and chemical analyses will be needed. Armico have declared, that they can carry out such investigations.

Geoconsult presented an opportunity study in 1982 to the Government of Fujairah. This study indicated, that a glass container plant in Fujairah could be feasible. The Government therefore asked UNDP to carry out a more detailed study.

The Government of Fujairah is interested in industrializing the Emirate and to use local raw materials as much as possible. The use of silica sand for some other projects have been evaluated but these projects have not yet been implemented.

In the economic calculations for this project, the following rate of exchange has been used:

US $ 1 = Dhs 3.70

## I.2 Market and Plant Capacity

The market study carried out by GOIC indicated, that in 1983 approximately 11 000 tons of glass containers were used in the suggested market region (U.A.E., Bahrain and Qatar). In this study it is assumed, that 90 % of the glass containers will be used by the local bottling plants in U.A.E. and 10 % exported

Inprinciple there are two types of bottles used in the region - a returnable bottle weighing approximately 410 gram and a non-returnable weighing about 195 gram. Two thirds of the bottles purchased are non-returnable bottles.

It is estimated by the market team, that there will be no growth in the number of returnable bottles being used. The proportion of one-way bottles will grow and the possible future market for this type of glass containers has been estimated by the GOIC market analysts in the following way:

| | Million cases with 24 bottles | | |
|---|---|---|---|
| | 1983 | 1986 | 1988 |
| Qatar | 2.9 | 3.4 | 3.7 |
| Bahrain | 5.4 | 6.3 | 6.9 |
| UAE | 8.9 | 10.3 | 11.4 |
| Total | 17.2 | 20.0 | 22.0 |

If the non-returnable bottles penetrate the market to an extent that 20 % or 40 % of the soft drinks are distributed in N-R bottles, the tonnage of these bottles will be as follows:

| | 1986 | 1988 |
|---|---|---|
| 20 % penetration | 18700 | 20600 |
| 40 % penetration | 37400 | 41100 |

It is of grat importance, however, to notice that, as a trial, glass bottles are not permitted to be used in the schools of Qatar. Some authorities in UAE are also considering to ban the use of non-returnable bottles. If it is not allowed to use non-returnable bottles in UAE, the glass container market will decrease con-siderably and it will probably not be feasible to start a glass container factory in the region.

In the market estimate for this study it is assumed that there will be no further increase in the number of returnable bottles and that there will be no legal ban regarding the use of non-returnable bottles.

The increase regarding the market for soft drinks has been estimated by the GOIC team to be 5 % per year.

It may then be assumed that the number of glass containers should increase by 5 % per year as well. Since there is no increase in the number of returnable bottles, however, it means that the increase of non-returnable bottles will be more than 5 %. Every year the tonnage of returnable glass bottles could increase by 5 %, but the extra tonnage of glass exceeding 3400 tons will be used to make non-returnable bottles. When converting the extra tonnage of returnable bottles to non-returnable bottles the weight should be multiplied by 195/410 = 0.476. In addition it will be necessary to take into consideration the number of trips made by returnable bottles.

It can be estimated, that the returnable bottles can be used for 10 -20 trips in the market region. It may therefore be assumed that when changing from returnable bottles to non-returnable bottles, it will be necessary to use about 15 times more bottles.

Calculating the market demand in UAE, Bharain and Qatar using the principle mentioned above and starting with figures slightly less (about 10 %) than those presented for 198[illegible] in the GOIC market study gives the following tonnage.

| Year | Returnable bottles, tons | Non-returnable tons | Total tons |
|---|---|---|---|
| 1 | 3400 | 5389 | 8789 |
| 2 | 3400 | 6870 | 10270 |
| 3 | 3400 | 8429 | 11829 |
| 4 | 3400 | 10060 | 13460 |
| 5 | 3400 | 11776 | 15176 |
| 6 | 3400 | 13579 | 16979 |
| 7 | 3400 | 15470 | 18870 |
| 8 | 3400 | 17450 | 20850 |
| 9 | 3400 | 19541 | 22941 |
| 10 | 3400 | 21722 | 25122 |
| 11 | 3400 | 24022 | 27422 |
| 12 | 3400 | 26436 | 29836 |
| 13 | 3400 | 28972 | 32372 |
| 14 | 3400 | 31630 | 35030 |
| 15 | 3400 | 34420 | 37820 |

It is seen that the approximate market demands of 20000 tons and 40000 tons as mentioned by GOIC are obtained after about 8 and 16 years.

In this study it has been assumed, that it is possible for the glass plant to obtain a sale of bottles as shown below:

| Year | Returnable tons | Non-returnable tons | Total tons |
|---|---|---|---|
| 1 | 3400 | 5389 | 8789 |
| 2 | 3400 | 6268 | 9668 |
| 3 | 3400 | 7234 | 10634 |
| 4 | 3400 | 8298 | 11698 |
| 5 | 3400 | 9468 | 12868 |
| 6 | 2550 | 8066 | 10616 |
| 7 | 3400 | 12170 | 15570 |
| 8 | 3400 | 13727 | 17127 |
| 9 | 3400 | 15440 | 18840 |
| 10 | 3400 | 17323 | 20723 |
| 11 | 3400 | 17323 | 20723 |
| 12 | 2550 | 12994 | 15444 |
| 13 | 3400 | 17323 | 20723 |
| 14 | 3400 | 17323 | 20723 |
| 15 | 3400 | 17323 | 20723 |

The sale in the first production year is about 90 % of the recorded demand for 1983. The sales then increases by about 10 % every year.

In years 6 and 12 the furnace must be stopped for 3 months to be repbuilt and therefore there is less production in those years.

It is assumed that only flint glass will be manufactured, but it is quite possible to change the colour of the glass in the furnace and make some green glass if there is a satisfactory market demand for it.

The prices for bottles in the region in1983 were as follows:

| | |
|---|---|
| Flint, returnable bottles | $ 332-373/ton |
| Green, N-R bottles | $ 394/ton |
| Flint, N-R bottles | $ 392-445/ton |

The average prices have been used in this study. They are:

| | |
|---|---|
| Returnable flint | Dhs 1304/ton |
| Non-returnable flint | Dhs 1548/ton |

The estimated sales revenue is the following:

| Year | Returnable Dhs 1000 | Non-returnable Dhs 1000 | Total Dhs 1000 |
|---|---|---|---|
| 1 | 4434 | 8342 | 12776 |
| 2 | 4434 | 9703 | 14137 |
| 3 | 4434 | 11198 | 15632 |
| 4 | 4434 | 12845 | 17279 |
| 5 | 4434 | 14656 | 19090 |
| 6 | 3326 | 12486 | 15812 |
| 7 | 4433 | 18839 | 23272 |
| 8 | 4433 | 21249 | 25682 |
| 9 | 4433 | 23901 | 28334 |
| 10 | 4433 | 26816 | 31249 |
| 11 | 4433 | 26816 | 31249 |
| 12 | 3325 | 20114 | 23439 |
| 13 | 4433 | 26816 | 31249 |
| 14 | 4433 | 26816 | 31249 |
| 15 | 4433 | 26816 | 31249 |

It is assumed that the furnace will be enlarged at the first rebuilding. The maximum capacity will then be obtained in year 10, that is four years after the rebuilding.

The prices recorded in 1983 by GOIC are very low. In general however, there is a tendency in 1984 for some increase of the price of glass containers.

Two new glass container plants will start operation in 1984 in the region, one in Saudi Arabia (39000 tons/year) and one in Kuwait (30000 tons/year). It is also considered to start a glass container company in Oman and one in Sharjah. The promoters in Oman have asked for international tenders before the end of 1984.

There will also be an increasing competition from other packaging materials like plastic and metal cans.

## I.3 Materials and Input

The following raw materials are used for the manufacturing of container glass:

Silica sand

Limestone

Dolomite

Soda ash

Feldspar (or some other mineral containing aluminium oxide like pegmatite)

Sodium sulphate

Sodium nitrate

Arsenic oxide (or cerium Oxide)

Selenium

Cobalt oxide

Geological investigations carried out by Geoconsult of the Netherlands have shown, that siliceous rock (from which silica sand can be obtained), Limestone, dolomite and pegmatite are available in Fujairah. The other raw materials have not been found in Fujairah and must therefore be imported.

The local raw materilas must, after mining, crushing and milling, be treated in a beneficiation process.

For each of these materials there are international specifications regarding chemical composition and grainsize. It will be difficult and may be too costly to obtain the international standard quality for all of these materials.

It may be possible, however, to use the local raw materials if they comply with the following points:

1. The composition of the raw material as delivered to the glass must be constant and within the specified local range as agreed with the technology suppliers.

2. The raw materials must not contain colourizing agents, especially iron oxide, more than specified in normal inter national standard specifications.

3. The grain size distribution must be within specified international limits.

More geological investigations must be carriedout before it can be certified, that local silica sand, limestone, dolomite and pegmatite can be used as glass raw materilas.

Should it be too expensive to obtain a satisfactory quality of the locally found raw materials, it may be necessary to import one or more of them.

An offer from Turkey regarding the major raw materials has been found too costly.

At the stage of finishing this report the consultant has been informed of a sand from Saudi Arabia, which is found acceptable as a glass raw material and which may be available at a satisfactory price. Preliminary calculations show that the price for the batch in Saudi Arabia will be very similar to that calculated for Fujairah.

Consumption of raw materials and utilites in one year

In the 5th year of production about 15600 tons of glass bottles will be produced. This will require the following approximate quantities of raw materials and utilities.

| | |
|---|---|
| Silica sand | 7800 tons |
| Limestone | 1600 tons |
| Pegmatite | 1600 tons |
| Soda ash | 2500 tons |
| Sodium sulphate | 65 tons |
| Sodium nitrate | 35 tons |
| Selenium | 65 kg |
| Cobalt oxide | 20 kg |
| Arsenic | 800 kg |
| Glass cullet | 4000 tons |
| LPG | 1.5 mill $m^3$ |
| Electricity | 12500 MWhr |
| Water | 40000 $m^3$ |
| Moulds | 5 sets |
| Wooden pallets | 20000 pieces |
| Shrink foil | 45000 $m^2$ |
| Cardboard, 10 cm wide | 160 km |

I.4 Location and Site

The United Arab Emirates, U.A.E. is an independent federation of seven emirates. The U.A.E. was constituted as a sovereign federal state in 1971 comprising seven emirates, namely Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaimah and Fujairah.

The country's economy is depending to a large extent on oil, natural gas and trade and to a lesser degree on agriculture and fishery. Other industries have been developed throughout the country. The industries produce construction materials, chemical and petrochemical products and some food products.

The Emirate of Fujairah has no oil or gas resources. There are, however, some small scale industries and fisheries in the emirate. In addition there are mountains in Fujairah containing siliceous rocks, limestone, dolomite and pegmatite. This type of minerals may be used for the preparation of raw materials for glass melting.

The area of U.A.E. is approximately 80 000 square kilometres. The U.A.E. is mainly a desert with a hot and a humid climate.

To the south and west of U.A.E is Saudi Arabia andto the east the Sultanate of Oman. To the north of U.A.E is the Arabian Gulf.

The population of U.A.E. according to information from the official tourist office was 1.2 million in 1982. Most of the population, or 80 % are expatriates.

The area of Fujairah is 1450 square kilometres. It is situated at the eastern part of U.A.E along the Arabic Gulf. There are many high mountains and narrow valleys in the Emirate and most of the population live along the coast.

There is an idustrial area In Fujairah approximately six kilometres from the centre of the city. There is a ceramic plant and a roch wool plant in this industrial area. This area is also suitable for glass plant and it has been decided, that if a glass container plant is started it should be situated there.

The reasons for the selection of this site for a glass plant were:

1. It is a policy to concentrate industrial activities in this area.
2. The infra structure is good.
3. Water, electricity, gas and fuel oil are available of international standards and prices.
4. The glass plant can share some of the existing facilities with the two other plants such as: transport equipment (trucks fork lifts, wheel loaders), gas station, workshop, canteen and housing.

The total land requirement is approximately 40 000 square meters, but it is advisable to secure an additional 20 000 square meters for future expansion.

A good standard dual carriage way passes very close to the industrial area. There is also a harbour in Fujairah with satisfactory port facilities.

Most of the bottling Plants in U.A.E. are situated 150-250 kilometers from the industrial area of Fujairah.

There will be no environmental problems with a glass plant at the industrial area in Fujairah. There is no residential area very close to the industrial area.

Possible environmental problems created by a glass factory close to a residential area are dust from thesoda ash and smoke from the chimney.

## I.5 Project Engineering

The selection of technology and equipment for the glass plant has been based on the following statements:

1. The plant should have a small capacity - a mini plant - and the most advanced and sophisticated technology and equipment can therefore not be used.

2. The plant must be able to make high quality glass containers, that are up to the international standards as specified by the bottling companies and the franchising companies.

3. The batch plant must be automatic. This should secure correct weights of the raw materials and a satisfactory mixing of them to a batch of correct and constant composition.

4. The furnace must be made of high quality refractory materials. The furnace should last for 5 years or more. It should be well insulated and the fuel consumption at full capacity should not be more than 2000 kcal per kg of molten glass.

   The furnace should be of a regenerative type or of a Heye recuperative system.

5. The two glass forming machines should be Individual Section machines of the Emhart construction.

6. Two automatic inspection machines, a spindle gauger and a check inspector. should be used at both of the production lines.

### a) The batch plant

There should be steel silos in the batch having the following capacities:

| Material | Approx,volume, $m^3$ |
|---|---|
| Silica sand | 120 |
| Limestone | 50 |
| Soda ash | 60 |
| Pegmatite | 50 |
| Reserve | 50 |
| Premixed minor material | 5 |
| Glass cullet | 60 |

In each silo there should be level indicators.

There should be two weighing machines, one having a capacity of 750 kg and the other one a capacity of 10 kg. Both of them should work to an accuracy of 0.2 %.

The mixer should be of the counter current type and have a capacity of 400 litres.

There should be an control panel installed in a dust free room. The panel should indicate all the operations in the batch plant. The batch preparation should be stopped automatically as soon as the operation does not follow the pre-set guide lines.

The batch plant should have a capacity of 50 tons of batch per 8 hours. The batch silo at the furnace should have a storage capacity of batch sufficient for two days of production.

In the batch plant there should be a crusher and a magnetic separator for the glass cullet.

In the batch control room there should be an illuminated diagram on a panel indicating the following processes:

Control of raw material feeding

Control of the dosing

Control of the weighing

Control of the mixing

Control of the addition of cullet

Control of the batch transport

When ever there is a failure of any part of the system, this should be indicated and the batch plant operation should be stopped automatically.

b) <u>The furnace</u>

The glass melting furnace should at first have a capacity of 50 tons per day. At the first re-building after about six years the capacity of the furnace should be increased to about 77 tons per day.

Primarily it is recommended to use an end fired regenerative furnace. An advanced type of a Heye recuperator furnace is also very suitable for the Fujairah plant. In both cases the consumption of fuel should be maximum 2000 kcal per kg of molten glass at full load of the furnace.

The steel recuperator should be able to preheat the incoming fresh air up to about 750°C.

The furnace must be well insulated and there should be a cooling system of the furnace wall and of all critical parts of the furnace, especilaly the "throat".

High quality refractory materials must be used in the furnace, in particular where there is a contact with the glass.

The steel structure of the furance shall include all necessary stairs with hand rails and service platforms.

The control and recording instruments at the furnace should include the following:

Automatic temperature control

Furnace glass level regulation

Air pressure regulation

Combustion air volume measurement

Control and indication of combustion air pressure

Fuel oil (or gas) pressure control

Control of compressed air

Safety systems

c) The glass blowing equipment

From the feeders of the furnace the glass will drop as gobs into the blank mould of two I.S. machines.

The I.S. machines should have six sections each. It should be possible to run both machines with double gobs when the machine operators have enough skill and when there is a market demand for this increased capacity.

There shall be 10 sets of moulds for the required types of soft drink bottles.

There should also be a pre-heating furnace for the moulds and a complete set of fixture for the feeders and the I.S. machines.

d) Equipment for annealing and processing

When the bottles leave the I.S. machines they have a temperature of about 500°C and must be cooled to room temperature under very controlled conditions. This annealing is carried out in two annealing lehrs. Each lehr should have a capacity of 30 tons of glass bottles per 24 hours. The lehrs should be heated by electric elements.

There should be equipment in the lehrs for surface coating of the bottles - one at the hot end and one at the cold end of the lehr.

After the annealing the bottles must be inspected. There should be one visual inspection station and two inspection stations where there are automatic inspection machines. One machine should be a gauger for the control of the dimensions of the neck and the height of the bottles. The other machine should control checks and cracks in the bottle. Defective bottles should be rejected automatically.

After having been inspected the bottles will be packed by palletizers and then wrapped with a shrinkable plastic film. These units are then passed through a hot air shrinking machine.

It may also be required by the customers to pack the bottles in cartons or in plastic crates. In both cases it is satisfactory to use manual operations.

On some of the returnable bottles it may be required to apply labels - ACL (Applied Ceramic Labels).

This is done in a decorating machine by a silk screen method. The bottles are then passed into a decorating lehr (similar to an annealing lehr). In this lehr they are heated to about 600$^{\circ}$C, where the ceramic label melts into the surface of the glass. The bottles are then annealed in the ordinary way.

There is a tendency to use shrinkable plastic labels on non-returnable bottles. Equipment for this type of labels is not included in the Fujairah project, but can easily be installed, if there is a satisfactory market demand for this type of lables.

For the handling of the bottles, cullet, moulds, pallets, raw materials etc. The following transport equipment will be required:

2 palletizers

3 lift trucks - 1.5 tons

5 manual fork carriages - 2 tons

2 wheel loaders (0.5-1.0 ton)

8 steel containers (o.6 $m^3$)

15 steel containers (0.4 $m^3$)

e) Service equipment

Qulaity control and laboratory equipment

In the chemical laboratory it should be possible to make chemical analyses of the raw materials and the glass. All necessary equipment for this should be available in the laboratory.

It will also be necessary to have the following equipment in the control laboratory:

Polarizing microscope for ring section examination

Optical pyrometer

Orsat gas analyzer

Densitometer

Polariscope

Seed -o-scope

Thermal shock testing machine

Internal pressure tester

Wall thickness meter

Impact tester

Diamond saw

Verticality tester

Workshop

There must be a general maintenance and mould maintenance workshop in the plant.

The following equipment should be available in the workshop:

A lifting plat form

A steel sheet cutting machine

A welding transformer

Two welding sets

A lathe with copying systems

A column drilling machine

A table drilling machine

A grinding machine

A refractory saw

A sand blasting machine

A mould polishing machine

A metal spray coating machine

A polishing station

Sets of electric, mechanic and wood working tools and instruments

f) Civil egineering works

The civil engineering works will cover all necessary buildings and civil engineering constructions for the glass factory within the factory limits.

The scope of the work will consist of the following:

- Civil engineering and design work
- Site installation and preparation of the site
- Actual construction works
- Supervision and site management
- Coordination of contracts with local authorities regarding provision of water, electricity and road connections to the site.

- Soil testsmust be carried out and it may be necessary to carry out the following work as well:
- Pile foundation
- Excavation of rock
- Removal of artificial obstructions in the ground
- Some increase of the foundations caused by specific conditions
- Some exchange of soil
- Any other measures to substitute bad sub-soil

The buildings should be designed for wind forces resulting from wind speeds of 35 m/s giving a pressure of 80 $kp/m^2$.

All floors of the process buildings shall withstand a uniform load of 2 $tons/m^2$. Special machine loads exceeding 2 $tons/m^2$ must be dealt with separately.

The glass plant will consist of the following buildings and areas:

| | |
|---|---|
| - Open air storage for of raw silica sand and cullet with the cullet crushing equipment | about 970 $m^2$ |
| - Raw material storage hall for raw materials supplied to the factory in bags or in bulk. | about 650 $m^2$ |
| - Batch house for housing of the batch plant and the cullet silo | about 110 $m^2$ |
| - Main process building. A single storey building with cellar is proposed with the melting and production equipment on the ground floor and the regenerator (if any), ventilation and cullet scraper in the basement | about 2375 $m^2$ |
| - Bottle storage | about 1560 $m^2$ |
| - Service building | about 1550 $m^2$ |
| - Social building. Workers dressing and washing rooms, staff canteen. | about 300 $m^2$ |
| - Office building | about 460 $m^2$ |
| - Gate house and weighing bridge | about 66 $m^2$ |
| - Pump station house | |
| - Foundations for auxiliaries (Fuel oil and LPG tanks about 330 ton total capacity | |
| - Water storage tank (Tank about 80 $m^3$, 18 m above ground level) | |
| - Roads and parking areas | about 38000 $m^2$ |

g) Auxiliary equipment

Fuel storage and distribution

This proposal is based on the assumption, that light oil will be used for heating the melting end of the furnace and L.P.G for heating the working end and the forehearths. Should it be decided to heat all the furnace with L.P.G the capacities of the oil tank and the L.P.G. tank should be changed accordingly.

For the light oil (diesel oil)

- Storage tank of 300 tons cpacity (one month of operation)
- 2 pumps ( one as stand-by) each having a capacity of 40 $m^3$/hr at a pressure of 3 bar
- One twin-pump aggregate with 2 pumps (one as a stand-by) with filters, valves, thermometres, manometers, etc. Each pump should have a capacity of 500 l/hr at a pressure of 3 bar.

For the LPG

- A storage tank of 30 tons (about one month of operation)
- Two pumps (one as a stand-by) having a capacity of about 10 $m^3$/hr each
- Two vapourisers (one as a stand-by) each having a capacity of 50 kg/hr. They should be heated electrically.

All the systems for storage and distribution should be equipped with necessary relief valves, pressure gauges, pressure regulators, thermometers etc.

Supply of compressed air

The following equipment should be included:

3 piston type compressors (one as a stand-by) for the production equipment.

2 piston type compressors (one as a stand-by) for the furnace

A main air receiver (about 10 $m^3$)

Water supply system

The equipment should include:

2 booster pumps (one as a stand-by) 40 $m^3$ per hour

2 Cooling towers (2 x 30 $m^3$)

1 water tower, 80 $m^3$ and 18 m. above ground level.

Water for sanitary and drinking purposes should be taken from the public network.

Fire fighting equipment

A satisfactory fire fighting equipment must be available in the plant. This should include:

A main ring for water distribution

2 booster pumps (120 $m^3$ per hour)

10 stationary fire fighting cabinets

20 wall fire extinguishers

Supply of electricity

There must be a reliable supply of electric power to the plant. A glass plant can never be without electricity ( particularly for heating and cooling the furnace in emergencies) and it is therefore necessary to have a satisfactory emergency power supply as well.

The following equipment should be available in the plant:

Medium tension switch board

A 6-panel switch board with the following ratings:

| | |
|---|---|
| Rated voltage | 11000 V |
| Rupturing capacity | 250 MVA |
| Rated frequency | 50 Hz |

Distribution transformers

3-phase, oil-immersed, self cooled power transformers

| | |
|---|---|
| Capacity | 1600 kVA each |
| Voltage ratio | 11000/400 V |

Low tension distribution boards

Automatic switch over to a stand-by generator operation. The board should be complete with incoming and outgoing lines.

Low tension sub-distribution boards

Should serve the following parts of the plant:

Cullet processing

Batch plant

Furnace

Production department

Decorating department

Compressor plant

Some other departments

Cables

All cables necessary for a complete installation of the electric system.

Lighting

Lighting of all the buildings, outside lighting and street lighting.

Clock and alarm system

Should consist of a master clock in one building and several clocks in other buildings, punch-card clocks and a siren with a range of 500 metres.

Internal telephone system

Cabling and wiring for a capacity of 40 extensions.

Emergency power supply

There should be one emergency diesel generating set for automatic start-up at power-breaks of the main electric system. The set should include one 4-stroke diesel engine and one 3-phase synchronous alternator, output 625 kVA for 220/380 V, 50 cycles, 1500 r.p.m.

The emergency supply should be sufficient for running the cooling of the furnace, the throat cooling, combustion air for the furnace and the forehearths, compressed air supply for reversal operations, batch charging, furnace control etc.

## I.6 Plant Organization and Overhead Costs

There will be the following main departments in the glass company:

Office of the general manager

Production department

Sales department

Department for accounting and office service

Purchasing department

The production department will be divided into the following departments:

Raw materials and batch department

Furnace department

Forming Department

Annealing, inspection and packaging

Storage department

Quality control and laboratory

Work shop

Maintenance and service departments

Overhead costs for the production year number 5 are shown below:

| | Dhs '000 |
|---|---|
| Factory overheads | 264.60 |
| Repair | 850.- |
| Spare parts | 1700.- |
| Administrative overheads | 1332.- |
| Depreciation | 5703.48 |
| Financial costs | 1137.35 |
| Total | 10987.43 |

Depreciation

The dereciation for the buildings and the equipment is based on the following numoer of years:

| | |
|---|---|
| Buildings | 20 years |
| Furnace | 5 years |
| Machinery | 10 years |
| Cars | 4 years |
| Office equipment | 5 years |

Financial charges

It is assumed that a bank loan is arranged covering 50 % of the investment costs. The interest is 12 %. There is a repayment over 5 years, starting after a grace period of 2 years.

Alternatively it may be possible for the share holders to raise the equity from 50 % to 100 % of the total investment costs.

## I.7 Manpower

There will be 145 people working in the glass plant. It is believed by the promoters that there may only be one local man - the general manager.

The different people required for the glass plant are shown below:

| Function | Number |
|---|---|
| General manager | 1 |
| Production manager | 1 |
| Sales manager | 1 |
| Purchasing manager | 1 |
| Accountant | 1 |
| Assistant accountant | 1 |
| Sales men | 2 |
| Office staff | 3 |
| Engineers | 2 |
| Glass technologist | 1 |
| Maintenance engineer | 1 |
| Supervisors | 7 |
| Production staff | 8 |
| Ski led labours | 59 |
| Unskilled labours | 56 |
| Total | 145 |

Preliminary investigations by the management of the Ceramic plant and the Rockwool plant in Fujairah have indicated, that it may be possible to get some of the required people having some experience of glass container manufacturing from the Philippines. Many of the people in the Ceramic plant and the Rockwool plant come from the Philippines.

It is of especial importance , that the production manager, the glass technologist and the maintenance engineer have a good experience in their special fields from other glass container factories.

The following people should get special training in a glass container factory before the production starts in the Fujairah plant:

| Employees to be trained | Required time |
|---|---|
| Production manager | 3 months |
| Batch plant manager | 1 month |
| Furnace manager | 2 months |
| Electrical engineer | 2 months |
| Glass technologist | 2 months |
| Furnace operators | 4 x 2 months |
| I.S. operators | 2 x 3 months |
| Mould maintenance supervisor | 2 months |
| Total | 26 man-months |

The production manager, the maintenance engineer and some more of the technical personnel should be present at the plant, when the implementation starts.

The production will be carried out in three shifts per day and these will be four shift team. The production will continue 24 hours every day of the week.

## I.8 Implementation Scheduling

It will take about 22 months for the implementation of the glass project. A schedule of the project implementation is shown on the next page.

The erection of the plant can be finished about 18 months after a contract has been signed. The erection of the buildings will take about 8 months and should be carried out by a local group.

Cold testing of the equipment and the installation of it in the plant can start as soon as the erection is finished.

The actual commissioning will start by heating the furnace. The full commissioning may take 2-3 months and then the plant should be in full operation. It can be estimated, that it will take about three years of operation, before more than 80 % of the produced bottles will be accepted as high quality glass containers. In the first production year about 72 % of the bottles produced should be of a fully satisfactory quality.

In most glass container factories 10-15 % of the bottles produced are rejected. These rejected bottles are used as cullet, which is necessary for the melting of the glass.

IX:2 <u>Schedule of project implementation.</u>

| Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signing of contract | x | | | | | | | | | | | | | | | | | | | | | | | |
| Drawings for buildings | | x | x | x | | | | | | | | | | | | | | | | | | | | |
| Detailed drawings | | | x | x | x | x | x | x | x | x | | | | | | | | | | | | | | |
| Site preparation | | | x | x | x | | | | | | | | | | | | | | | | | | | |
| Foundations | | | | | x | x | | | | | | | | | | | | | | | | | | |
| Training | | | | | x | x | x | x | x | x | | | | | | | | | | | | | | |
| Erection of buildings | | | | | | | x | x | x | x | x | x | x | x | | | | | | | | | | |
| 1.st shipment at site | | | | | | | | | | x | | | | | | | | | | | | | | |
| Last shipment at site | | | | | | | | | | | | | | | | | x | | | | | | | |
| Erection | | | | | | | | | | | | | x | x | x | x | x | x | | | | | | |
| Cold test run | | | | | | | | | | | | | | | | | | | x | | | | | |
| Commissioning | | | | | | | | | | | | | | | | | | | | | x | x | | |

## I.9 Financial and Economic Evaluation

a) Total investment costs (in 1000 Dhs)

| Year | 1985 | 1986 |
|---|---|---|
| Fixed investment costs | | |
| Site preparation and development | 600 | 75 |
| Buildings and civil works | 5300 | 1210 |
| Incorporated fixed assets | 75 | 175 |
| Machinery and equipment | 8324 | 20048 |
| Total fixed investment costs | 14299 | 21508 |
| Pre-production capital cost | 6460 | 3714 |
| Working capital | - | 2302 |
| Total initial investment costs | 20759 | 27524 |
| In foreign exchange, % | 44.19 | 82.84 |

For re-building of the furnace there will be additional investment costs in year 6 of 7350 and in year 12 of 7000 Dhs 1000. New transport equipment will be purchased in years 5, 10 and 15 for a total of 450 Dhs 1000. The total current investment costs including working capital will be 19812 Dhs 1000 and the total investment costs over the 15 years' period will thus be 68095 Dhs 1000 (US $ 18.4 million). The total initial investment costs are 48283 Dhs 1000 (US $ 13.0 million).

b) Project financing

Primarily the promoters are considering to pay 50 % of the initial investment costs as equity. The remaining 50 % will be paid for by arranging a bank loan.

It is assumed after discussions with the Emirates Industrial Bank, Abu Dhabi that the interest on this loan will be 12 %. There will be a grace period of 2 years and the repayment time of the loan will be 5 years.

As an alternative it may be possible for the promoters to arrange an equity equal to 100 % of the total initial investment costs. This alternative has been run through the computer and is enclosed as appendix XI.7.

c) Total production costs

The toal manufacturing costs for the production year number 5 are as follows:

| | Dhs 1000 |
|---|---|
| Raw materials | 2132 |
| Energy | 5275 |
| Utilities | 545 |
| Labour | 1769 |
| Repair | 850 |
| Spares | 1700 |
| Factory overheads | 264 |
| Factory costs | 12535 |
| Administrative overheads | 1332 |
| Sales and distribution | 1827 |
| Depreciation | 5703 |
| Financial costs | 1137 |
| Total production cost | 22534 |

d) Income statement

The net income statements for production years 5 and 11 (the years before the furnace will be re-built) are shown below: (in Dhs 1000)

| | Year 5 | Year 11 |
|---|---|---|
| Total sales | 19090 | 31250 |
| Less variable costs | 3959 | 6258 |
| Variable margin | 15131 | 24992 |
| Non-variable costs incl. depreciation | 17438 | 16426 |
| Operational margin | -2307 | 8566 |
| Cost of finance | 1133 | - |
| Gross profit | -3440 | 8566 |
| Tax | - | |
| Net profit | -3440 | 8566 |

e) Financial evaluation

Basic version

a) The project shows a loss for the first six years of 37 126.33 Dhs '000 and then there is a profit during the next nine years of 56 322.75 Dhs '000. The reserves as retained profit after 19 years are 19 196.4 Dhs '000.

b) The cumulated cash balances are negative for the first ten years and then positive through out.

There will be a bank overdraft from the second pre-production year to the tenth year of production.

c) The net present value at 12 % discount rate is negative (-32 609.76 Dhs '000).

d) The internal rate of return is 3.39 %.

e) The payback period is 10.9 years.

f) Alternative studies

Beside the basic version three more alternatives were run through the computer:

1. The basic version (FUJAI 2)
2. No export of bottles (FUJAI 3)
3. All raw materials imported (FUJAI 4)
4. 100 % equity (FUJAI 5)

All the input and data for the basic version are taken from the following chapters of this report.

In the second version it was assumed, that no bottles could be exported. The same quantity of bottles are produced as in the basic version and the excess number of bottles are used as cullet.

In the third version it is assumed, that all raw materials have to be imported. A turkish offer for silica sand, limestone and feldspar was selected for the calculations. In the basic version the cost for raw materials per ton of glass was Dhs 136.72 and when using the Turkish offer the cost is Dhs 277.63 per ton.

In the fourth version it has been assumed, that the equity will be 100 % of the cost of the initial investment. This alternative was calculated mainly to see the effect on the cash flow for financial planning. The re-building of the furnace in the 6th year can then be financed by using cumulated cash balance.

The following comments can be made regarding the three alernatives to the basic version:

"No export" alternative

a) The project shows a loss for the first seven years of 41 111.46 Dhs '000 and then there is a profit during the next eight years of 36 362.29 Dhs '000. The reserves as retained profit after 15 years are negative (-4 749.17 Dhs '000).

b) The cumulated cash flow balances are negative for the first 14 years. There will be a bank overdraft from the second preproduction year to the 14th year of production.

c) The net present value at 12 % discount rate is negative (-40 621.47 Dhs '000)

d) The internal rate of return is 0.37 %.

e) The pay back period is 14.1 years.

The alternative of importing all raw materials

a) The project shows a loss for the first seven years of 50 088.39 Dhs '000 and then there is a profit during the next eight years of 29 020.57 Dhs '000. The reserves as retained profit after 15 years are negative (-21 067.82 Dhs '000).

b) The cumulated cash balances are negative for all the 15 years. There will be a bank overdraft from the second pre-production year to the 15th year of production.

c) The net present value at 12 % discount rate is negative (-49 755.91 Dhs '000).

d) The internal rate of return is recorded as zero on the computer print-out. It may be negative, which will not be recorded by the computer.

e) The pay back period is more than 15 years.

100 % equity alternative

a) The project shows a loss for the first six years of 25 779.99 Dhs '000 and then there is a profit during the next nine years of 56 324.74 Dhs '000. The reserves as retained profit after 15 years are 30 544.76 Dhs '000.

b) The cumulated cash balances are negative for the first four years and then positive through out. There will be a bank overdraft for the first four and for the sixth year of operation.

c) The net present value at 12 % discount rate is negative (-31 195.61 Dhs '000).

d) The internal rate of return is 3.62 %.

e) The pay back period is 4.2 years.

| Cashflow Discounting | Basic version |
|---|---|
| | FUJAI 2 |
| a) Interest payable on loan=cash outflow | |
| Net present value at 12.00 % | -41029.82 |
| Internal rate of return | 1.83 % |
| b) Interest payable on loan added back to net cashflow | |
| Net present value at 12.00 % | -32609.76 |
| Internal rate of return | 3.39 % |

Note: NPV is computed for the year before production starts, using the future value of cashflows during pre-production

| | |
|---|---|
| c) Future value of cashflow during pre-production | |
| Total cash outflow at 12.00 % | 50774.22 |
| Total cash outflow, Nominal value | 48283.14 |

| No export | Raw materials imported | 100 % equity |
|---|---|---|
| FUJAI 3 | FUJAI 4 | FUJAI 5 |
| -49018.87 | -58573.32 | -31195.61 |
| 0.0 % | 0.0 % | 3.62 % |
| -40621.47 | -49755.91 | -31195.61 |
| 0.37 % | 0.0 % | 3.62 % |
| 50774.22 | 50774.22 | 49360.08 |
| 48283.14 | 48283.14 | 46869.00 |

## g) Foreign exchange effect

Table I.9.1 below shows the saving of foreign exchange, if manufacturing the bottles in U.A.E instead of importing them.

Table I.9.1

Savings in foreign exchange by producing bottles locally instead of importing them. (in Dhs 1000)

| Year | Import fixed investm. | Import prod. material | Bottles import saving | Bottles exported | Differ. per year | Cumulative differ. |
|---|---|---|---|---|---|---|
| -2 | -9173 | | | | -9173 | -9173 |
| -1 | -22801 | | | | -22801 | -31974 |
| 1 | | -2540 | 12776 | | 10236 | -21738 |
| 2 | | -2794 | 13430 | 707 | 11343 | -10395 |
| 3 | | -3073 | 14850 | 782 | 12559 | 2164 |
| 4 | | -3381 | 15983 | 1296 | 13898 | 16062 |
| 5 | -150 | -3722 | 17658 | 1432 | 15218 | 31280 |
| 6 | -7350 | -3068 | 14230 | 1582 | 5394 | 36674 |
| 7 | | -4500 | 20945 | 2327 | 18772 | 55446 |
| 8 | | -4950 | 23114 | 2568 | 20732 | 76178 |
| 9 | | -5445 | 25501 | 2833 | 22889 | 99067 |
| 10 | -150 | -5989 | 28125 | 3124 | 25110 | 124177 |
| 11 | | -5989 | 28125 | 3124 | 25260 | 149437 |
| 12 | -7000 | -4492 | 20984 | 2455 | 11974 | 161384 |
| 13 | | -5989 | 28125 | 3124 | 15260 | 186644 |
| 14 | | -5989 | 28125 | 3124 | 25260 | 211904 |
| 15 | -150 | -5989 | 28125 | 3124 | 21110 | 233014 |

The table shows, that there is a deficit in foreign exchange during the pre-production years and the two first years of production.

The total saving in foreign exchange is approximately Dhs 233 million over the 15 years' period by producing bottles in Fujairah instead of importing them.

## I.10 Conclusions

### a) Raw materials

Siliceous rock, limestone, dolomite and pegmatite are available in Fujairah. Further geological surveys including petrological and chemical analyses must be carried out in order to identify the materials more precisly. Armico have resources for this type of investigations.

Suitable beneficiation processes should be suggested in order to make the materials acceptable as raw materials for glass manufacturing.

Glass melting tests should be carried out with the materials treated and prepared in a pilot plant.

Technical and economic evaluations should be done before it is decided to start mining and processing the various materials.

Detailed information about the availability of suitable glass raw materials in neighbouring countries and prices for such raw materials C&F Fujairah should be obtained.

### b) The market study

The market study presented in 1983 by GOIC should be up-dated. In particular it is of importance to get further information about the following points:

- Prices in 1984 for the various types of glass containers (returnable, non-returnable, additional price for ACL labels and plastic shrink-on lables.
- Average number of trips for returnable containers.
- Is there any interest from the bottling plants in using plastic crates for the distribution of filled bottles to their customers? The same crates can be used by the glass plants in distributing new bottles to the bottling plants.
- Interest from the bottling plants in receiving their bottles packed on pallets covered by shrink-on plastic film. Both these types of packaging will be cheaper than using cartons.
- If wooden pallets are used for packaging the bottles can the pallets be returned to the glass factory?
- Has the competition regarding glass bottles increased on the regional market since 1983 due to new glass plants having started production of bottles in neighbouring countries.
- Is it possible for Fujairah glass plant to get a long time agreement with the local bottling plants regarding supply of glass containers?

c) The packaging of bottles

Glass containers are usually packed in three different ways by glass companies:

- Packaging in cartons
- Packaging on pallets and covered by a shrinkable plastic film
- Packaging in plastic crates

The cost of the cartons with internal division is approximately Dhs 350 per ton of glass.

The cost using pallets, a card board wall and a plastic film is about Dhs 113.50 per ton of glass.

The returnable plastic crates are normally paid for by the bottling company. The crates are sent to the glass supplier and crates are then continuously used for the distribution of filled bottles to the shops and other customers. This is the cheapest way of distributing glass bottles empty as well as filled.

It is a competitive advantage for glass bottle suppliers to distribute bottles in plastic crates for the local beverage plants.

The bottling plants in U.A.E, Qatar and Bahrain receive the bottles in cartons, when supplied by foreign glass companies.

The cost of using pallets, cardboard and plastic film can be reduced if the wooden pallets are returned to the glass plant. If the wooden pallets can be used five times, the cost for this type of packaging will be reduced to approximately Dhs 55 per ton of glass. A system for returning the pallets must then be agreed upon with the beverage plants.

For the reference year 5 when 12868 tons of glass bottles are sold by the glass plant, using returnable wooden pallets means a reduction inthe cost of production of about 765000 Dhs. For the total quantity of the bottles distributed by the glass plant over the 15 years' period being studied it means a decreased cost of about Dhs 14 million.

The GOIC market team should discuss the packaging of bottles in detail with the beverage plants.

d) Advantages of the project

If a glass plant is started inFujairah, it will help in the industrialization of the country.

Local raw materials may be used. If these materials can be prepared to high quality glass raw materials there may be export possibilities of such raw materials.

If the local glass raw materials are processed to an acceptable quality, other manufacturing companies using similar raw materials may be started. Several projects have been considered by the Government of Fujairah.

Local manufacturing of glass containers may create an interest for the preservation of local fruits and vegetables.

A glass plant will give job opportunities for other industries and organizations (workshops, service industries, harbour facilities, transport companies, cap manufacturers).

A glass plant in the industrial area of Fujairah may share some of the services and the costs of the Ceramic Plant and the Rockwool plant. The total cost for the two established companies may therefore decrease if a glass plant is started.

A glass plant will help in saving some foreign currency for the Emirate.

The quantity of export of industrial products will increase.

e) Drawbacks of the project

The project will not be very profitable. If competition increases from other glass suppliers or other packaging materials, the project can easily be unprofitable.

The projected glass plant is a mini-plant. It will always be difficult to compete with the large glass companies.

If new glass plants are started in neighbouring countries, the possibilities of export and maybe also the local sales, may decrease,

Discussions have been started regarding the legal right of using or banning non-returnable glass containers. If a glass plant is built and if afterwards the use of non-returnable glass containers is not allowed, this will mean a complete failure for the glass project.

Based on experience from other countries a total ban on non-returnable bottles in the local market region does not appear very likely, however.

It is recommended, however, that all the points mentioned under I.10 Conclusions are carefully examined and evaluated before a final decision is taken regarding the erection of a glass container plant.

## II. PROJECT BACKGROUND AND HISTORY

The United Arab Emirates was constituted as a sovereign federal state in 1971. There are seven Emirates in U.A.E. These are Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaimah and Fujairah.

To a large extent the country's economy is depending on oil and natural gas and to a lesser degree on agriculture and fishery. Industries for construction materials, food processing and chemical and petrochemical products have been established.

The rate of industrial growth is increasing, but there are still many problems such as lack of skilled labours and the small market in the country.

The Emirate of Fujairah has no oil or gas deposits and its economy depends mainly on agriculture, fisheries and some small scale industries. Quite recently factories for the production of ceramic tiles and rock wool have been started.

Glass containers are being imported by the local bottling plants. Since major raw materials for glass manufacturing are available in Fujairah the Emirate is desirous to know if it may be feasible to start a glass container factory in Fujairah.

The promoter of the project is the Government of Fujairah. For various reasons the Government of Fujairah has decided to join with the Arab Mining Company, Amman, Jordan when establishing the new glass company. The Arab Mining Company (ARMICO) started its activities 1976 by looking for investment opportunities in the mining sector of different Arab countries. Since then ARMICO has been engaged in 11 mining or industrial projects related to mineral resources in 7 Arab countries.

These projects include development, mining, processing, beneficiation and industrialization of ores including copper, iron, lead, zinc, silver, fluorspar, radioactive minerals, potash and fertilizers.

Some of the countries in which ARMICO has worked are Jordan, Bahrain, North Yemen, Somalia, Tunisia, Morocco and Mauretania.

It is the policy of ARMICO to conduct technical environmental studies on mineral deposits discovered in the countries of the states covered by the activities of the company with the aim of determining the feasibility of the economic utilization of such deposits and selecting the most appropriate technical methods for this purpose.

The Geoconsult company of the Netherlands was asked in 1980 by the Government of Fujairah to carry out geological surveys in order to look for suitable glass raw materials.

Siliceous rock, limestone, dolomite and pegmatite have been found. The siliceous rock in particular, however, is not of a fully satisfactory quality. Further investigations including petrographic and chemical analyses may be needed. Such tests can be carried out by Armico.

Geoconsult presented an opportunity study in 1982 to the Government of Fujairah. This study indicated, that a glass container plant in Fujairah could be feasible and the Government therefore asked UNDP to carry out a more detailed study.

## III. MARKET AND PLANT CAPACITY

### III.1 The Market

The Government of Fujairah asked GOIC (The Gulf Organization for Industrial Consulting) to carry out a market study of glass containers in U.A.E., Qatar and Bahrain. This market study was presented in December 1983 (see Appendix XI.2)

It was shown in the GOIC study, that glass containers in GOIC member states are mainly used for carbonated beverages.

Two types of glass bottles are being used. One is a returnable bottle weighing approximately 410 gram and the other one is a non-returnable (one way) bottle having a weight of approximately 195 gram.

The speed of manufacturing bottles depend mainly on the weight of the bottles and to a less degree on the design of a bottle. Using the same type of machine (I.S.6 single gob) a 410 gram bottle can be produced at a speed of 40-45 bottles per minute and a bottle weighing 195 gram at a speed, of 60-65 bottles per minute. The price of a bottle depends to a large extent on the speed at which it can be manufactured.

One bottling plant reported in 1983 a price of 0.33 Dh/bottle for the light bottle and a price of 0.62 Dh/bottle for the heavier one. In this project it is considered to make flint (colourless) bottles only. It will be possible, however, to change the colour of the glass in the melting furnace, if this is required from a market point of view. A change of colour in a furnace usually takes 3-5 days. Normally no acceptable bottles can be produced during the time of altering the colour of the glass.

Changing the production in a machine from one type of bottle to another one normally takes 8-16 hours.

In the GOIC report it was mentioned, that 16 different bottles were used in the region investigated (U.A.E, Qatar and Bahrain).

In 1983 the following tonnage of glass containers was used in the region.

| | |
|---|---|
| Returnable bottles | 4 540 tons |
| Non-returnable bottles | 6 545 " |
| TOTAL: | 11 085 tons |

The non-returnable bottles are all made of flint glass. The returnable bottles are made of green glass (1 080 tons) as well as flint glass (3 460 tons). The total quantity of flint glass bottles is thus 10 005 tons.

The market team identified the larger volume type of bottles as follows:

| Type of bottle | Tons | Colour |
|---|---|---|
| Returnable: | | |
| Pepsi | 1 950 | Flint |
| 7-Up | 850 | Green |
| Canada Dry "Utility" | 490 | Flint |
| 7-Up | 375 | Flint |
| Canada Dry | 230 | Flint |
| Alkola | 150 | Flint |
| Non-returnable: | | |
| RC Cola | 4 215 | Flint |
| Double Cola | 2 330 | Flint |

The most popular container for carbonated beverages in the GCC countries is the metallic can. This is snown in table III.1.

Table III.1

Estimated consumption of carbonated beverages by container type, 1983. (Million cases - all numbers rounded)

| Country | Unit | Cans | Returnable bottles | N-R bottles | Total |
|---|---|---|---|---|---|
| UAE | Million | 4.0 | 3.7 | 1.2 | 8.9 |
| Oman | cases | 1.9 | 2.5 | 0.8 | 5.2 |
| Bahrain | 250 ml | 0.3 | 4.8 | 0.3 | 5.4 |
| Qatar | size | 0.9 | 1.4 | 0.6 | 2.9 |
| S.Arabia | equiva- | 52.4 | 22.9 | 21.0 | 96.3 |
| Kuwait | lent | 5.7 | 9.5 | 3.8 | 19.0 |
| TOTAL | | 65.2 | 44.8 | 27.7 | 137.7 |

A case contains 24 containers.

Source: GOIC estimates based on indications provided by Pepsi Cola International, Dubai.

Table 7 of the GOIC market report gives the following market demand for non-returnable bottles in 1983, 1986 and 1988.

| | Million cases with 24 bottles | | |
|---|---|---|---|
| | 1983 | 1986 | 1988 |
| Qatar | 2.9 | 3.4 | 3.7 |
| Bahrain | 5.4 | 6.3 | 6.9 |
| UAE | 8.9 | 10.3 | 11.4 |
| TOTAL | 17.2 | 20.0 | 22.0 |
| | Tonnage of glass with a penetration of 20 % of non-returnable bottles. | | |
| Total for all three regions | 16 100 | 18 700 | 20 600 |

The bottles used in the region are being inported from Singapore, Malaysia, Pakistan, Turkey, UK and some other countries.

The prices of the bottles have decreased quite considerably in the last years. The average prices for the end of 1983 were given as follows:

Flint, returnable bottles: $ 332-373/ton

Green, returnable bottles: $ 394/ton

Flint, non-returnable bottles: $ 392-445/ton

The prices were reported as "historically low".

It is important to notice, that glass bottles are not permitted to be used in the schools of Qatar. Some authorities in U.A.E are also considering to ban the use of non-returnable bottles. If it is not allowed to use non-returnable bottles in U.A.E, the glass container market will decrease considerably and it may not be feasible to start a glass container factory in the region.

If, on the other hand, there is no ban on the use of non-returnable bottles, it is assumed by the GOIC market team, that this type of bottles will be used to the extent of 20-40 % of the total market.

The possible future market for non-returnable bottles in Bahrain, Qatar and U.A.E were estimated as follows:

| | 1986 | 1988 |
|---|---|---|
| With 20 % penetration | 18 700 tons | 20 600 tons |
| With 40 % penetration | 37 400 tons | 41 100 tons |

The competition regarding the supply of glass bottles will increase in the region during 1984. One glass company will start production in Kuwait of 30 000 tons of bottles and another in Jeddah, Saudi Arabia with a capacity of 39 000 tons.

It is also considered to start a glass container company in Oman. The eventual share holders of that company have asked for international tenders before the end of 1984.

In addition there will be a strong competition from the use of other types of beverage containers like metal cans and plastic bottles. In general, however, the use of beverage containers will continue to increase all over the world and this also applies to glass containers in most countries.

The increase in the consumption of soft drinks in the market of U.A.E, Qatar and Bahrain has been 10-15 % in 1970-1980. This is no longer the case, however, and the market team predicts an annual increase of 5 % at present (1984). It is estimated, that if non-returnable bottles are allowed to be used quite freely in the local markets, there will be a considerable use of these bottles.

Since there will be no increase in the number of returnable bottles, however, it means that the increase of non-returnable bottles will be more than 5 %. Every year the tonnage of returnable glass bottles would increase by 5 %. The extra tonnage of glass exceeding 3400 tons will then be used to make non-returnable bottles.

When converting the extra tonnage of returnable bottles ton non-returnable bottles, the weight should be multiplied by 195/410 = 0.476. In addition it will be necessary to take into consideration the number of trips made by returnable bottles.

It can be estimated, that a returnable bottle can make 10 - 20 trips in the market region. It will therefore be necessary to use as an average 15 times as many non-returnable bottles for the number of returnable bottles displaced.

Calculating the market demand in UAE, Bahrain and Qatar using the principle mentioned above and starting with the figures presented for 1983 in the GOIC market study gives the following **tonnage of bottles.**

Market demand.

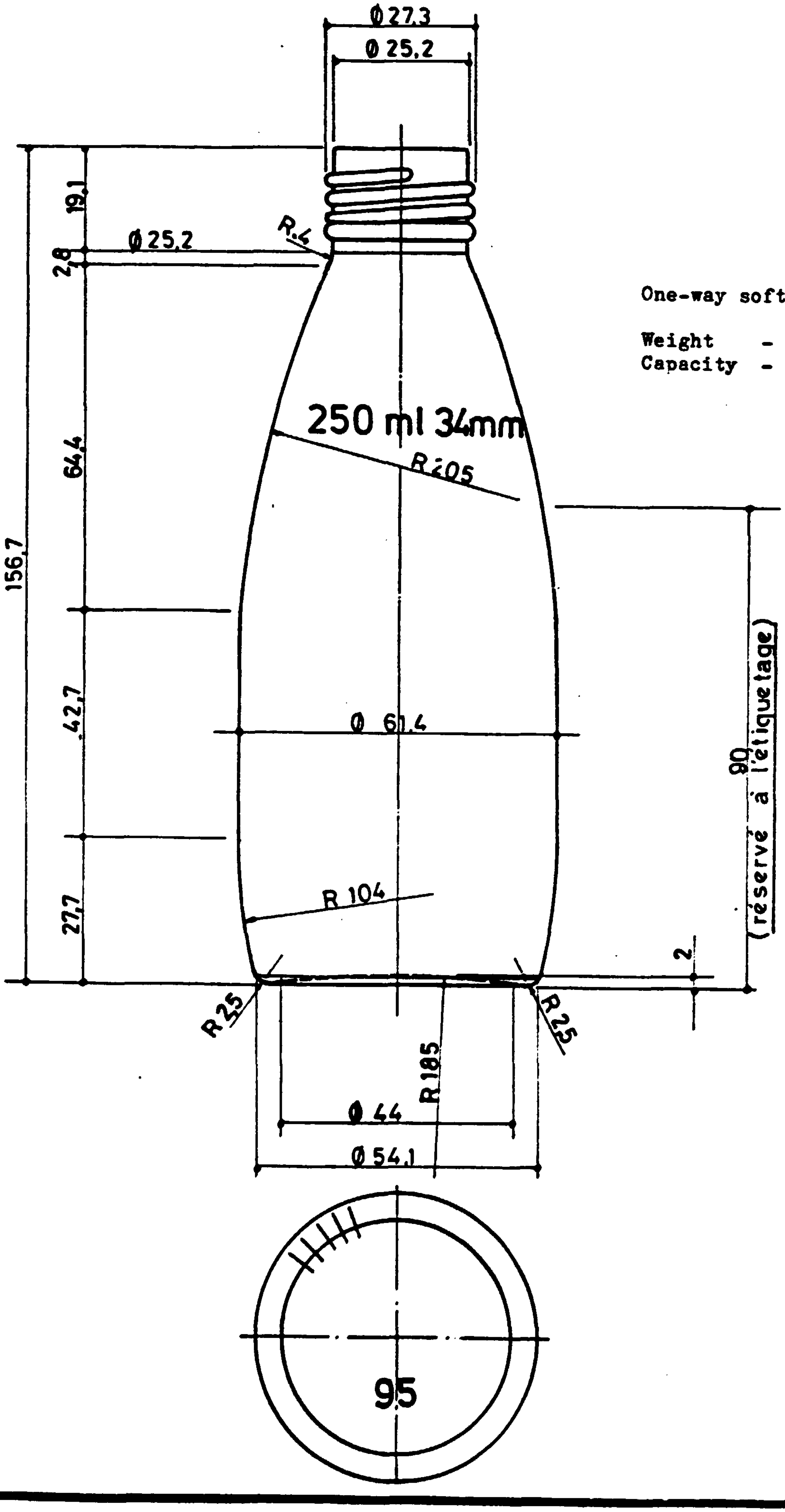
| Year | Returnable bottles, tons | Non-returnable bottles, tons | Total tons |
|---|---|---|---|
| 1 | 3400 | 5389 | 8789 |
| 2 | 3400 | 6870 | 10270 |
| 3 | 3400 | 8429 | 11829 |
| 4 | 3400 | 10060 | 13460 |
| 5 | 3400 | 11776 | 15176 |
| 6 | 3400 | 13579 | 16979 |
| 7 | 3400 | 15470 | 18870 |
| 8 | 3400 | 17450 | 20850 |
| 9 | 3400 | 19541 | 22941 |
| 10 | 3400 | 21722 | 25122 |
| 11 | 3400 | 24022 | 27422 |
| 12 | 3400 | 26436 | 29836 |
| 13 | 3400 | 28972 | 32372 |
| 14 | 3400 | 31630 | 35030 |
| 15 | 3400 | 34420 | 37820 |

It may be assumed, that the sales in the first-production year can be the same as those figures presented presented by GOIC for 1983. The sales can then increase by about 10 % per year. The increase is then influenced by the change from **returnable to** non-returnable bottles.

The following sales is estimated for the plant:

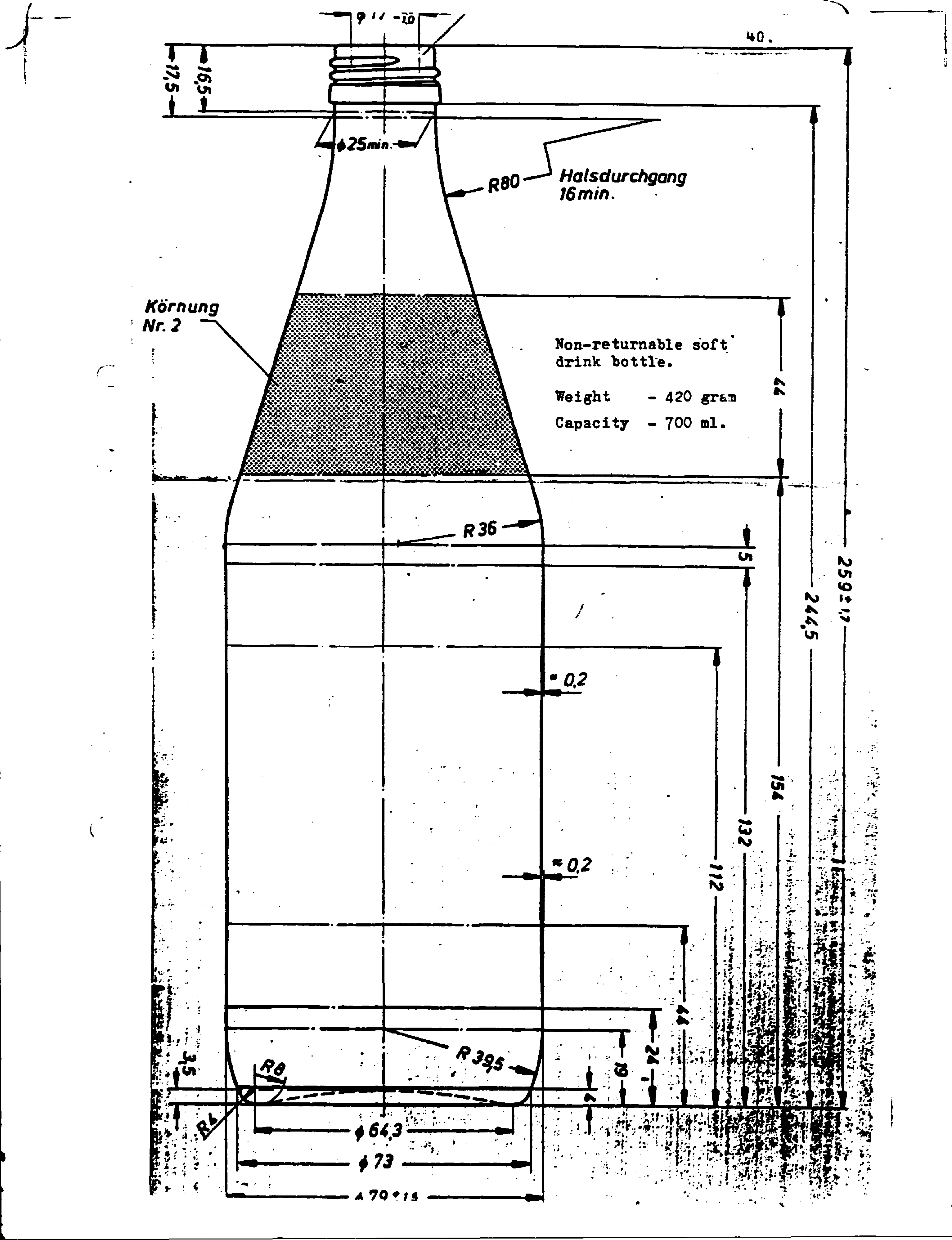
| Year | Returnabel tons | Non-returnable tons | Total tons |
|---|---|---|---|
| 1987 | 3 400 | 5 389 | 8 789 |
| 1988 | 3 400 | 6 268 | 9 668 |
| 1989 | 3 400 | 7 234 | 10 634 |
| 1990 | 3 400 | 8 298 | 11 698 |
| 1991 | 3 400 | 9 468 | 12 868 |
| 1992 | 3 400 | 10 755 | 10 616 |
| 1993 | 3 400 | 12 170 | 15 570 |
| 1994 | 3 400 | 13 727 | 17 127 |
| 1995 | 3 400 | 15 440 | 18 840 |
| 1996 | 3 400 | 17 323 | 20 723 |
| 1997 | 3 400 | 17 323 | 20 723 |
| 1998 | 3 400 | 12 142 | 15 542 |
| 1999 | 3 400 | 17 323 | 20 723 |
| 2000 | 3 400 | 17 323 | 20 723 |
| 2001 | 3 400 | 17 323 | 20 723 |

The market of Oman is not included in these figures.




One-way soft drink bottle

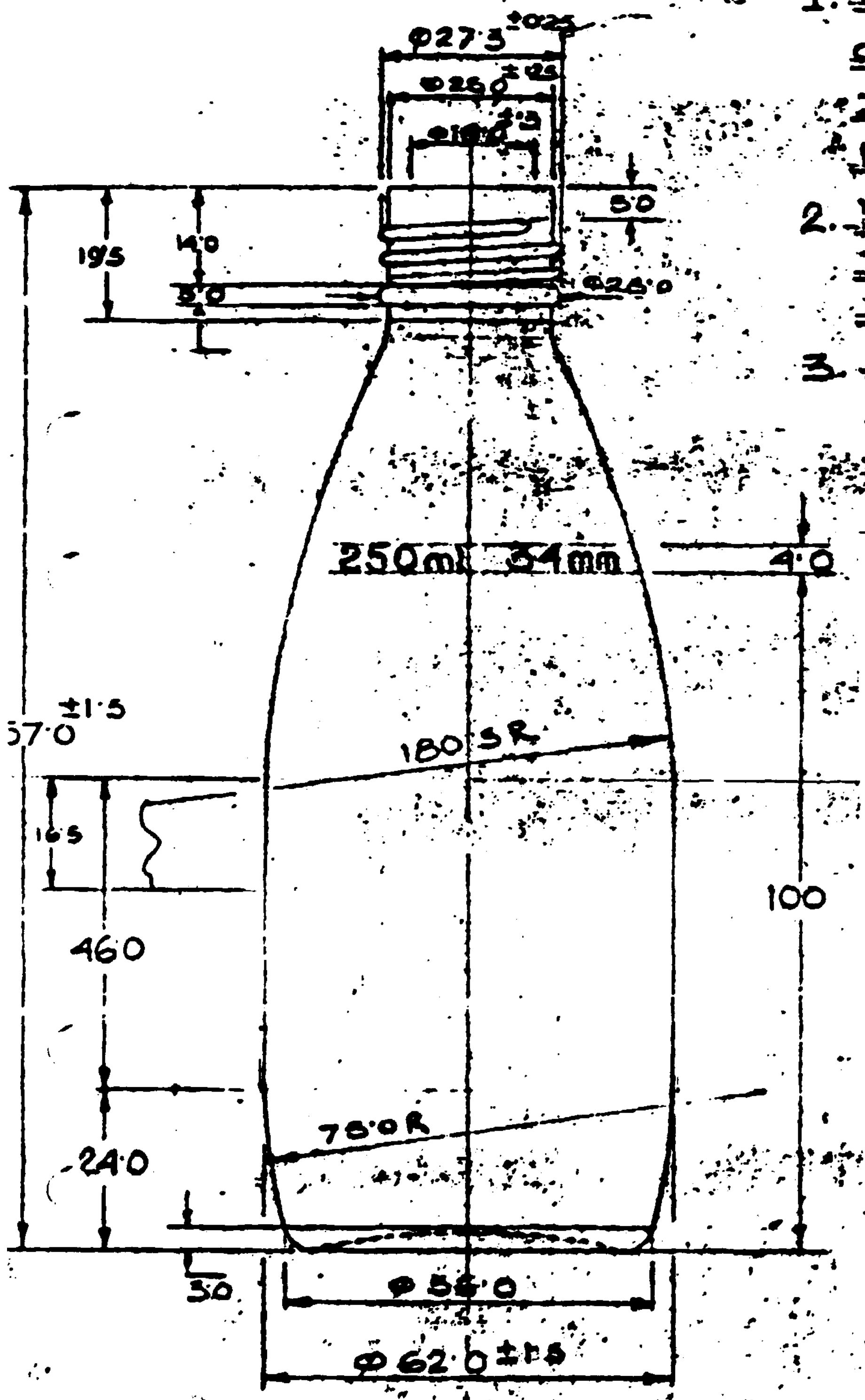
Weight - 163 gram
Capacity - 250 ml.



17,5
16,5
ϕ25 min.
R80
Halsdurchgang
16 min.
Körnung
Nr. 2
Non-returnable soft drink bottle.
Weight - 420 gram
Capacity - 700 ml.
44
R 36
5
259±1,7
244,5
154
132
112
≈ 0,2
≈ 0,2
44
24
19
R 39,5
3,5
R8
R4
4
ϕ 64,3
ϕ 73

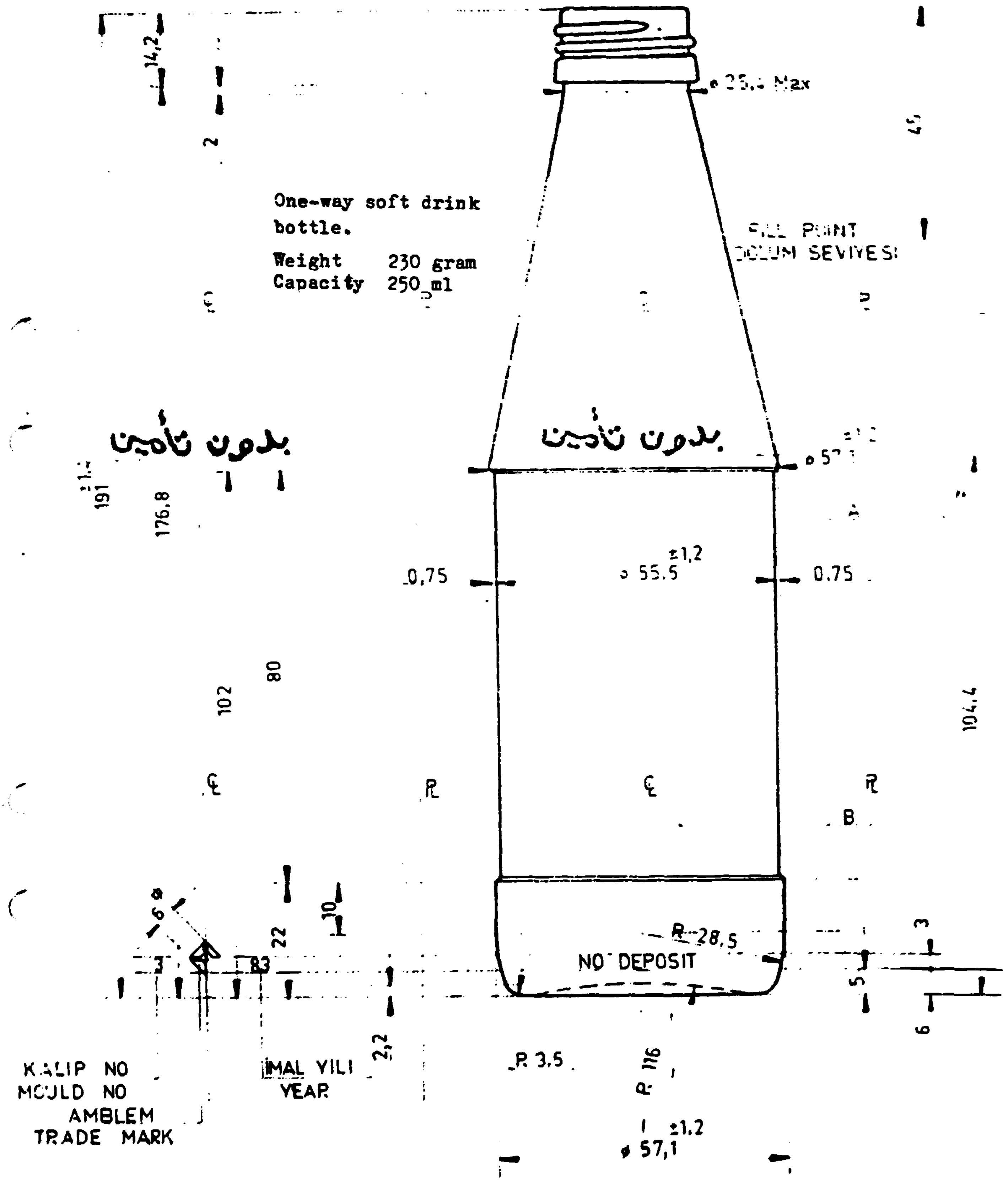
NOTES

1. DIMENSIONS WITHOUT SPE
CIFIED TOLERANCES SUB
JECT TO NORMAL MANU
FACTURING VARIATION
2. FINAL GLASS SIZES ARE
TO BE DETERMIND FROM
ACTUAL GLASS SAMPLES
3. ALL DIMENSIONS ARE
IN M.M. EXCEPT OTHER-
WISE SPECIFIED.




Non-returnable soft drink bottle.

| | |
|---|---|
| Weight | 180 gram |
| Volume | 265 ml. |
| Wall thickness | 3 mm. |


One-way soft drink bottle.
Weight 230 gram
Capacity 250 ml
بدون تأمين
ø 25,4 Max
14,2
2
45
DOLUM SEVIYESI
191
176,8
102
80
104,4
0,75
ø 55,5 ±1,2
0.75
R 28,5
NO DEPOSIT
22
10
3
5
6
2,2
R 3.5
R 116
ø 57,1 ±1.2
KALIP NO
MOULD NO
AMBLEM
TRADE MARK
IMAL YILI
YEAR

## SPECIFICATIONS FOR NO DEPOSIT SOFT DRINK BOTTLES.

| | | |
|---|---|---|
| WEIGHT | | 230 +- 10 G |
| CAPACITY | NET CONTENT | 250 +- 4.5 ML |
| | BRIMFUL(REF) | 265ML |
| IGHT | OVERALL | 191 +- 1.4MM |
| | FILL POINT | 45 (FROM FINISH TOP) |
| DIAMETER: | CONTACT POINT | 57.0+- 1.2MM |
| | BODY DIA | 56.0+- 1.2MM |
| | BEARING SURFACE DI | 46.74MM |
| PUSH UP | | 2.2 OVER |
| DEFORM | (TOTAL READING) | 5 |
| FINISH | | CROWN CORK AND/OR MCA-2 |
| | INSIDE DIA. | 17.0 +- 0.8NN |
| | OUTSIDE DIA | 24.84+-0.33 AND/OR 0.30MM |
| THICKNESS: | SIDEWALL MIN. | 1.2MM |
| | HEEL MIN. | 1.7MM |
| | BOTTOM THICKNESS | 3.3NN - + 8.0MM |
| STRENGTH | INTERNAL PRESSURE MIN (BY ASTM) | 14 BARS |
| | THERMAL SHOCK RESISTANCE(BY ASTM). | T-44 DEG.C. |
| | ANNEALING GRADE (BY ASTM) TEMBER | 4 OR LESS |
| OLOUR | FLINT WHITE AND DARK GREEN | |
| | Y (BRIGHTNESS) | 70 - 80 P.CENT |
| | D (DOMINANT WAVELENGTH) | 490-510NM |
| | PE (PURITY) | 5 P.C. OR LESS |

BOTTLE MARKINGS: BLOWN LETTERING.

## RETURNABLE AND NON-RETURNABLE BOTTLES

When making a decision wether to use a returnable or a non-returnable bottle, the following considerations may be taken.

### Returnable bottles

Heavy bottles.

More expensive bottles to manufacture.

Permanent ACL labels can be applied.

Bottles must be inspected carefully before entering the filling line.

Must be cleaned and washed thoroughly before being re-filled.

Not so hygienic - usually not used for pharmaceuticals and some food products.

Can be re-used up to 50 times (usually 10-30 times).

Cheap packaging material.

Most bottles are returned to the shop since a deposit has been payed for them.

### Non-returnable bottles

Light glass container.

Can be manufactured at high speed and are therefore relatively cheap.

A hygienic container - usually not necessary to wash if before filling, but only to clean it by compressed air.

Pharmaceutical bottles can be kept in an aseptic condition from the glass plant to the filling line.

Easy to handle on the filling lines (partly due to a surface coating).

Plastic label coating can be applied (protects the surface).

More expensive than a returnable bottle for the consumer.

Since no deposit is paid, the bottles may be left where ever the drink is consumed.

The bottles should be recycled and re-used by the glass factories.

## III.2 The sales price

It may at present be considered, that only white flint glass will be produced in the furnace. There will be no difficulty, however, to make a coloured glass in the furnace should this be decided at a later stage.

The prices for flint glass mentioned in the market study were $ 332-373 per ton for returnable bottles and $ 392-445 per ton for non-returnable bottles.

When checking prices early 1984 there are indications of a general increase. In this study, however, the prices used will be the average prices as presented in the market study.

The average prices to be used are as follows:

Returnable bottles: $ 352.50=Dhs 1304 per ton

Non-returnable bottles: $ 418.5=Dhs 1548 per ton

The cost of distribution of the bottles is Dhs 20 per ton for the local UAE market and Dhs 65 per ton for the export market (Bahrain and Qatar).

It is assumed that there is no export during the first production year. The export in the second and third years is 5 %. The export during the following two years is then 7.5 % and thereafter it is assumed to be 10 % of the total sales.

The total quantity of bottles produced and sold during the first fifteen years of operation is shown in the table 3-1 to 3-3.

### Number of working days

It is assumed, that the plant will be in operation all days of the year. The actual production, however, may have to be stopped for the following reasons:

| | Production days |
|---|---|
| General maintenance and power failure, 10 % of the working days | 329 |
| Change of refactories, 2 % | 322 |
| Change of moulds, 14 times à 12 hours per machine | 315 |

It can therefore be estimated, that there will be 315 full production days per year.

The total production in tons of bottles per year is shown in schedule 3-3. The furnace has to be re-built during the 5th and 12th years of operation.

In year number 5 the production is 15 594 tons. Out of this 12868 tons are of an acceptable quality and can be sold.

When the furnace is re-built in year 6, it is increased in size and the melting capacity is therefore increased. It can then produce approximately 24 100 tons of glass per year.

The rejection of glass bottles in the first year is as high as 28 % and then gradually decreases to 14 % after ten years. These are average figures for new glass plants. Very few glass plants have a rejection of bottles less than 10 %.

Schedule 3-1 Estimate of Sales revenue

A Returnable bottles

| Year | Unit Price | Quantity sold (tons) | | | Dhs '000 Sales revenue | | |
|---|---|---|---|---|---|---|---|
| | Dhs/ton | Export | Local | Total | Export | Local | Total |
| 1 | 1304 | - | 3400 | 3400 | - | 4434 | 4434 |
| 2 | 1304 | 170 | 3230 | 3400 | 222 | 4212 | 4434 |
| 3 | 1304 | 170 | 3230 | 3400 | 222 | 4212 | 4434 |
| 4 | 1304 | 255 | 3145 | 3400 | 333 | 4101 | 4434 |
| 5 | 1304 | 255 | 3145 | 3400 | 333 | 4101 | 4434 |
| 6 | 1304 | 255 | 2295 | 2550 | 333 | 2993 | 3326 |
| 7 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 8 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 9 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 10 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 11 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 12 | 1304 | 340 | 2210 | 2550 | 443 | 2882 | 3325 |
| 13 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 14 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 15 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| | | B Non-returnable bottles | | | | | |
| 1 | 1548 | - | 5389 | 5389 | - | 8342 | 8342 |
| 2 | 1548 | 313 | 5955 | 6268 | 485 | 9218 | 9703 |
| 3 | 1548 | 362 | 6872 | 7234 | 560 | 10638 | 11198 |
| 4 | 1548 | 622 | 7676 | 8298 | 963 | 11882 | 12845 |
| 5 | 1548 | 710 | 8758 | 9468 | 1099 | 13557 | 14656 |
| 6 | 1548 | 807 | 7259 | 8066 | 1249 | 11237 | 12486 |
| 7 | 1548 | 1217 | 10953 | 12170 | 1884 | 16955 | 18839 |
| 8 | 1548 | 1373 | 12354 | 13727 | 2125 | 19124 | 21249 |
| 9 | 1548 | 1544 | 13896 | 15440 | 2390 | 21511 | 23901 |
| 10 | 1548 | 1732 | 15591 | 17323 | 2681 | 24135 | 26816 |
| 11 | 1548 | 1732 | 15591 | 17323 | 2681 | 24135 | 26816 |
| 12 | 1548 | 1300 | 11694 | 12994 | 2012 | 18102 | 20114 |
| 13 | 1548 | 1732 | 15591 | 17323 | 2681 | 24135 | 26816 |
| 14 | 1548 | 1732 | 15591 | 17323 | 2681 | 24135 | 26816 |
| 15 | 1548 | 1732 | 15591 | 17323 | 2681 | 24135 | 26816 |

Schedule 3-1 (continued) C Total bottles (Dhs 1000)

| Year | Export | Local | Total |
|---|---|---|---|
| 1 | - | 12776 | 12776 |
| 2 | 707 | 13430 | 14137 |
| 3 | 782 | 14850 | 15632 |
| 4 | 1296 | 15983 | 17279 |
| 5 | 1432 | 17658 | 19090 |
| 6 | 1582 | 14230 | 15812 |
| 7 | 2327 | 20945 | 23272 |
| 8 | 2568 | 23114 | 25682 |
| 9 | 2833 | 25501 | 28334 |
| 10 | 3124 | 28125 | 31249 |
| 11 | 3124 | 28125 | 31249 |
| 12 | 2455 | 20984 | 23439 |
| 13 | 3124 | 28125 | 31249 |
| 14 | 3124 | 28125 | 31249 |
| 15 | 3124 | 28125 | 31249 |

Schedule 3-2 Estimate of production costs

Sales and distribution costs

| | Foreign currency | Local currency | Total |
|---|---|---|---|
| 1. Sales costs (Dhs 1000 per year) | | | |
| Training of sales men and merchants | 5 | 15 | 20 |
| Advertising | 10 | 10 | 20 |
| Travel expenses | 15 | 5 | 20 |
| After sales service communications | 10 | 5 | 15 |
| Sub-total | 40 | 35 | 75 |
| 2. Distribution costs (Dhs per ton of glass) | | | |
| a) Shrink palletizing | | | |
| Wooden pallets | | 74.49 | 74.49 |
| Shrink foil | 7.74 | | 7.74 |
| Cardboard | | 31.29 | 31.29 |
| Sub-total | 7.74 | 105.78 | 113.52 |
| b) Freight (Dhs per ton glass) | | | |
| For local market | | 20 | |
| For export market | | 65 | |

Schedule 3-3 Production programme

Returnable bottles

| Year | 100 % acceptance tons | Acceptance %-age | Saleable bottles, tons |
|---|---|---|---|
| 1 | 4722 | 72 | 3400 |
| 2 | 4474 | 76 | 3400 |
| 3 | 4304 | 79 | 3400 |
| 4 | 4146 | 82 | 3400 |
| 5 | 4048 | 84 | 3400 |
| 6 | 3036 | 84 | 2550 |
| 7 | 4048 | 84 | 3400 |
| 8 | 4000 | 85 | 3400 |
| 9 | 4000 | 85 | 3400 |
| 10 | 4000 | 85 | 3400 |
| 11 | 3953 | 86 | 3400 |
| 12 | 3000 | 85 | 2550 |
| 13 | 3953 | 86 | 3400 |
| 14 | 3953 | 86 | 3400 |
| 15 | 3953 | 86 | 3400 |

Non-returnable bottles

| | | | |
|---|---|---|---|
| 1 | 7485 | 72 | 5389 |
| 2 | 8357 | 75 | 6268 |
| 3 | 9274 | 78 | 7234 |
| 4 | 10373 | 80 | 8298 |
| 5 | 11546 | 82 | 9468 |
| 6 | 9837 | 82 | 8066 |
| 7 | 14663 | 83 | 12170 |
| 8 | 16342 | 84 | 13727 |
| 9 | 18165 | 85 | 15440 |
| 10 | 20143 | 86 | 17323 |
| 11 | 20143 | 86 | 17323 |
| 12 | 15287 | 85 | 12994 |
| 13 | 20143 | 86 | 17323 |
| 14 | 20143 | 86 | 17323 |
| 15 | 20143 | 86 | 17323 |

Schedule 3-3 Total quantity of bottles
(continued)

| Year | 100 % acceptance tons | Saleable bottles, tons |
|---|---|---|
| 1 | 12207 | 8789 |
| 2 | 12831 | 9668 |
| 3 | 13578 | 10634 |
| 4 | 14519 | 11698 |
| 5 | 15594 | 12686 |
| 6 | 12873 | 10616 |
| 7 | 18711 | 15570 |
| 8 | 20342 | 17127 |
| 9 | 22165 | 18840 |
| 10 | 24143 | 20723 |
| 11 | 24096 | 20723 |
| 12 | 18287 | 15544 |
| 13 | 24096 | 20723 |
| 14 | 24096 | 20723 |
| 15 | 24096 | 20723 |

Schedule 3-4 Estimate of production cost

Emissions disposal

| | Local Dhs |
|---|---|
| Disposal in sewage system Dhs 800/month | 9600 |

The final comment and recommendations by the GOIC market team were the following:

" Unless the non-returnable glass bottle market becomes an important long term feature of the local soft drink market the potential for a new bottle plant would be extremly limited.

Recommendations

1. Because of the considerable uncertainty in the position of the non-returnable glass bottle the whole market situation should be carefully monitored for at least the next months and probably a year before any decision is made on the proposed project.

2. Contact with the Kuwait glass company may be valuable in terms of technical and commercial experience.

3. Contact with possible technology suppliers and joint venture partners may also be valuable.

4. The position regarding proposed plants in Oman and Sharjah should be clarified. There may be prospects of joint ventures in both these situations."

The GOIC market report was delivered in December 1983. Since then some decisions have been taken regarding a glass container plant in Oman. This is shown in a letter of 15th May 1984 from Mr Patrick Davies, UNIDO adviser in market research to the Feasibility Section (see appendix XI.3)

Very shortly it is mentioned in the letter, that a preliminary licence has been granted to a group for establishing a glass container plant. The two major soft drink companies will be share holders. The plant is expected to produce 10 000 tons of packed weight of bottles initially. Suitable raw materials appear to be available in Oman.

The market in Oman is not included in the expected export market for the Fujairah glass plant. A new glass plant in Oman may, however, increase the competition in other Gulf countries like Qatar and Bahrain.

## IV MATERIALS AND INPUTS

### IV.1 Raw materials

The following raw materials are used for the manufacturing of container glass:

Silica sand

Limestone and/or dolomite

Soda ash

Feldspar or some other mineral containing aluminium oxide

Colourizing and decolourizing agents

Geoconsult Comp. have carried out geological surveys in Fujairah and they have identified minerals, which after Benefic can be used as raw materials for the introduction of silica, calcium oxide and aluminium oxide. These minerals are siliceous rock, limestone and pegmatite.

Geoconsult have described the deposit of the siliceous rock in the following way:

Wadi Mualla Silica Deposit

From the report of Geoconsult:

Location: "This deposit is lying 7 km SW of Tawiyyan village, in Wadi Musalla, 200 m North of the track linking the shale quarry (for Fujairah Ceramic Factory) to the asphalt road Man ma-Ras al-Khaimah.

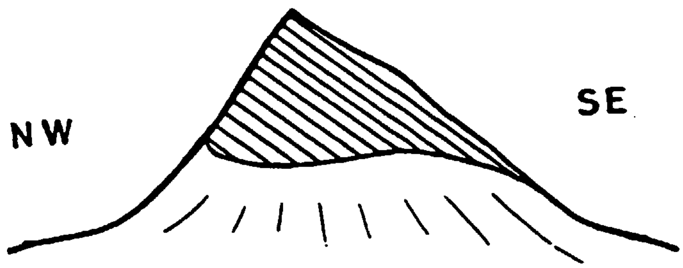
The distance from the deposit to the asphalt road is 4,5 km. Coordinate: 401 900 E/ 2822 500 N.

( ology: The studied formation is part of a geological unit consisting of shales, marls, cherts and platy limestones intensively folded. The studied formation consist of partly to completely silicified limestones and cherts, thin to medium bedded (0.1-1m) with some intercalations of thin layer of marls in the bottom part of the formation. This formation is a minimum of 10 to 12 meters thick.

These silicified limestones have a whitish grey to brown coloured patina: cherts have a white to greyish colour and are translucent and silicified limestones are deep white coloured.

Chemically, mainly 2 components occur: It is silica (quartz or chalcedony) and calcite, but their proportion can vary from layer to layer. Moreover there is sometimes important lateral varations in the composition of the layer: lenses of limestone of variating shape and volume are irregularly distributed within cherts. Cherts layers also contains veins of calcite (few mm. thickness) without regular orientation and distribution, in a volume proportion of 5 - 15 %.

Structure: The deposit occur mainly as a dip slope forming 2 ridges oriented E-NE and dipping 30° - 60° to S-SE. This meaning that a natural cross section occur on the N-NW side of the ridges.




. In the eastern zone, part of the deposit (see map) shows compicated folding and faults, with axes directions variating and sub paralell to the topography.

Reserves: This deposit is topographically separated into 2 main zones: The eastern one and the western one. At the South, a small outcrop of silicified limestone occurs. The structure is very irregular and quantities are so small, that it has not been included in reserves.

Minimum reserves for:

- Eastern zone: 150m x 50m x 10m = 75000m$^3$
  with 2.5 density = 187000 tons

- Western zone: surface 3500m$^2$ with a thickness of
  10m - 35000m$^3$:
  density 2.5 - 87000 tons

- Extension of the deposit:

  1. The western zone is extending in the direction of the west and is there partly covered with platy limestone having a maximum thickness of 6 - 10m.

  2. Silica formation occur also 150m north of the studied deposit with at least 30,00 tons.

Proposed sampling method:

- Surface sampling: To be representative and to eliminate weathering effect, samples have to be taken at minimum depth of 1/2 - 1 meter. Samples have to be taken across the whole thickness of the deposit.

Consequently surface representative sampling can be done only in the north western part of the deposit, by making a groove cut across the complete outcropping layers and by taking composite samples. In these type of rocks, groove cut can be done only by blasting.
A minimum of 8 sampling points are necessary.

Price for preparation of 8 sampling points with 2 hand drilling machines is estimated to be 50000 Dirhams; this including all drilling and blasting operations.

Knowing the structure of the deposit, core drilling is the economical method to get representative samples in the central and in the S-SE part of the deposit.

The analysis of sand from this deposit is shown in table IV:1, Geoconsult."

# Wadi Musalla Silica deposit

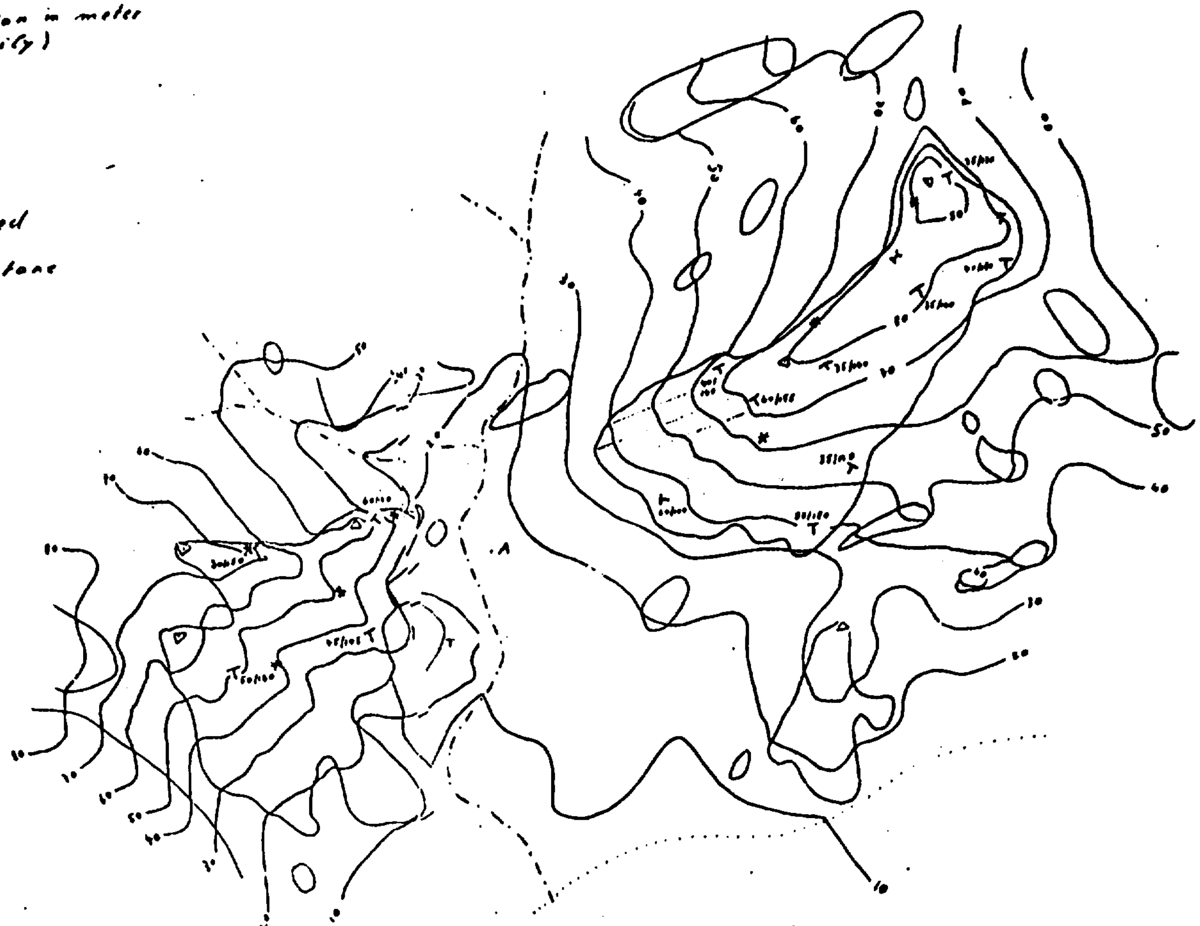
Schematic geological map

Scale 1:1500 0 ___ 50 m

**Legend.**

- — 60 — contour line with elevation in meter (level 0 choosen arbitrarily)
- top
- wadi
- "silica" formation
- zone intensively folded
- cheet, shale and limestone
- scree
- wadi Musalla bed
- 35/50 dip
- proposed sampling point

North




GEOCONSULT

Coordinate of point A
401 400 E / 1911 500

**Table IV:1**

Geoconsult

Silica rock

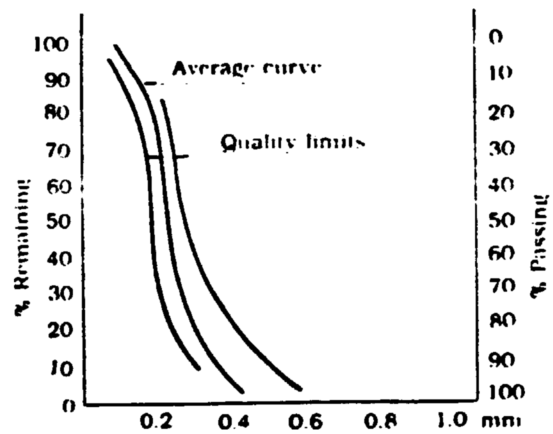
| No. | Q-1 | Q-2 | Q-3 | Q-4 | Q-5 | Q-21 | | |
|---|---|---|---|---|---|---|---|---|
| Loi | 4.78 | 6.62 | 5.13 | 4.85 | 5.05 | 2.13 | | |
| Na2O | 0.00 | 0.00 | 0.03 | 0.02 | 0.02 | 0.00 | | |
| MgO | 0.03 | 0.07 | 0.06 | 0.14 | 0.07 | 0.07 | | |
| Al2O3 | 0.08 | 0.13 | 0.11 | 0.09 | 0.19 | 0.18 | | |
| SiO2 | 89.0 | 84.5 | 88.1 | 88.6 | 88.3 | 95.1 | | |
| P2O5 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 | | |
| SO3 | 0.02 | 0.03 | 0.03 | 0.02 | 0.03 | 0.02 | | |
| K2O | 0.00 | 0.02 | 0.02 | 0.00 | 0.02 | 0.02 | | |
| CaO | 5.86 | 8.21 | 6.31 | 5.97 | 6.24 | 2.40 | | |
| TiO2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Cr2O3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| MnO | 0.02 | 0.02 | 0.02 | 0.04 | 0.01 | 0.00 | | |
| Fe2O3 | 0.19 | 0.08 | 0.11 | 0.06 | 0.10 | 0.03 | | |
| ZnO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| As2O3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| SrO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| BaO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |

Silica sand prepared from the siliceous rocks may be suitable as a glass raw material. It must, however, pass through a benificiation process including a removal of part of the iron oxide. It may also be advisable to prepare 10 000 tons of silica sand at a time and deliver to the glass factory. This quantity of sand should be well mixed by the sand processing plant.

The sand delivered to the glass plant will then have a homogeneous composition and the sand will be sufficient for about one year of glass production.

A good quality sand for colourless glass containers may have the following composition:

| | |
|---|---|
| $SiO_2$ | 99.1 |
| $Al_2O_3$ | 0.2 |
| $Fe_2O_3$ | 0.05 |
| $CaO$ | 0.3 |
| $MgO$ | 0.3 |
| Loss on ignition | 0.2 |




*Grain size distribution for sand*

## Limestone

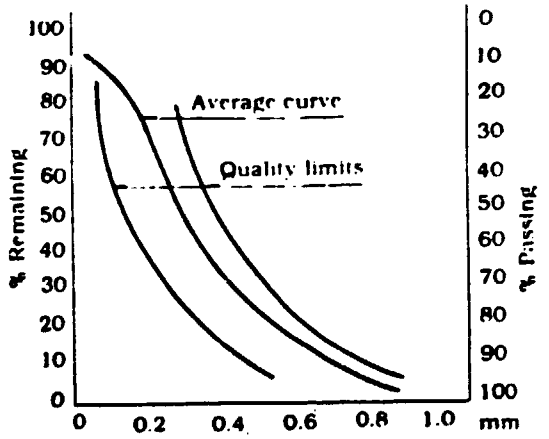
Limestone, $CaCO_3$, is added to the batch in order to introduce calcium oxide, CaO, into the glass. A suitable limestone will contain 54-56 % CaO. Many limestones are of dolomite type and contain therefore some magnesium carbonate, $MgCO_3$.

The iron content in limestone used for container glass should not exceed 0.1 % $Fe_2O_3$.

Two limestones found in Fujairah have the following composition:

| | Limestone 1. | Limestone 2. (used for cement) |
|---|---|---|
| $SiO_2$ | 0.93 | 2.83 |
| $Al_2O_3$ | 0.46 | 3.83 |
| $Fe_2O_3$ | 0.14 | 0.34 |
| MgO | 0.47 | 0.01 |
| CaO | 54.37 | 54.00 |
| $K_2O$ | 0.06 | 0.19 |
| $TiO_2$ | 0.01 | |
| $P_2O_5$ | 0.22 | |
| $Na_2O$ | 0.05 | |
| $SO_3$ | 0.13 | 0.05 |
| Loss on ignition | 43 | 38 |

Both these limestones taken directly from the deposit contain too much iron oxide. After a suitable benificiation these limestones can be acceptable for glass manufacturiing.




*Grain size distribution for limestone and dolomite.*

Dolomite is also available in Fujairah and to some extent this can be used as an alternative to limestone.

Pegmatite

Alumina, $Al_2O_3$, is a very important glass component. One way of adding it to glass is to use pegmatite. A pegmatite available in Fujairah has the following composition:

| | |
|---|---|
| $SiO_2$ | 76.1 |
| $Al_2O_3$ | 13.3 |
| $TiO_2$ | 0.03 |
| $Fe_2O_3$ | 0.27 |
| CaO | 1.08 |
| MgO | 0.36 |
| $Na_2O$ | 3.34 |
| $K_2O$ | 4.54 |
| $P_2O_5$ | 0.01 |
| $SO_3$ | 0.03 |
| MnO | 0.03 |
| BaO | 0.13 |
| L.O.I. | 0.76 |

This pegmatite can be used as a glass raw material, but its content of iron oxide should be decreased to 0.1 %.

Other raw materials

All other raw materials must be imported. Necessary raw materials are soda ash (dense quality), sodium sulphate, sodium nitrate, selenium and cobalt oxide. It may also be an advantage to use arsenic oxide in the glass for decolourization.

Cullet, crushed glass, is always added as a raw material. Normally 20-30 % of the batch is added as cullet. After having introduced recycling of glass in many countries nowadays, the proportion of cullet in the batch is often 40 % or more.

By adding cullet to the batch the cost of raw materials will decrease and the glass will be easier to melt, thereby decreasing the quantity of fuel.

2 Utilities

For the heating of the furnace a fuel oil or LPG gas can be used. None of them are available in Fujairah, but can easily be bought from other emirates of U.A.E.

Shrinkable ethylene foil for packaging of the bottles and lubricants for the machines must be imported.

Electricity (12 kV supply and distribution board) 380/220 V.

Water

All utilities are available at the site or can easily be arranged to be available.

## 3 Cost of local raw materials

The estimates of the costs for raw materials and utilities are shown on schedules IV:3:1 - IV:3:3.

The cost for processing and beneficiation of the silica sand, limestone and pegmatite has been calculated by Geoconsult in the following way:

| | |
|---|---|
| Drilling - blasting | 20 Dhs/ton |
| Transport to crusher | 10 |
| Crushing cost | 10 |

Investment for milling

US $ 78160.-

Depreciation $\frac{78160 \times 10}{100} = 7816$

= 28607 Dhs/year

| | |
|---|---|
| $\frac{28607}{10000} = 2.86$ Dhs/ton | 3 |
| Operation cost | 5 |

Investment for magnetic separation unit

$ 40000.-

Depreciation $\frac{40000 \times 10}{100} = 4000$

= 14640 Dhs/year

| | |
|---|---|
| $\frac{14640}{10000} = 1.46$ Dhs/ton | 2 |
| Operation cost | 3 |
| Total cost | 53 Dhs/ton |

In the feasability calculations a price of 60 Dhs/ton has been used for silica sand, limestone and pegmatite.

## IV: 3:1 Estimate of production costs

### Materials and inputs

| Raw materials | Unit cost | Foreign | Local | Total |
|---|---|---|---|---|
| | | | Dirhams/ton glass | |
| Sand, 499 kg | 60/ton | | 29.94 | 29.94 |
| Limestone, 100 kg | 60/ton | | 6.00 | 6.00 |
| Pegmatite, 101 kg | 60/ton | | 6.06 | 6.06 |
| Soda ash, 157 kg | 580/ton | 91.06 | | 91.06 |
| Sodium sulphate, 4 kg | 290/ton | 1.16 | | 1.16 |
| Sodium nitrate, 2 kg | 925/ton | 1.85 | | 1.85 |
| Selenium, 4 g | 110/kg | 0.44 | | 0.44 |
| Cobalt oxide, 1 g | 30/kg | 0.03 | | 0.03 |
| Arsenic, 50 g | 3.50/kg | 0.18 | | 0.18 |
| Glass cullet, 250 kg | --- | | | |
| Sub-total per ton of glass | | 94.72 | 42.00 | 136.72 |
| **Utilities** | | | | |
| LPG gas $2.15 \times 10^6$ kcal per ton=79 $m^3$ | 3.42 | | 270 | 270 |
| Electricity 800 kWhr | 0.075 | | 60 | 60.0 |
| Water 2.5 $m^3$ | 3.30 | | 8.25 | 8.25 |
| Subtotal per ton of glass | | | 338.25 | 338.25 |
| Materials and utilities per ton of glass | | 94.72 | 380.25 | 474.97 |

## IV: 3:2 Estimate of production cost (Dhs 1000)

| | Foreign currency | Local currency | Total |
|---|---|---|---|
| Lubricants, sundry, etc | 330 | | 330 |
| Moulds, 5 sets per year | 215 | | 215 |
| Spare parts of approx. 4 % of initial fixed investment cost | 1700 | | 1700 |
| Repair cost at approx. 2 % of initial fixed investment cost | | 850 | 850 |
| Total per year | 2245 | 850 | 3095 |

IV: 3:3 Summary sheet - Production cost

Production year No. 5 taken as basic year

12 868 tons saleable glass

15 594 tons glass produced

| | Dhs '000 | | |
|---|---|---|---|
| | Foreign currency | Local currency | Total |
| Raw materials | 1477.06 | 654.95 | 2132.01 |
| Utilities | | 5274.67 | 5274.67 |
| Lubricants | 330 | | 330 |
| Moulds | 215 | | 215 |
| Spare parts | 1700 | | 1700 |
| Repair cost | | 850 | 850 |
| Total | 3722.06 | 6779.62 | 10501.68 |
| Packaging ma terials. | | | |
| Wooden pallets | | 960 | 960 |
| Card board | | 403 | 403 |
| Shrinkable foil | 100 | | 100 |
| Total packaging material | | | 1463 |

Pallets can be used as an average 5 times, if they are returned continuously to the glass factory. Once this system is in force, the cost of packaging material can be reduced from 1463 to 695 Dhs 1000. This is thus a saving of Dhs 768 000 per full production year or Dhs 59.70 per ton of glass bottles.

Using cartons with divisions would cost about Dhs 350 per ton glass or 4504 Dhs 1000 in year 5.

Imported raw materials

It is assumed in the basic study that silica sand, limestone and pegmatite will besupplied from local sources.

Originally it was assumed by Geoconsult, that some other manufacuring plants would also consume some of the raw materials. The glass factory would only take about 25 % of the processed minerals. These other projects have not yet been implemented.

Should it be decided, that there will be no processing of local raw materials, then silica sand, limestone and pegmatite (or feldspar) must be imported.

The following prices are based on an offer for raw materials from Turkey.

| | Price C&F Fujairah |
|---|---|
| Silica sand | 230 |
| Limestone | 322 |
| Feldspar | 359 |

These prices have been used in an alternative computer study.

Consumption of raw materials during one year

In the 5th year of operation about 15 600 tons of glass bottles will be produced. This will require the following approximate quantities of raw materials:

| Raw material | |
|---|---|
| Silica sand | 7800 tons |
| Limestone | 1600 tons |
| Pegmatite | 1600 tons |
| Soda ash | 2500 tons |
| Sodium sulphate | 65 tons |
| Sodium nitrate | 35 tons |
| Selenium | 65 kg |
| Cobalt oxide | 20 kg |
| Arsenic | 800 kg |
| Glass cullet | 4000 tons |
| | |
| LPG | 1.5 mill. $m^3$ |

# V LOCATION AND SITE

## V.1 General information

The United Arab Emirates, U.A.E., is an independent federation of seven emirates. The U.A.E. was constituted as a sovereign federal state in 1971 comprising seven emirates, namely Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaimah and Fujairah.

The country's economy is depending to a large extent on oil, natural gas and trade and to a lesser degree on agriculture and fishery. Other industries have been developed throughout the country. The industries produce construction materials, chemical and petrochemical products and some food products.

The Emirate of Fujairah has no oil or gas resources. There are, however, some small scale industries and fisheries in the emirate. In addition there are mountains in Fujairah containing siliceous rocks, limestone, dolomite and pegmatites. This type of minerals may be used for the preparation of raw materials for glass melting.

The area of U.A.E. is approximately 80 000 square kilometres. The U.A.E. is mainly a desert with a hot and humid climate.

To the south and west of U.A.E. is Saudi Arabia and to the east the Sultanate of Oman. To the north of U.A.E. is the Arabian Gulf.

The population of U.A.E. according to information from the official tourist office was 1.2 million in 1982. Most of the population, or 80 %, are expatriates.

The area of Fujairah is 1450 square kilometres. It is situated at the eastern part of U.A.E. along the Arabic Gulf. There are many high mountains and narrow valleys in the Emirate and most of the population live along the coast.

## V.2 The site

There is an industrial area in Fujairah approximately six kilometres from the centre of the city. There is a ceramic plant and a rock wool plant in this industrial area. This area is also suitable for a glass plant and it has been decided, that if a glass container plant is started it should be situated there.

The reasons for the selection of this site for a glass plant were:

1. It is a policy to concentrate industrial activities in this area.

2. The infra structure is good.

3. Water, electricity, gas and fuel oil are available of international standards and prices.

4. The glass plant can share some of the existing facilities with the two other plants such as: transoprt equipment (trucks, fork lifts, wheel loaders), gas station, workshop, canteen and housing.

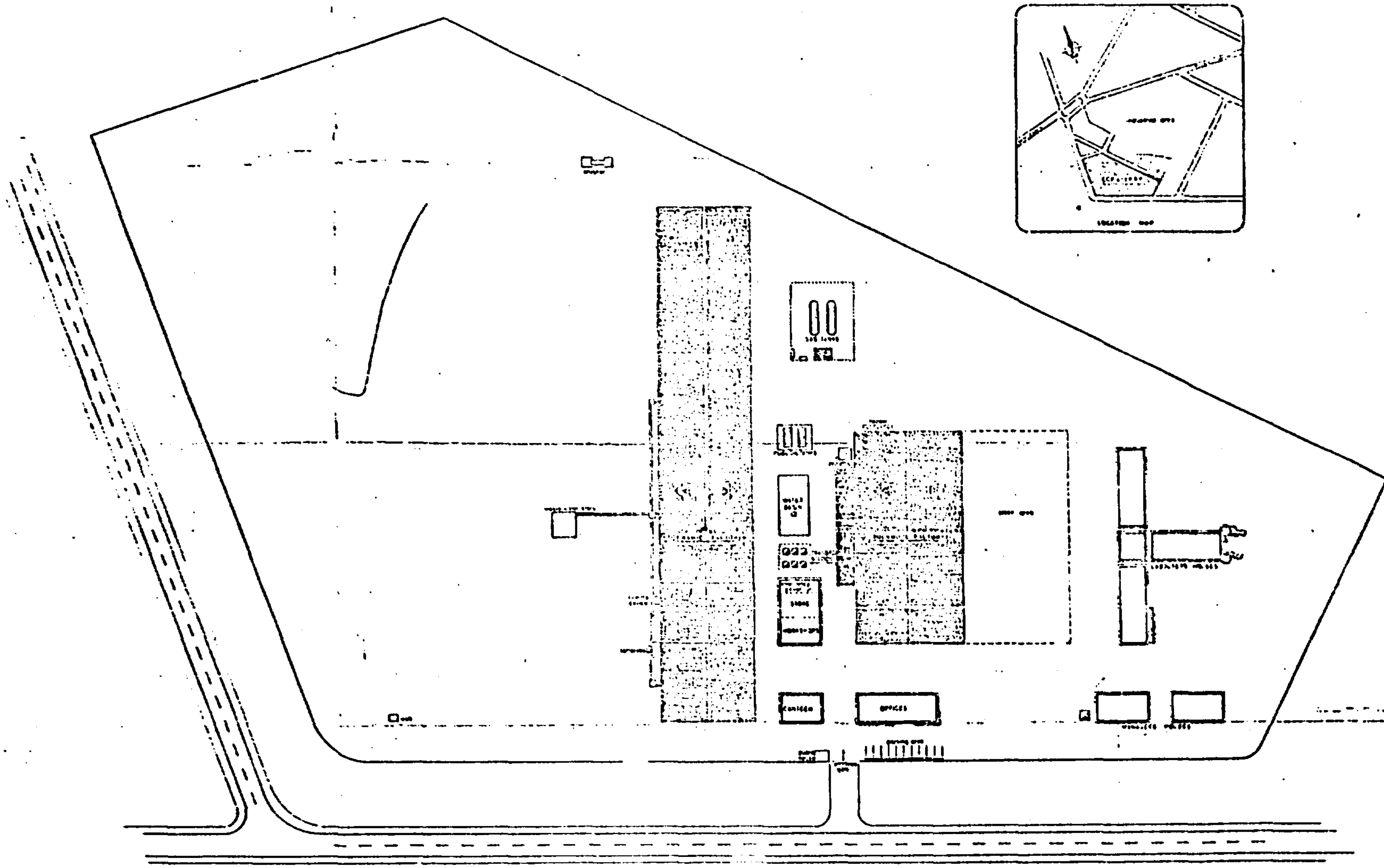
The total land requirement is approximately 40 000 square meters, but it is advisable to secure an additional 20 000 square meters for future expansion.

A good standard dual carriage way passes very close to the industrial area. There is also a harbour in Fujairah with satisfactory port facilities.

Most of the bottling plants in U.A.E. are situated 150-250 kilometers from the industrial area of Fujairah.

## V.3 Cost of land

It has been decided by the representatives of the Emirate of Fujairah, that there will be no cost for the site in the industrial area if a glass plant will be constructed there.



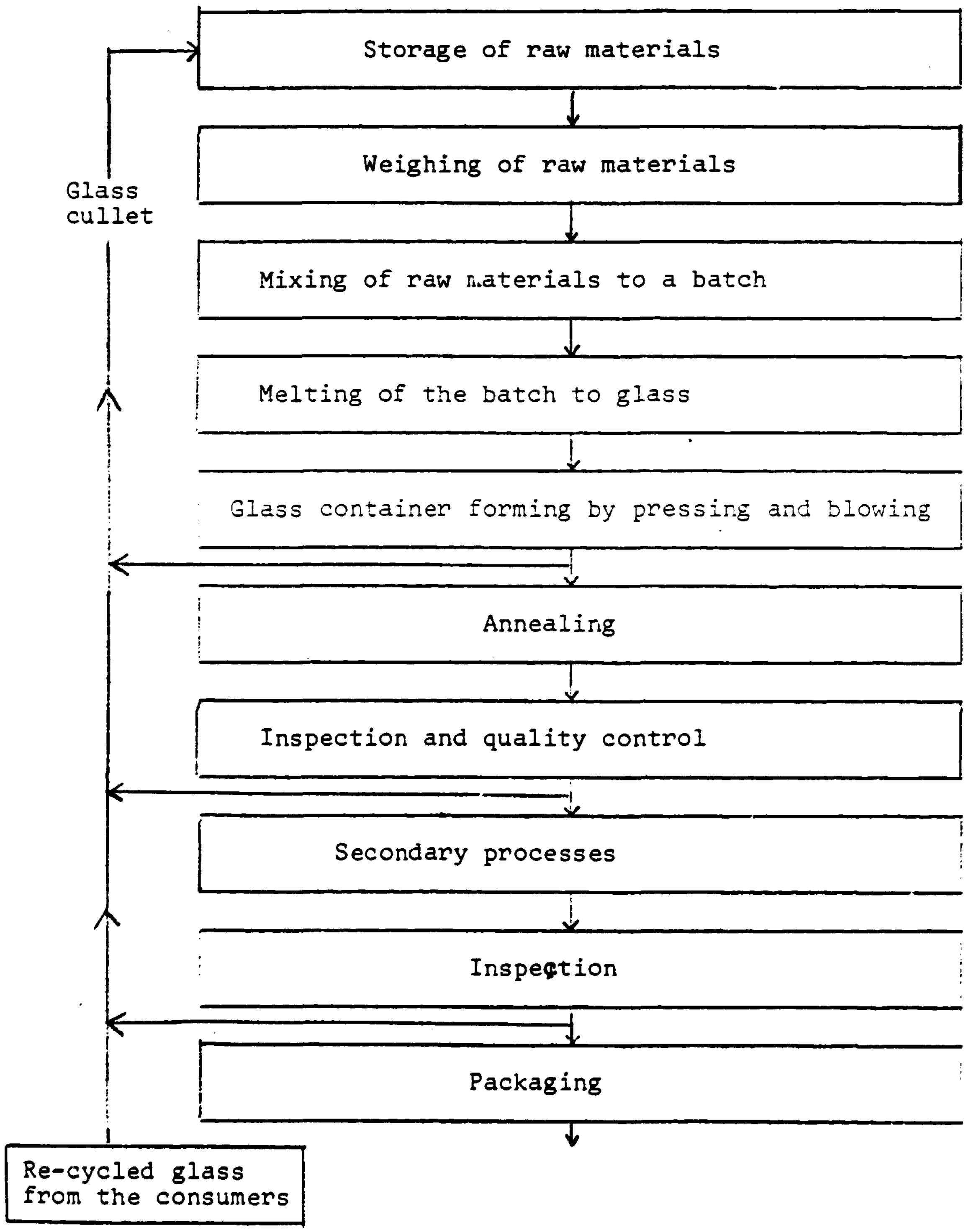

SITE PLAN
EMIRATES CERAMIC FACTORY / FUJAIRAH ROCKWOOL FACTORY
Fujairah, U.A.E.

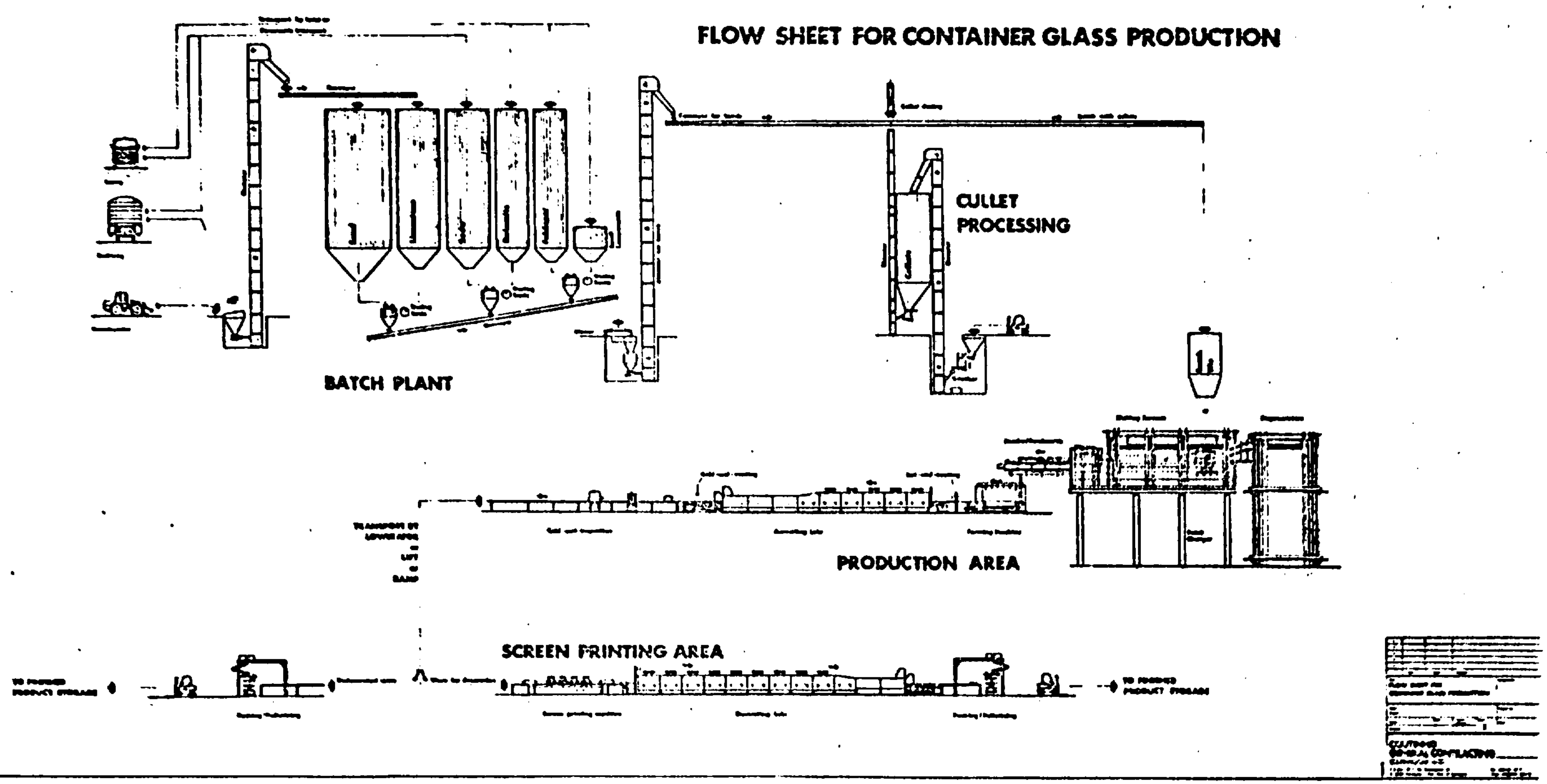
## VI PROJECT ENGINEERING

### VI.1 The glass manufacturing process

The manufacturing of glass containers can be carried out according to different methods and by using different types of equipment and machinery. The following flow chart gives the general principle of the production of glass containers.

It is assumed, that the glass raw materials arrive at the glass plant ready to be used in the glass manufacturing process.




FLOW SHEET FOR CONTAINER GLASS PRODUCTION
CULLET
PROCESSING
BATCH PLANT
PRODUCTION AREA
SCREEN PRINTING AREA

## VI.2 Technology

### 1) General information

Glass containers have been used for the packaging of beverages, food, pharmaceuticals, cosmetics, detergents, chemicals and many other products for a long time. There is a continuous research and development work being carried out in order to make it possible to produce lighter and stronger containers with improved chemical durability. The manufacturing speed of the glass forming machines are continuously being increased and the bottles made have small dimensional tolerances.

Glass containers produced in Fujairah must have a high quality in order to fit into the high speed filling machines used by most bottling plants. The competition is very tough from other glass container producers and from suppliers of other packaging materials.

These basic considerations must be born in mind, when deciding to start a new glass container plant and when selecting technology and equipment.

In principle glass is made of cheap and abundant raw materials. The raw materials must, however, have a specified chemical composition and grain size. Every supply must be checked by the glass plant regarding composition and grain size.

The batch composition used by a glass plant will depend on the composition of the individual raw materials. Using silica sand, limestone and pegmatite as locally available in Fujairah would give a batch having the following composition:

Proposed batch composition

| | |
|---|---|
| Silica sand | 499 kg |
| Limestone | 100 kg |
| Pegmatite | 101 kg |
| Soda ash | 157 kg |
| Sodium sulphate | 4 kg |
| Sodium nitrate | 2 kg |
| Selenium | 4 gram |
| Cobalt oxide | 1 gram |
| Arsenic | 50 gram |
| Glass cullet | 250 kg |

The chemical composition of the glass should be within the following range:

| | |
|---|---|
| $SiO_2$ | 71.5-72.5 |
| $Al_2O_3$ | 1.5-2.0 |
| $Fe_2O_3$ | max 0.06 |
| CaO | 8.5-10.5 |
| MgO | 3.5-1.5 |
| $Na_2O$ | 13.0-14.0 |
| $K_2O$ | 0-1.0 |
| $SO_3$ | 0-0.5 |

None of the three locally available raw materials, however, has a satisfactory quality. They must therefore be treated in a beneficiation process in a seperate plant before they can be used by the glass plant. This may change the batch composition. It may also be an advantage to use some dolomite in the batch. If a satisfactory dolomite is found in Fujairah it could replace some of the limestone. Instead of using arsenic it is also possible to use cerium (250 g) in order to improve the decolourization of the glass.

In a flint container glass the iron oxide content should not be higher than 0.06 % $Fe_2O_3$ otherwise the glass will be too green. The tendency should always be to get the iron into the ferric state. This green colour is more acceptable than the blue colour produced by iron in the ferrcus state. Sodium sulphate and sodium nitrate will help to oxidize the iron oxide.

If there is a tendency for crystallization of the glass in the furnace itis an advantage to replace about 1/3 of the limestone by dolomite.

It is proposed to manufacture colourless flint glass only. Should, however, there be a satisfactory market demand for green glass, the colour of the glass in the furnace can be changed without any problems. The following batch composition can be used:

Batch composition for green glass

| | |
|---|---|
| Silica sand | 499 kg |
| Limestone | 100 kg |
| Pegmatite | 101 kg |
| Soda ash | 157 kg |
| Sodium sulphate | 4 kg |
| Chromium ore | 4.5 kg |
| Iron oxide | 1.5 kg |

Before deciding what batch composition to use it will be necessary to analyse the processed raw materials and to make laboratory melting tests.

Since the composition of the local sand varies from one deposit to another it may be necessary to prepare sand for the consumption of one year (approx. 10 000 tons) and to mix it well before it is shipped to the glass plant.

The raw materials to be used in a batch must be weighed very accurately. The weights must be recorded so that they can be checked afterwards. The weighed materials are then mixed very carefully in special mixing machines in order to obtain a homogeneous batch. The batch is then transported on conveyor belts to a batch silo at the furnace.

The batch is fed into the furnace at a rate equal to the withdrawal of the glass from the furnace. The glass depth in the furnace must be kept at a constant level. This is important from a melting point of view and also in order to get gobs of correct weight being fed to the glass forming machines.

The furnace, a tank furnace, is made of highly refractory blocks. Different types of refracory blocks are used in different parts of the furnace.

In plants where glass containers and other glass products are made by manual processes it is normal to use a pot furnace. The glass is then melted in pots and gathered by hand from there. By manual operation it is not possible to make glass containers suitable for high speed filling and capping machines.

The same is true for a semi-automatic operation when melting the glass in a day tank. In such a tank the glass is melted during the night shift and the blowing of bottles is carried out in the day shifts using semi-automatic machines.

In order to get high quality glass containers there must be a continuous operation of melting the glass in tank furnaces and blowing the bottles in automatic machines.

In the tank furnace the batch is melted at a temperature of 1500-1600°C. This high temperature is necessary in order to refine and homogenize the glass (chemically, physically and thermally) before it is fed as gobs into the moulds of the forming machines.

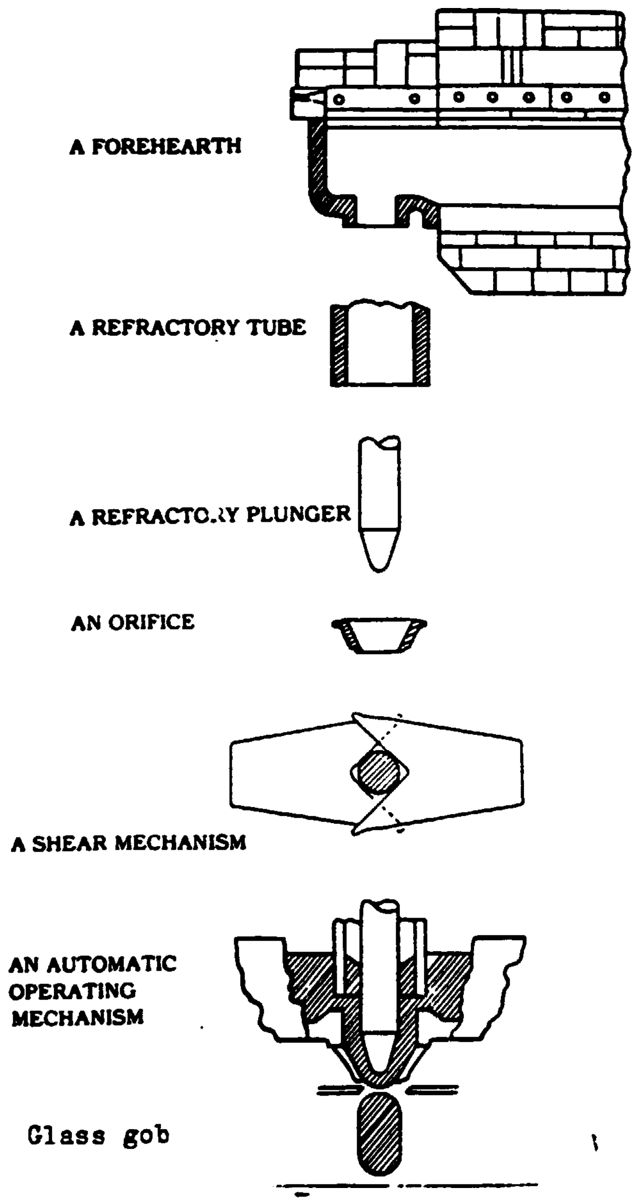
The furnace used must have as high fuel efficiency as possible. The furnace should be well insulated and there should be an efficient way of pre-heating the in-coming fresh air before the combustion. The pre-heating can be arranged in two different ways. The pre-heating of the air can be carried out in a regenerator or in a recuperator.

In the regenerative system there are two regenerators at each furnace. The incoming cold air for the combustion of the fuel passes betwen the hot bricks of one regenerator. The air is thus heated before it meets the fuel and acts in the combustion. The hot gases after the combustion of the fuel pass through the other regenerator and heat the refractory bricks in that one. After 20-30 minutes the directions of the incoming air and of the outgoing hot waste gas are reversed.

The regenerative system is the most common way to pre-heat the the air in tank furnaces. A disadvantage is the heavy and costly regenerators. It is also a disadvantage having to change the direction of the air and the gas every 20 to 30 minutes.

In the recuperative system there is only one recuperator at each furnace. There may be a refractory recuperator or a metal recuperator (usually the most efficient one).

In the recuperator the air and the waste gas flow in channels close to each other. It is a counter current system. There is a continuous combustion in the furnace and a good fuel efficiency can be obtained if the most modern technology is used.




The formation of a glass gob in a feeder.

From "Glass Technology", Cheong Moon Gak Publishing Company, Seoul, Korea

After having been melted, refined and homogenized the glass leaves the furnace and enters temperature controlled channels known as forehearths. At the end of the forehearth there is a feeding device that prepares the gobs of glass, which drop into the moulds of the forming machines.

There are a few different types of glass container forming machines on the market. More than 80 % of the glass containers made by the advanced glass companies are formed in I.S (Individual Section) machines.

A glass gob must have specified and well controlled weight, shape and temperature, when it leaves the feeder. It falls into the first mould, the blank mould, of the I.S machine. It is formed into a parison by blowing and then transferred to the second mould, the blow mould, where it is blown into its final shape.

When the bottle leaves the forming machine it has a temperature of approximately 500°C. It must then be cooled to room temperature under very careful and controlled conditions. This controlled cooling or annealing is necessary in order not to introduce any strain in the bottle.

In order to obtain these controlled cooling conditions the bottles after leaving the forming machine are passed into an annealing lehr. An annealing lehr is a tunnel shaped oven for controlled cooling of glass in order to prevent the products from having permanent strain.

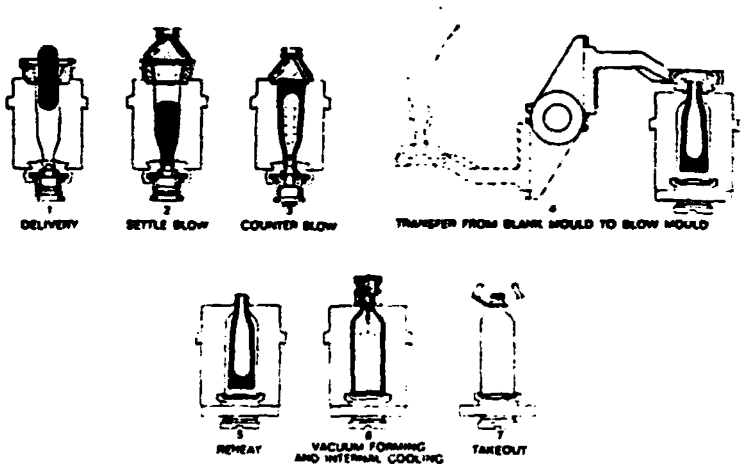
A lehr consists of four zones; a heating zone, an annealing zone, a cooling zone and a packing zone. It normally takes 1.5-2 hours for normal size bottles to pass through the annealing lehr.

At the end of the annealing lehr, the cold end, the bottles are inspected and controlled. Normally at the cold end of the lehr the bottles enter a single liner. Along this single liner of bottles there are various control stations.

At the first station there is a visual inspection. An inspector checks each bottle and rejects all bottles having visible defects. Since, however, normally more than 60 bottles per minut pass the inspector, it is impossible for him to control all the bottles in a satisfactory way. For this reason automatic inspection machines are installed along the single liner.

One inspection machine is called a spindle gauger and it controls the inside and outside diameter of the finish (the neck) of the bottle as well as the height and verticality.

Another inspection machine is the check detector. This will detect checks, cracks and crizzles in the finish, neck, shoulder, body and base of the container.




*The principle of the blow and blow operation of an I.S. machine. The gob of glass is fed to the blank mould of each section by the delivery system. Settle blow air is applied to the top of the blank mould to form the finish. This is followed by counterblow which forms the complete parison in the inverted position. By means of the neck ring and invert mechanisms the invert takes place and the parison is transferred to the blow mould and the empty neck ring returns to the blank mould. The final bottle shape is made in the blow mould using vacuum forming and internal cooling while the next parison is formed in the blank mould.*

The spindle gauger and the checkinspector should always be installed when manufacturing glass containers for beverages and food and when the containers will pass through high speed filling machines.

The inspection machined will automatically reject glass containers, that are not up to the required standard regarding the different defects.

There are many more types of automatic inspection machines available on the market but they are not absolutely necessary for the smaller glass container plants. It is important, however, that the quality control laboratory checks the bottles for all possible defects.

A control should be carried out regarding the following items:

Visual defects

Grade of annealing

Weight

Volume or capacity

Dimensions

Colour

Density

Glass homogeneity

Seeds, blisters, stones, cracks, checks

Hydrostatic pressure

Thermal shock

Vertical load

Impact test

Wall thickness

After having been controlled carefully and tested in accordance with standard specifications the accepted high quality glass containers are packed or transferred for further processing, such as labelling.

The most common way of applying a colour label to a glass container is by screen printing. These labels are called ACL (Applied Ceramic Labels). Fast working machines(up to 125 containers per minute) can apply ACL labels on glass containers in one, two or three colours. The glass containers are then heated in a decorating lehr (similar to an annealing lehr) to about 600°C.

At this temperature the ceramic label is melted on the glass surface and permanently attached to it. The containers are then carefully cooled (annealed) to room temperature.

Normally ACL labels are applied on returnable bottles only. There is now an incresing tendency to use a pre-printed PVC foil as a label on non-returnable bottles. The plastic label foil is applied round the bottle by a special applicator and the bottles with the foil are heated in order to shrink the foil round the bottle. In addition to being a label the foil will protect the surface of the bottle from scratches and thus make the bottle stronger.

Another way of decreasing the abrasion of the surface of the glass containers is to apply a coating on the surface. Coatings are applied at the hot and the cold ends of the annealing lehr.

At the hot end a thin transparent layer of tin oxide or titanium oxide is applied on the outside surface of the containers. At the cold end a thin organic layer of polyethylene, glycole or stearate is applied on the surface of the bottles.

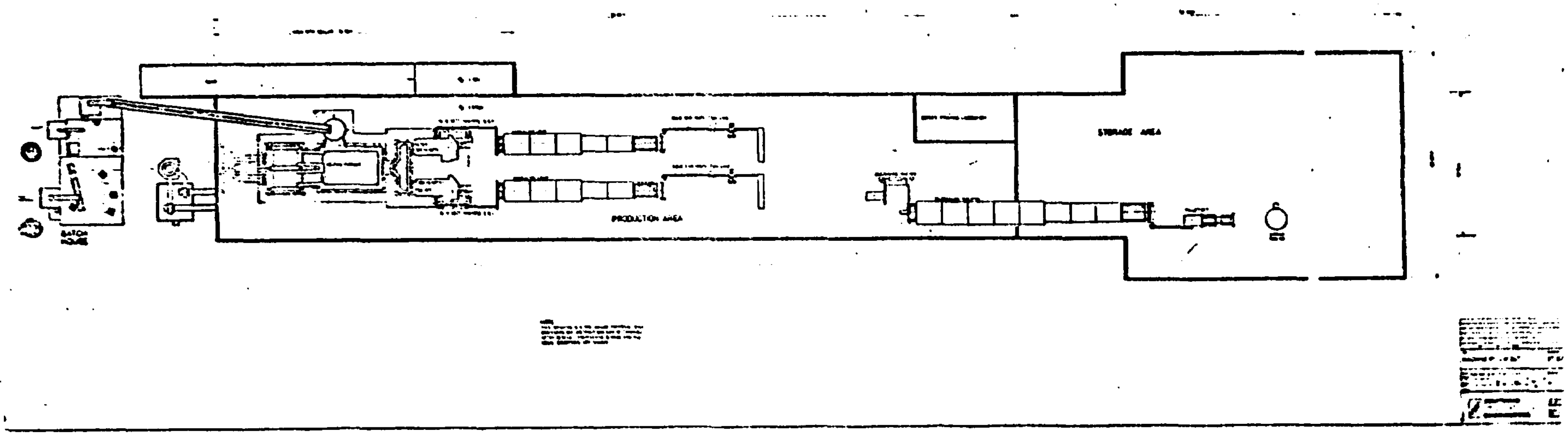
In addition to preventing the surface from abrasion, the surface coating gives a high increase in lubricity of the container surface. This makes it much more easy to handle the glass containers in the fast filling and capping lines.

The coatings are only efficient on one-way containers since they will be removed on returnable containers after 3-5 washings.

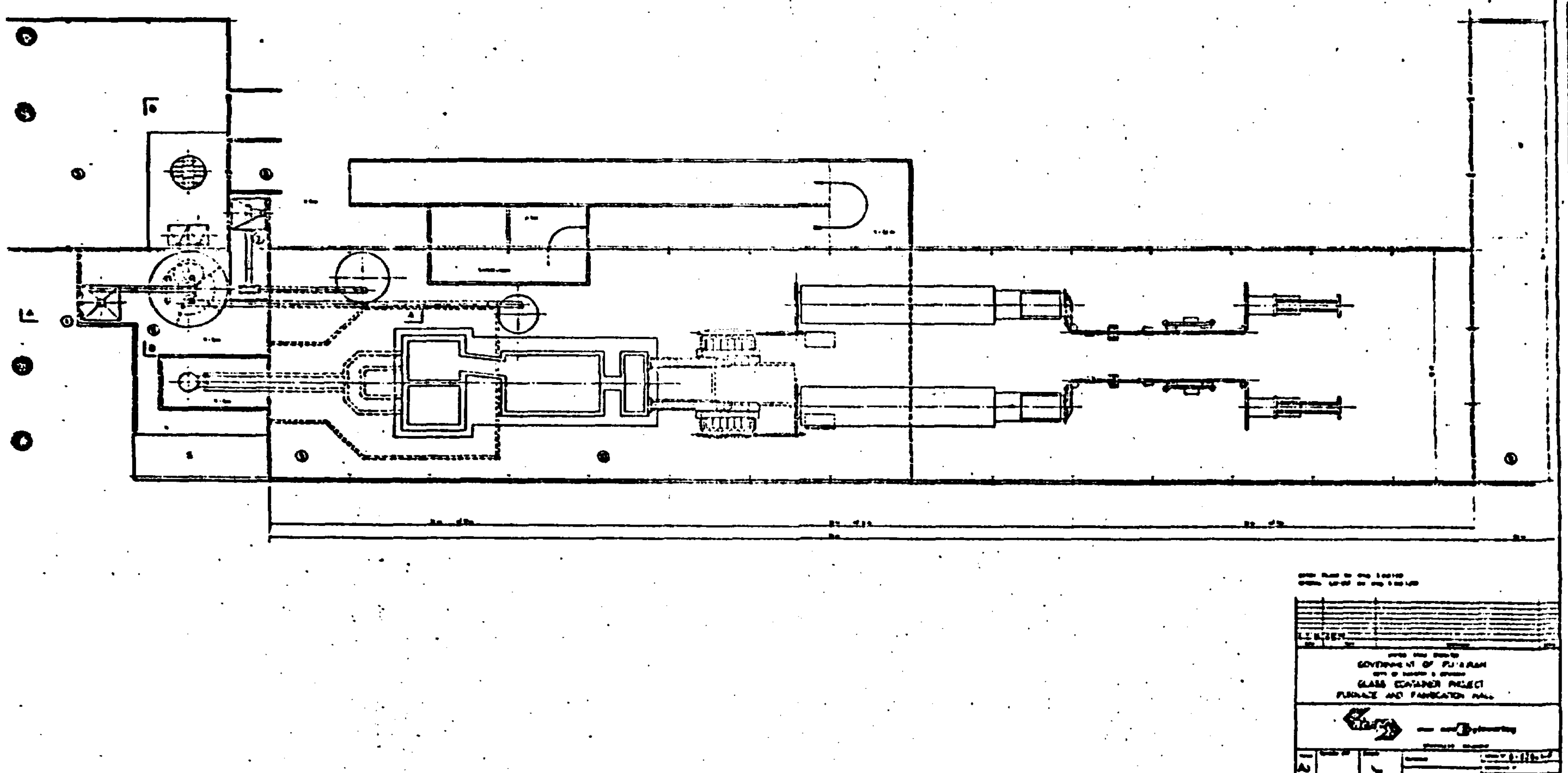
Schedule 6-1·Estimate of technology cost

No cost of technology.

Machinery layout for
the glass plant



ALTERNATIVE LAYOUT FOR
THE PRODUCTION HALL



## VI.2.2 Technical description

The selection of technology and equipment has been based on the following facts and assumptions:

1. The plant in Fujairah will have a small capacity - a mini plant - and the most advanced and sophistitcated technology and equipment can not be used.
2. The plant must be able to make high quality glass containers, that are up to the required standard as specified by the bottling companies and the franchising companies.
3. The batch plant must be automatic.
4. The furnace must have a satisfactory fuel efficiency.
5. The glass forming machines should be I.S. machines made in Europe.
6. Some automatic inspection machines must be used.

### a) The batch plant

The handling of the raw materials and the design of the batch plant are based on the assumptions, that raw materials of satisfactory quality will be delivered to the glass plant.

Storage facilities must be available at the plant in order to safeguard the production against difficulties which might arise in respect to delivery of raw materials.

For the automatic preparation of the batch, the raw materials must be stored in steel silos. For cost reasons, however, these silos will be kept as small as possible. It is satisfactory if the silos are large enough to store the individual raw materials for 5-7 days.

Silos for raw materials

| Material | Approx. volume, $m^3$ |
|---|---|
| Silica sand | 120 |
| Limestone | 50 |
| Soda ash | 60 |
| Pegmatite | 50 |
| Premixed minor materials | 5 |
| Glass cullet | 60 |

There should be level indications in each silo. The silos should be loaded by bucket elevators or a pneumatic transport method.

From the silos the raw materials should be transported on controlled vibration chutes to the weighing scale. There should be two weighing scales, one having a capacity of 750 kg and the other one a capacity of 10 kg. Both scales should have an accuracy of 0.2 %.

The weighed raw materials should be conveyed automatically to the mixer. The mixer should be of the counter current type having a capacity of about 400 litres. The batch should be transported automatically on a conveyor belt to the furnace batch silo. The glass cullet should be added on top of the batch, when it is transported on the conveyor belt to the batch silo.

Before the cullet is added to the batch it should be discharged into a crusher reducing the size of the pieces of cullet to a maximum of 5 cm.

The crusher should have a capacity of about 2 tons per hour.

In order to remove pieces of iron from the cullet a magnetic separator should be installed on the conveyor belt.

Containers for the hot glass coming from the machines should be placed in the cellar underneath the machines. The hot glass should be pulverized by cold water and collected in steel containers having a volume of about one cubic meter.

There should be a separate dust free room for the control and operation of the batch plant. The batch preparation should be stopped automatically of a silo is empty or if a correct weight of a raw material is not delivered to the mixer.

Water should automatically be added to the batch in the mixer in order to get a certain humidy of the batch.

The minor raw materials should be mixed in a mixer having a capacity of about 50 litres. The premixed minor material are then conveyed to the specified silo.

The batch plant should have a capacity of 50 tons per 8 hours. The batch silo at the furnace should have a capacity of batch for two days of production.

The control system of the batch plant should be located on a panel in the batch plant control room.

The control installation should include and indicate on an illuminated diagram the following processes:

Control of raw material feeding

Control of the dosing

Control of the weighing

Control of the mixing

Control of the addition of cullet

Control of the batch transport

When ever there is a failure of any of the systems this should be indicated and the batch plant operation should be stopped automatically.

b) <u>The furnace</u>

There will be one glass melting furnace with two forehearths and feeders in the plant. The furnace should have a melting capacity of 50 tons per day.

It may be required at the first re-building of the furnace to increase its capacity to 77 tons of glass per day. This should be considered when designing the furnace and when constructing the steel structure for the furnace.

A satisfactory fuel efficiency and furnace life for this size of furnace can be obtained with a regenerative as well as with a recuperative furnace.

Primarily it is recommended to use an end fired regenerative furnace. This system is well known by most furnace suppliers. An advanced type of a recuperative furnace has, however, been developed by Heye Glas in West Germany. This type of furnace will also be suitable for the Fujairah plant. A detailed comparison regarding cost of equipment, installation and operation as well as furnace life can only be done after further discussions with the suppliers.

There should be a melting area in the furnace of about 26 $m^2$ and a working end area of about 5 $m^2$.

The furnace should be heated by LPG gas (light oil can also be used).

The furnace must be made of high refractory materials in order to secure a long furnace campaign of minimum five years.

All parts of the furnace in contact with glass shall be electrocast refractories. The bottom of the furnace shall be covered with a zircon refractory material.

The super structure and the crown shall be made of silica refractories.

The regenerators of a regenerative furnace should be made of magnesia material at the upper part and silica-aluminous material at the bottom part.

The bottom, the tank , the crown and the regenerators shall be well insulated.

The total weight of the refractory materials for a regenerative furnace is approximately 850 tons. A recuperative furnace will only require about 450 tons of refractory materials.

The steel recuperator should be able to pre-heat the incoming air up to 750°C.

For an efficient operation of the furnace it must be possible to cool certain parts of the furnace structure. Cooling fans must be arranged along the furnace walls. A critical part of the furnace is the "throat" where a circulating water cooling system must be applied.

A sufficient number of burners with compressed air and oil/gas atomizers should be installed in the melting end and working end of the furnace. The total capacity of the burners should be higher than the required quantity of gas (or oil) for the melting of the glass.

The melting capacity of the furnace should be minimum 1.9 ton per square metre of the melting area. The consumption of fuel at full load should be maximum 2000 kcal per kg of glass.

There shall be spring tension elements in the steel structure in order to allow for expension between the refractory material and the steel structure.

The steel structure shall include all necessary stairs with hand rails and service platforms around and on top of the furnace.

The regenerative furnace shall have an automatic regenerator reverting system for changing the directions of the incoming air and the outgoing waste gas every 20-30 minutes.

In a special dust free room all the control and recording instruments of the furnace shall be installed.

The control and recording instruments should include:

Automatic temperature control

Furnace glass level regulation

Furnace pressure regulation

Air pressure regulation

Combustion air volume measurement

Control and indication of combustion air pressure

Oil pressure control

Oil temperature control

Control of compressed air

Safety systems

A mimic diagram shall show the actual operating conditions in the furnace.

The batch shall be distributed from the furnace batch silo to the batch charger and into the furnace. The batch charger shall have a vibrating type of conveyor and a water cooled pusher.

c) <u>The glass blowing equipment</u>

The molten and refined glass leaves the furnace through the forehearths and the feeders. The forehearth is a refractory channel with a cooling and a conditioning section. The forehearth is heated by several gas burners and the temperature is controlled automatically.

The feeder consists of a revolving refractory stirrer through which a reciprocating refractory plunger presses the molten glass downwards through an orifice ring. A mechanical stearing device will cut the glass into gobs having the specified weight and shape.

From the feeder the glass gob falls into the blank mould of the I.S. machine through a system of scoops, troughs and deflectors.

A parison of the bottle is formed in the blank mould by a blowing operation. The parison is then transferred to the blow mould, where the bottle is blown to its final shape. The blow mould is then opened and the bottle is taken out automatically and placed on a cooling plate, from which it is moved to a conveyor, which transfers it to the annealing lehr.

There shall be one I.S. (Individual Section) machine below each feeder. The plant will thus have two I.S. machines. Each I.S. machine shall work with six sections.

The feeders shall be of the Emhart 144 model. The machines shall be automatic I.S. machines of type Emhart EF for single gob (and convertible to double gob) operation and with automatic lubrication. The machines shall have necessary accessories in order to work within a weight range of 200- 600 grams for the single gob and 180-430 grams for the double gob mechanism.

There shall be 10 sets of moulds for different types pf soft drink bottles as required by the market. Each set of mould shall consist of the following parts:

12 Blank moulds

12 Finishing moulds

12 Funnels

50 Neck rings

50 plugs

50 Guide plates

25 Dummy thimbles

12 Blow heads

12 Take-out tongs

In order to prepare the moulds for the blowing operation there must be one mould pre-heating furnace. The heating chamber should have the approximate dimension of 1500 x 500 x 400 cm. The furnace shall be gas heated.

In the plant there should also be one complete set of fixtures for feeders and I.S. machines and one set of mould gauges.

d) Equipment for annealing and processing

When the bottle leaves the blow mould of the I.S. machine, it has atemperature of about 500°C. The bottle must then be cooled to room temperature under controlled conditions in order to preventstrain from appearing in the bottle. This controlled cooling is called annealing and is carried out in the annealing lehrs.

From the dead plate of the I.S. machine the bottle should be automatically pushed on a conveyor belt, that will take it to the lehr stacker. The stacker should be a pushbar stacker for automatic transfer of the bottles into the annealing lehr.

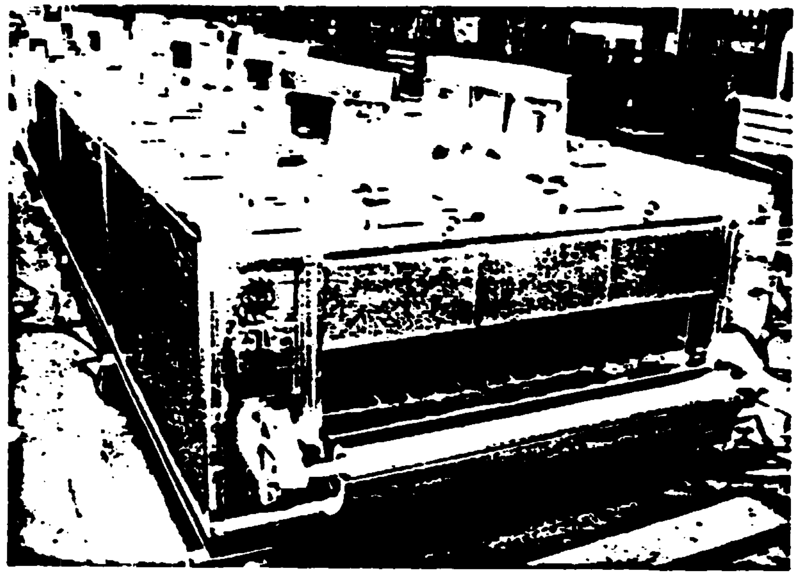
There shall be one annealing lehr for each I.S. machine. The annealing lehr shall have a cpacity of 30 tons of glass bottles per 24 hours. It shall be electric lehrs with 160 kW elements and a motor power of 15 kW. The annealing lehr should be 18-20 m long. The conveyor belt in the lehr should be about 1.8 m wide and the tunnel clearence above the conveyor belt should be 400 mm.

All the lehr must be well insulated. All the four different zones of the lehr (heating, fine cooling, quick cooling and ventilation) should be automatically controlled regarding the temperature.

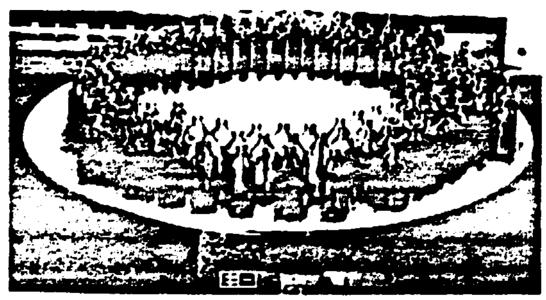
For each lehr there shall be a control panel for all the instrumentation and electric equipment.

After having passed through the annealing lehr the bottles are arranged in a single line by a lehr unloader(a single liner).

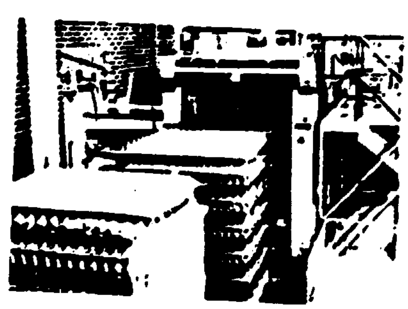
Inspection and some quality control is carried out, when the bottles are conveyed on the single line. The first quality station is for visual inspection. The bottles must be well illuminated, when they pass in front of the inspector. It is also an advantage if the bottles rotate at the inspection station. Bottles with visual defects are rejected by the inspector.



An electric annealing lehr for glass containers



Bottles after annealing and inspection
are transferred to an accumulating table
and then packed.



Bottles packed on pallets surrounded
by a plastic shrinkable foil.

From "Glass Technology", Cheong Moon Gak
Publishing Company, Seoul

After the visual inspection station there must be two automatic inspection machines in each of the single line. One inspection machine should be spindle gauger for the control of the inside and outside diametre of the finish (the neck) of the bottles. The spindle gauger will also check the height and the verticality of the bottles.

The other automatic inspection machine should be a check inspector. This machine will control the bottles regarding checks, cracks and crizzles in the finish, the neck, the body and the bottom of the bottle.

It is important, that there is a 100 % inspection of all bottles regarding all these defects. Bottles which are not up to the specified standard must be rejected and removed automatically.

After the bottles have passed the three inspections and been accepted they are conveyed on the single line conveyor belt to an accumulating table having an area of approximately 3 square metres.

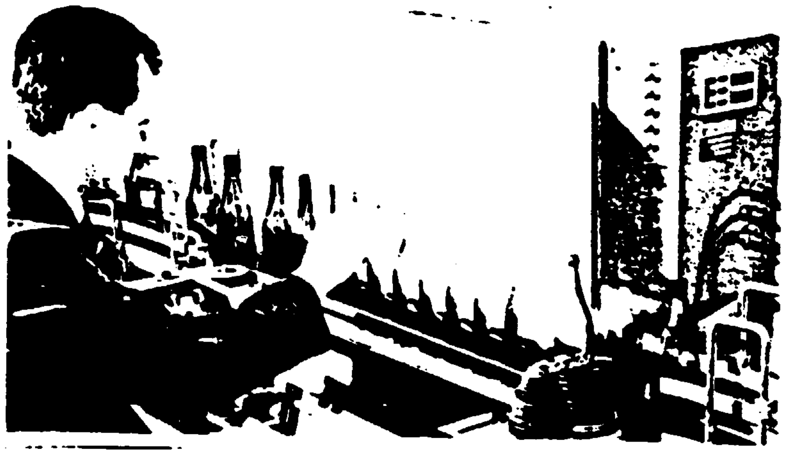
All bottles rejected at the forming machine and at the inspection stations should be recycled and used as cullet and remelted. Steel containers having a capacity of about one cubic metre can be used at the different places, where bottles are rejected. Bottles must be crushed, as has been mentioned previously, before they are used as cullet. Bottles being recycled from customers and consumers may have to be washed as well depending on their condition. Before the cullet is added to the batch it should be de-magnetized in order to remove pieses of iron.

Coating equipment should be installed at the hot end and the cold end of the annealing lehrs. Particularly non-returnable bottles, which are palletized should be surface coated.

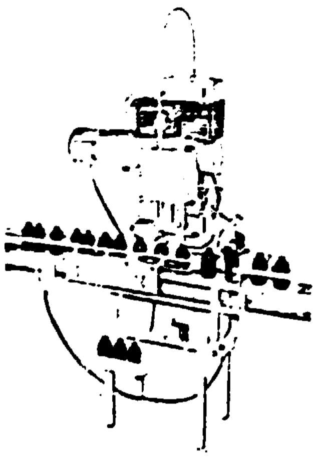
Some bottling plants want the glass supplier to apply labels on the bottles. Permanent ACL labels are applied on some types of returnable bottles and a plastic foil covering all the body may be used for non-returnable bottles.

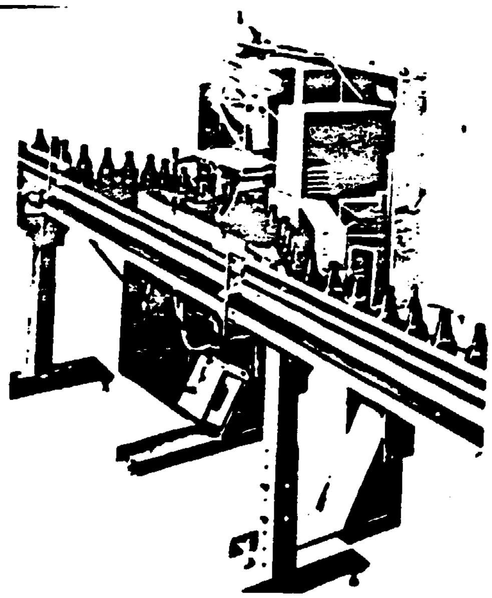
When applying ACL labels the bottles pass through a decorating machine. This should be automatic or semi-automatic depending on the market demand. The decorating machine applies the label of a ceramic ink by a screen printing process. Normally up to three colours can be applied by a decorating machine.

After the bottles have passed thorugh the decorating machine they are conveyed to a decorating lehr. This is very similar to an annealing lehr. The bottles must first be heated to 600°C, however, and therefore the heating zone is enlarged in the decorating lehr. When the bottles leave the decorating lehr, they are inspected visually and then conveyed to an accumulating table similar to the one at the end of an annealing lehr.



A visual inspection station. The bottles are illuminated and they rotate in front of the inspector.
From "Glass Technology", Cheong Moon Gak Bublishing Company, Seoul





Two automatic inspection machines. To the left a machine for simultaneous plug-ring-height gauging and dip detection.

To the right an inspection machine which detects cracks and crizzles in the finish, the neck and the base of glass containers.

From Cheong Moon Gak Publishing Company, Seoul, Korea

For preparation of the screen it is necessary to have a dark room and a coating room with the following equipment:

A semi-automatic camera

A film trimmer

A cutting mat

A coating bowl

A burner for degreasing of screens

A drying oven

Film developing equipment

A clamping device

A screen developing installation

Screen frames

There is an increasing demand to use pre-printed plastic foils on non-returnable containers. A special applicator is needed to wrap the foil round the bottles. The bottle with the foil is then passed through a hot air installation where the foil will shrink round the bottle.

e) The packaging of the bottles

The packaging of bottles can be done in different ways depending on the requirements of the customers. There are three usual methods of packaging bottles by the glass producers:

- Packaging in cartons
- Packaging on pallets with shrink on foils
- Packaging in plastic crates

The bottling plants in UAE like to receive their bottles packed in cartons. Usually there are 24 bottles in each carton. The cartons used by the glass container supplier are re-used by the bottling plants after the bottles have been filled with beverages. The cartons may be re-used a few times. This type of packaging is not very suitable for returnable bottles and is quite expensive. Its use for beverage bottles is decreasing.

Packaging bottles on pallets and then wrapping the pallets and the bottles with a shrinkable film is very common. The most expensive part of this system are the pallets. The cost can be decreased considerably if the pallets are returned to the glass factory. The use of this system of packaging is increasing.

A very common method of packaging bottles is to use plastic crates. The crates are paid for by the bottling plants. They send plastic crates to the glass plant. The glass plant pack the bottles in the plastic crates and the same crates are then used by the bottling plants and their customers for many trips of the bottles.

No special equipment will be needed by the glass plant if the bottles are packed in cartons or in plastic crates. The packaging can be done manually.

Some equipment will be needed, however, for using pallets and shrink foil.

The size of the pallet may be 1000 x 1200 mm and it may be packed to a height of over 2 metres.

For this type of packaging it is adviseable to use two automatic palletizers for putting the bottles on the pallets.

After the bottles and the pallet is covered by the foil, the package is moved to the shrinking machine. This is normally a hot air column equipped with high temperature resistant gas burners.

Two forklifts with a capacity of 2 tons and five hand pallet trucks for one ton will be needed.

For handling and transportingof raw materials, moulds, bottles and other articles within the glass plant the following transporting equipment will be needed:

- 2 palletizers for bottles in the packaging department
- 3 lift trucks having a capacity of 1.5 tons each. They should be able to lift the goods about five metres. These trucks can be used for handling pallets with or without bottles in the packaging department and for the transport of packed bottles to the storage room and to the delivery trucks. They can also be used for transport of cullet, moulds, machine parts etc.
- 5 manual fork carriages having a capacity of 2 tons and a lifting range of 1.5 m. Can be used in the batch house, in the work shop and in the packaging department.
- 2 wheel loaders (0.5 - 1.0 ton) for the handling of cullet and raw materials.
- 8 containers of steel about o.6 $m^3$ for various goods. These containers can be lifted and transported by the lift trucks.
- 15 steel containers (about 0.4 $m^3$) for the transport of moulds between the mould shop and the I.S. machines.

f) Service equipment

Quality control and laboratory equipment

All supplies of raw materials must be tested, when they are received at the plant.

There must also be a full chemical and physical control of the glass and the glass products during the production. Defects in the glass must be identified.

When glass containers are delivered to the customers it must be checked, that the quality of the products are up to the agreed standards and specifications.

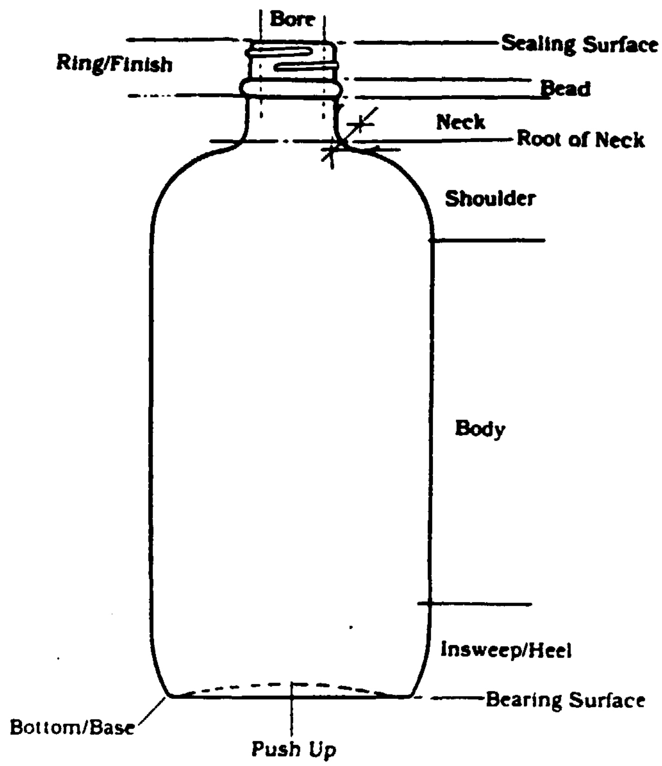
In order to carry out all this work the following equipment is needed in the glass plant:

For the chemical laboratory:

- Analytical balance (160 g $\pm$ 0.002)
- Test sieving machine
- Laboratory oven (up to 1500°C)
- Drying oven (up to 250°C)
- Water bath
- Electric hot plates
- Balance (3000 g. $\pm$ 0.05)
- Polarizing microscope for ring section examination
- Optical pyrometer
- Colourimeter
- Laboratory microscope (objective 40x)
- Laboratory pH-meter
- Water destillation apparatus
- Quick moisture meter
- Orsat gas analyzer
- Laboratory glass ware and other equipment for chemical analyses
- Set of laboratory chemicals
- Densitometer
- Bunsen burners

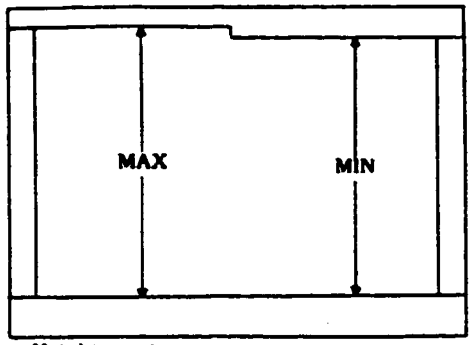
For the quality control laboratory:

- Polariscope
- Seed-o-scope
- Thermal shock testing machine
- Internal pressure tester
- Wall thickness meter
- Impact tester
- Diamond saw
- Set of metering tools (gauges, callipers and other control devices)
- Verticality tester

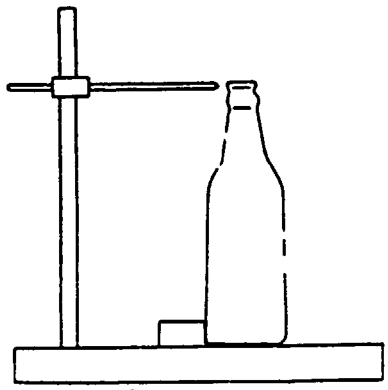



Glass container terms.

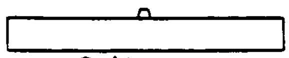
Definition by Glass Manufacturers' Federation, London



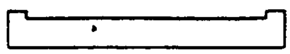

Height gauge



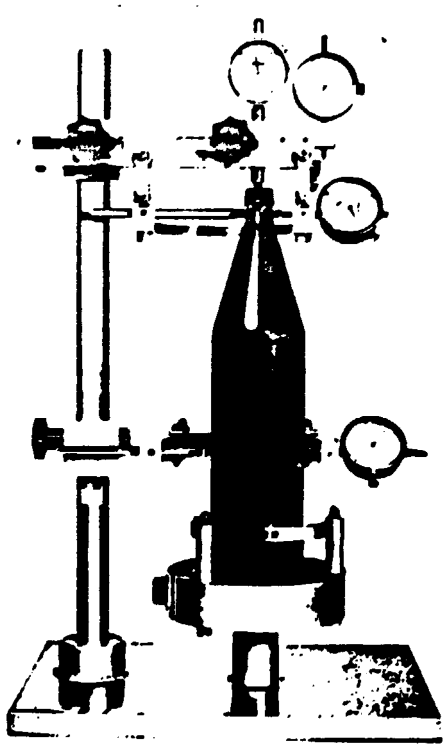
Verticality gauge



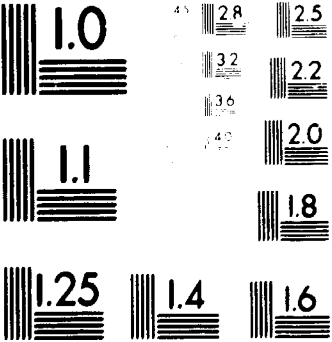
Sinking gauge



Bulge gauge



Principles and an instrument for measuring various dimensions of a glass bottle.
From "Glass Technology", Cheong Moon Gak, Seoul




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

Workshop

It is necessary in the glass plant to have a general maintenance and a mould maintenace workshop. In a factory operating 24 hours a day there will be a continuous need for a general maintenance and repair work.

The moulds in the glass blowing machines must be looked after very well. The moulds have to be cleaned and polished from residues of lubricants and from wear at the edges.

For all this maintenace work there must be a workshop in the plant with all necessary equipment and there must be technical personnel skilled in maintenance work.

The following equipment will be needed in the workshop:

- A lifting plat form
- A steel sheet cutting machine
- A steel sheet bending machine
- A welding transformer
- Two welding sets
- A lathe with copying system
- A column drilling machine
- A table drilling machine
- A grinding machine
- A refractory saw
- A sand blasting machine
- A spindle stock for mould polishing
- A set of mechanical tools and instruments
- A set of electric tools and instruments
- A set of wood working tools
- A metal spray coating machine
- A polishing station

g) Civil engineering works

The civil engineering will cover all necessary buildings and civil engineering constructions for the glass factory within the factory limits.

The soope of the work will consist of the following:

- Civil engineering and design work
- Site installation and preparation of the site

- Actual construction works
- Supervision and site management
- Coordination of contacts with local authorities regarding provision of water, electricity and road connections to the site
- Soil test must be carried out and it may be necessary to carry out the following work as well:
- Pile foundation
- Excavation of rock
- Removal of artificial obstructions in the ground
- Some increase of the foundations caused by specific conditions
- Some exchange of soil
- Any other measures to substitute bad sub-soil

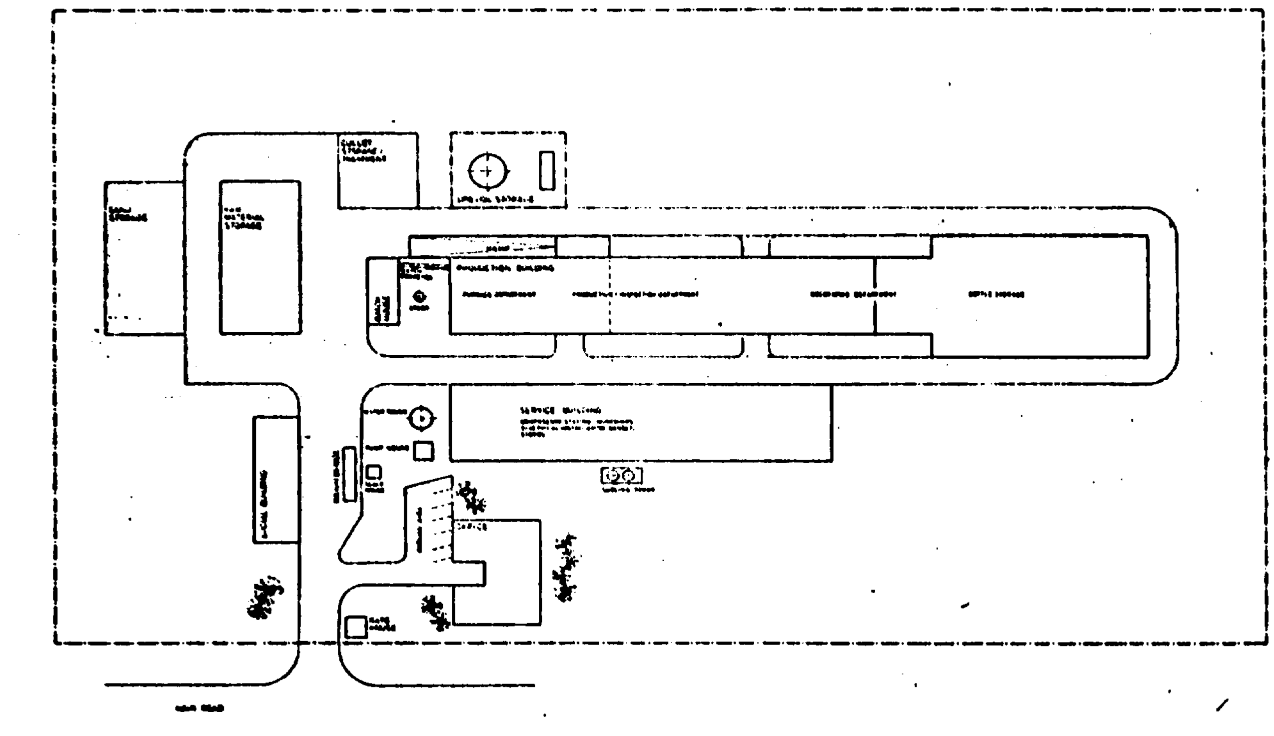
The buildings should be designed for wind forces resulting from wind speeds of 35 m/s giving a pressure of 80 $kp/m^2$.

All floors of the process buildings shall withstand a uniform load of 2 $tons/m^2$. Special machine loads exceeding 2 $tons/m^2$, must be dealt with separately.

The glass plant will consist of the following buildings and areas:

| | |
|---|---|
| - Open air storage for storage of raw silica sand and cullet with the cullet crushing equipment. | about 970 $m^2$ |
| - Raw material storage hall for storage of raw materials supplied to the factory in bags or in bulk. | about 650 $m^2$ |
| - Batch house for housing of the batch plant and the cullet silo. | about 110 $m^2$ |
| - Main process building. A single story building with cellar is proposed with the melting and production equipment on the ground floor and the regenerator (if any), ventilation and cullet scrapes in the basement | about 2375 $m^2$ |
| - Bottle storage | about 1560 $m^2$ |
| - Service building | about 1550 $m^2$ |
| - Social building. Workers dressing and washing rooms, staff canteen. | about 300 $m^2$ |
| - Office building | about 460 $m^2$ |
| - Gate house and weighing bridge | about 66 $m^2$ |
| - Pump station house | |

General layout of the glass plant



NOTE

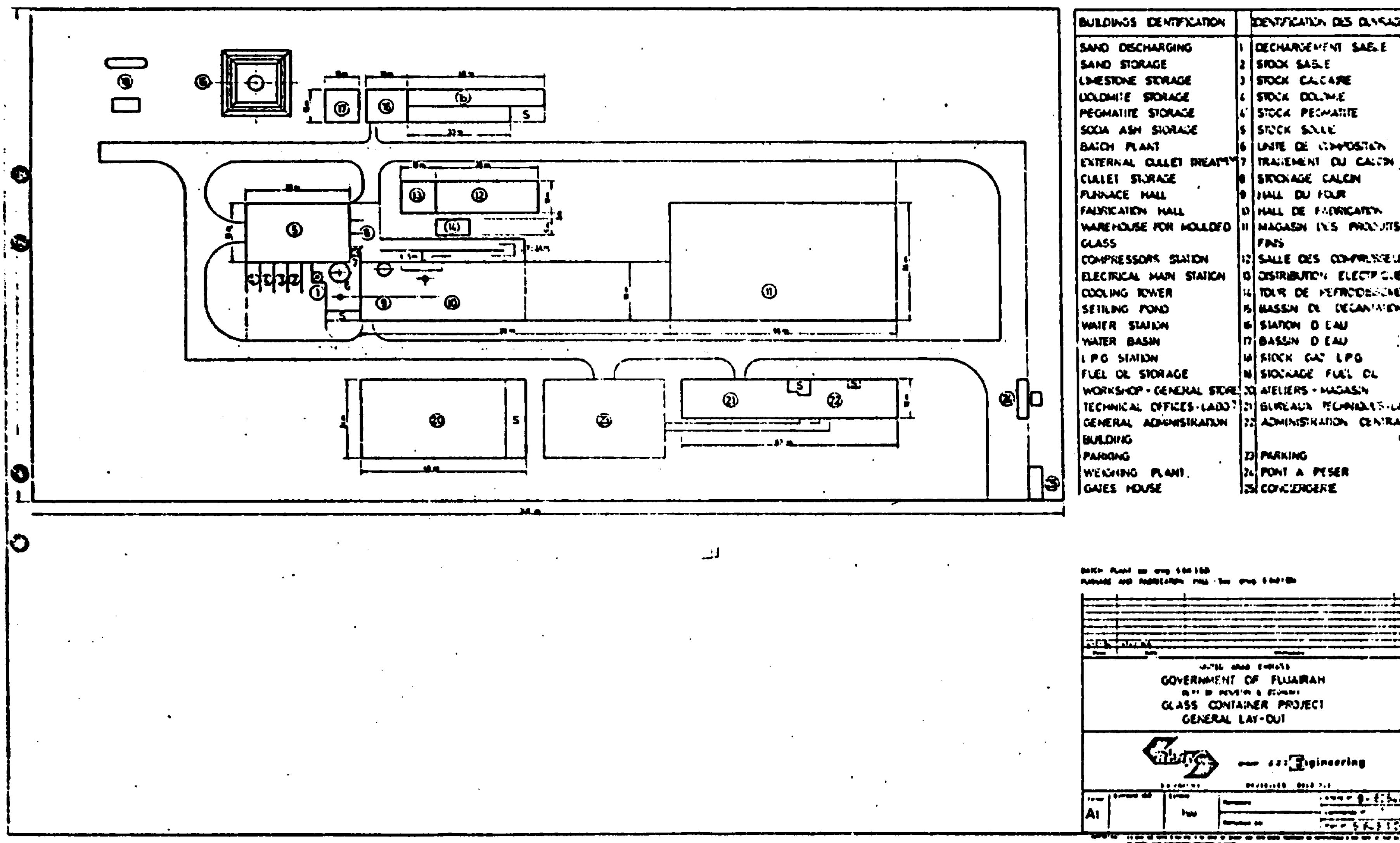
THIS DRAWING IS A PRELIMINARY PROPOSAL ONLY
DIMENSIONS AND DISTRIBUTIONS CAN BE CHANGED
AFTER DETAILED ENGINEERING IS MADE AND
ALL LOCAL CONDITIONS ARE KNOWN

SITE PLAN

67 .08 - 1

COUTINHO
ENGINEERING

Alternative general layout
of the glass plant



- Foundations for auxiliaries
  (Fuel oil and LPG tanks about
  330 ton total capacity)
- Water storage tank
  (Tank about 80 $m^3$, 18 m above
  process building ground floor level)
- Roads and parking areas — about 3800 $m^2$

h) Auxiliary equipment

Fuel storage and distribution

This proposal is based on the assumption, that light oil will be used for heating the melting end of the furnace and LPG for heating the working end and the forehearths. Should it be decided to heat all the furnace with LPG the capacities of the oil tank and the LPG tank should be changed accordingly.

For the light oil (diesel oil)

- Storage tank of 300 tons capacity (one month of operation)
- 2 pumps (one as stand-by) each having a capacity of 40 $m^3$/hr. at a pressure of 3 bar.
- One twin-pump aggregate with 2 pumps (one as a stand-by) with filters, valves, thermometers, manometers, etc. Each pump should have a capacity of 500l/hr at a pressure of 8 bar.

For the LPG

- A storage tank of 30 tons (about one month of operation)
- Two pumps (one as a stand-by) having a capacity of about 10 $m^3$/hr each.
- Two vapourisers (one as a stand-by) each having a capacity of 50 kg/hr. They should be heated electrically.

All the system for storage and distribution should be equipped with necessary relief valves, pressure gauges, pressure regulators, thermometers etc.

Supply of compressed air

There should be three piston type compressors (one as a stand-by) to supply compressed air to the production equipment.

Each compressor should deliver about 28 $m^3$/min. of air at a pressure of 4 bar.

In addition there should be two piston type compressors (one as a stand-by) for the furnace and for general purposes. These should give 8 $m^3$ of air per minute having a pressure of 8 bar.

...

There should also be a main air receiver having a capacity of about 10 $m^3$ with manholes, connecting flanges, pressure gauge, safety valve and a water outlet tap.

Water supply system

The equipment for the industrial water should include:

- 2 booster pumps (one as a stand-by)

| | |
|---|---|
| Capacity (of each pump) | 40 $m^3$/hr |
| Pressure | 4 bar |
| Speed | 1500 r.p.m. |
| Electric motor | 8 kW |

- 2 Cooling towers having a capacity of 30 $m^3$/hour each. The incoming water will have a temperature of 30°C.
- One water tower having a capacity of 80 $m^3$. The tower should be about 18 m above ground level. There should be two pumps (one as a stand-by) for pumping water into the water tower.

Water for sanitary and drinking purposes should be taken directly from the public network.

Fire fighting equipment

There must be a satisfactory fire fighting system in the plant. The system should include the following:

- A main ring of water distribution with hydrants at strategic points.
- Two booster pumps (one as a stand-by, to be motor-driven). The output of the line should be about 120 $m^3$ per hour and the pressure should be 8 bar.
- 10 stationary fire fighting cabinets. The cabinets should be installed on walls. They should be equipped with a hydrant and a 20 m long waterhouse with a nozzle.
- 20 wall fire extinguishers having 2.5 kg dry chemical fire extinguishing powder. These extinguishers should be installed in:

  The office building

  The gate house

  The service buildings

  The factory building

  The storage building

  The electric service stations

Lighting

Lighting of all buildings, outside lighting and street lighting.

Clock and alarm system

Should consist of a master clock in one building and several clocks in other buildings, punch-card clocks and siren with a range of 500 metres.

Internal telephone system

Cabling and wiring for a cpacity of 40 extensions.

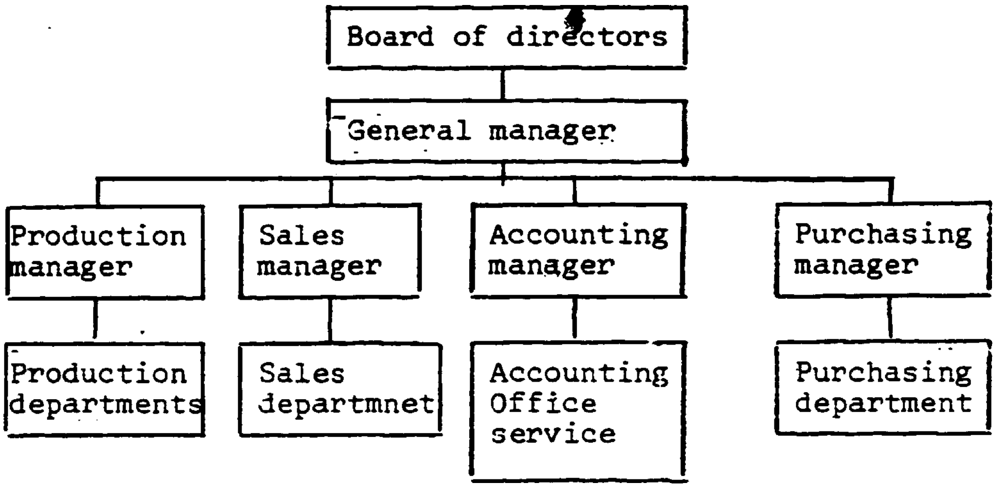
Emergency power supply

There should be one emergency diesel generating set for automatic start-up at power-breaks of the main electric system. The set should include one 4-stroke diesel engine and one 3-phase synchronous alternator, output 625 kVA for 220/380 V, 50 cycles, 1500 r.p.m.

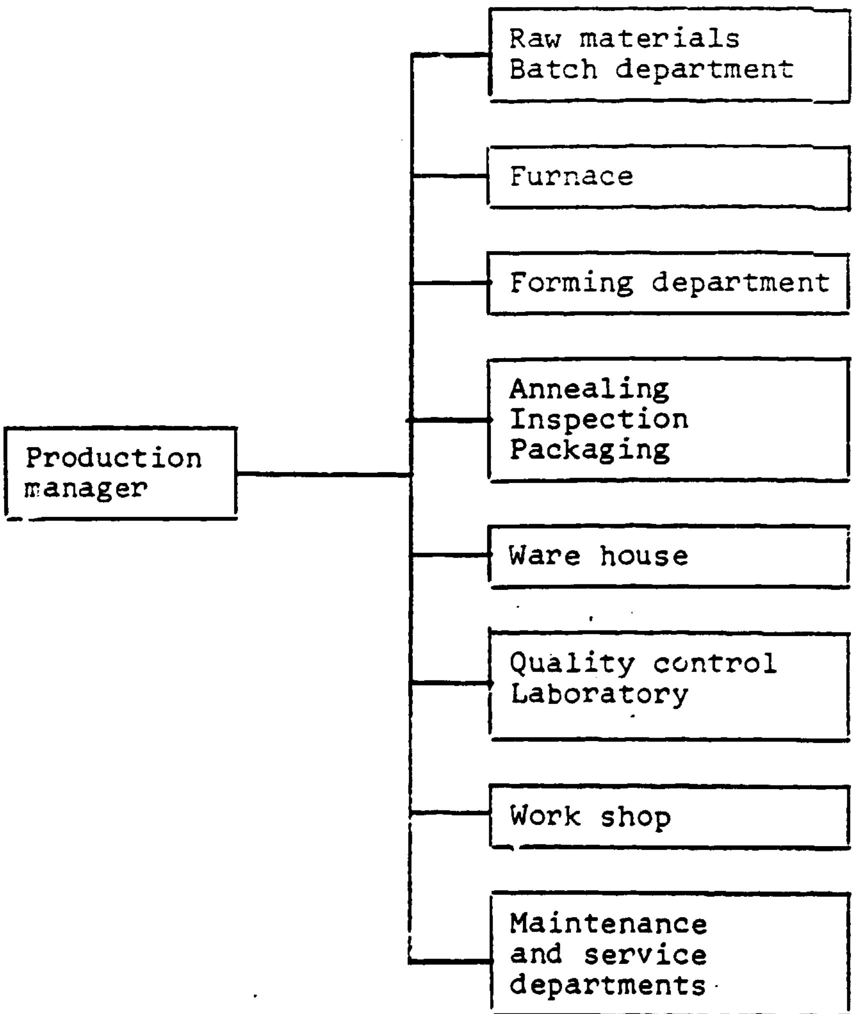
The emergency supply should be sufficient for running the cooling of the furnace, the throat cooling, combustion air for the furnace and the forehearths, compressed air supply for reversal operations, batch charging, furnace control etc.

## VII PLANT ORGANIZATION AND OVERHEAD COSTS

As is shown in chapter VIII, it is estimated, that there will be 145 people working in the glass plant. There will be the following organization in the plant:




A more detailed organization of the production department is shown below:



General overhead costs are shown in schedule 7. Cverhead costs for production year 5 as shown on the computer print-outs are shown below:

| | Dhs '000 |
|---|---|
| Factory overheads | 264.60 |
| Maintenance | 850 |
| Spare parts | 1700 |
| Administrative overhead | 1332 |
| Depreciation | 5703.48 |
| Financial cost | 1137.35 |
| Total | 10987.43 |

Depreciation

The depreciation for the buildings and the equipment is based on the following number of years:

| | |
|---|---|
| Buildings | 20 years |
| Furnace | 5 years |
| Machinery | 10 years |
| Cars | 4 years |
| Office equipment | 5 years |

Using the best refractory materials for the furnace and with good maintenance and firing conditions the furnace may last for 6-8 years. This is normal in glass plants having good technology and skilled people.

Financial charges

It is assumed that a bank loan is taken covering 50 % of the total investment costs. The interest is 12 %. There is a repayment over 5 years, starting after a grace period of 2 years.

Alternatively it may be possible for the share holders to raise the equity to 100 % of the total investment costs.

## VIII MANPOWER

There is no glass factory in UAE and there is probably no manpower available in UAE having satisfactory experience of glass container manufacturing. This means that foreign people must be selected and brought to the glass plant in Fujairah.

Preliminary investigations by the management of the Ceramic Plant and the Rockwool plant in Fujairah have indicated, that it may be possible to find the required number of people for the glass plant having some experience of glass container manufacturing in the Philippines and having an interest in coming to a glass plant in Fujairah.

When selecting the number of people for the plant and the required training, it is assumed that it will be possible to recruit people with some glass technical experience and skill from the Philippines.

The wages and salaries indicated for the glass factory are similar to those used for people from the Philippines working in the Fujairah ceramic plants.

The required number of manpower for the glass plant is shown below.

Table VIII:1 Manpower required.

| Function | Number |
|---|---|
| General manager | 1 |
| Production manager | 1 |
| Sales manager | 1 |
| Purchasing manager | 1 |
| Accountant | 1 |
| Asst. accountant | 1 |
| Sales men | 2 |
| Office staff | 3 |
| Engineers | 2 |
| Glass technologist | 1 |
| Maintenance engineer | 1 |
| Supervisors | 7 |
| Production staff | 8 |
| Skilled labours | 59 |
| Unskilled labours | 56 |
| Total | 145 |

It is believed that out of these people, there will only be one local man - the general manager.

Schedule 8 Manning Table

Production department

| Department | Engineer | Super visor | Staff | Skilled labour | Unskilled labour |
|---|---|---|---|---|---|
| Raw material | | | | 4 | 4 |
| Batch house | | 1 | | | 4 |
| Furnace | 1 | | | 4 | 4 |
| Forming dept | 1 | 1 | 1 | 8 | 8 |
| Annealing, insp. | | 1 | | 4 | 8 |
| Shrink wrapping | | | | 4 | 4 |
| Screen printing | | 1 | | 6 | 4 |
| Ware house | | 1 | | 3 | 4 |
| Qual. control lab | 1 | | 4 | 6 | 4 |
| Work shops | | 1 | 2 | 6 | 6 |
| Maintenance | 1 | | 1 | 6 | 4 |
| El. station | | 1 | | 2 | |
| Fuel station | | | | 1 | |
| Compr. station | | | | 1 | |
| Service group | | | | 4 | 2 |
| Total | 4 | 7 | 8 | 59 | 56 |

Schedule 8-1 Manning table - Labour Production

| Department | Shift | Skilled | Unskilled | Total |
|---|---|---|---|---|
| Raw material | 1 | 1 | 1 | 2 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| Batch house | 1 | | 1 | 1 |
| | 2 | | 1 | 1 |
| | 3 | | 1 | 1 |
| | 4 | | 1 | 1 |
| Furnace | 1 | 1 | 1 | 2 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| Forming dept. | 1 | 2 | 2 | 4 |
| | 2 | 2 | 2 | 4 |
| | 3 | 2 | 2 | 4 |
| | 4 | 2 | 2 | 4 |
| Annealing, insp | 1 | 1 | 2 | 3 |
| | 2 | 1 | 2 | 3 |
| | 3 | 1 | 2 | 3 |
| | 4 | 1 | 2 | 3 |
| Shrink wrapping | 1 | 1 | 1 | 2 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| Screen printing | 1 | 3 | 1 | 4 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| Ware house | 1 | 1 | 1 | 2 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | | 1 | 1 |
| Qual. control | 1 | 3 | 1 | 4 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| Work shop | 1 | 3 | 3 | 6 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |

8-1 (Continued)

| Department | Shift | Skilled | Unskilled | Total |
|---|---|---|---|---|
| Maintenance | 1 | 3 | 1 | 4 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| El. station | 1 | 1 | | 1 |
| | 2 | 1 | | 1 |
| | 3 | | | |
| | 4 | | | |
| Fuel Station | 1 | | | |
| | 2 | | | |
| | 3 | 1 | | 1 |
| | 4 | | | |
| Compr. station | 1 | | | |
| | 2 | | | |
| | 3 | | | |
| | 4 | 1 | | 1 |
| Service group | 1 | 1 | 1 | 2 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | | 1 |
| | 4 | 1 | | 1 |
| Total | | 59 | 56 | 115 |

Schedule 8-2 Estimate of production cost: wages

All foreign workers

| Fixed | Skilled | Unskilled |
| --- | --- | --- |
| Maintenance | 6 | 4 |
| Service group | 4 | 2 |
| Total | 10 | 6 |

| | | | |
| --- | --- | --- | --- |
| Wages: | 10 x 1000 x 12 | = Dhs 120000 | |
| Wages: | 6 x 750 x 12 | = Dhs 54000 | |
| Meals: | 16 x 220 x 12 | = Dhs 42240 | |
| Air tickets: | 16 x 2200 | = Dhs 35200 | Dhs 1000 |
| Sub-total | | | 251.44 |

Variable

| | | | |
| --- | --- | --- | --- |
| Wages: | 49 x 1000 x 12 | = Dhs 588000 | |
| Wages: | 50 x 750 x 12 | = Dhs 450000 | |
| Meals: | 99 x 220 x 12 | = Dhs 261360 | |
| Air tickets: | 99 x 2200 | = Dhs 217800 | |
| Sub-total | | | 1517.16 |
| Total cost wages | | | 1768.60 |

Schedule 8-3 Manning table - staff

| Administration | Number | Dhs/month | Total Dhs '000 |
|---|---|---|---|
| General manager | 1 | 10000 | 120 |
| x Production manager | 1 | 10000 | 120 |
| Sales manager | 1 | 5000 | 60 |
| Purchasing manager | 1 | 2500 | 30 |
| Accountant | 1 | 3000 | 36 |
| Asst. accountant | 1 | 2000 | 24 |
| Sales men | 2 | 2500 | 60 |
| Office staff | 3 | 1500 | 54 |
| Sub-total | 11 | | 504 |
| **Production** | | | |
| Engineers | 2 | 4000 | 96 |
| x Glass technologist | 1 | 8000 | 96 |
| x Maintenance engineer | 1 | 8000 | 96 |
| Supervisors | 7 | 1500 | 126 |
| Production staff | 8 | 1200 | 115.20 |
| Sub-total | 19 | | 529.20 |
| Air tickets 29 x 2200 | | | 63.80 |
| Total (Local Currency 120 + For. cur. 977) | | | 1097 |

x expatriates

only general manager local

The work in the factory will be continuous all days of the week. There will be a three shift operation. When calculating the number of labourers it has been assumed, that there should be four shift teams.

Training of personnel

It appears, that almost all of the people required by the glass factory must be recruited from abroad.

At least three of the engineers must be well qualified and have good experience from a glass container plant. These three engineers are the production manager, the glass technologist and the maintenance engineer. They should have at least 5 years' experience in their respective fields. It should be an advantage if they could stay in the plant for 3 years or more.

Regarding the other engineers and supervisors it is an advantage if they have some exprience from a glass container factory. In particular this applies to the supervisors. The supervisors working in the forming department, at the annealing lehrs and in the work shops should have experience from other glass factories.

Special glass experience is also required for the skilled labourers engaged with raw materials, the furnace, the I.S. machines, the annealing lehrs, the screen printing, work shops, maintenance and quality control.

The supplier of the plant will arrange a training programme. Depending on the skill of the people employed a training abroad will be arranged and should be very beneficient for the people concerned and for the operation of the plant.

The training required in a factory abroad as arranged by the supplier will depend on the skill and previous glass factory experience by the people to be trained.

The following training programme may be appropriate but must be evaluated after the different people have been selected and employed.

| Employees to be trained | Required time |
|---|---|
| Production manager | 3 months |
| Batch plant manager | 1 month |
| Furnace manager | 2 months |
| Electrical engineer | 2 months |
| Glass technologist | 2 months |
| Four furnace operators | 4 x 2 months |
| Two I.S. operators | 2 X 3 months |
| Mould maintenance supervisor | 2 months |
| Total man-months | 26 |

## IX IMPLEMENTATION SCHEDULING

Once a contract is signed it will take 20-24 months before operation can start in the glass factory. A schedule of a project implementaion is shown on chart IX:2. To this schedule must be added recruitment of personnel.

Itis an advantage if the key production personnel can take part in the erection of the plant and in the installation of the equipment. This normally starts after one year from the beginning of the implementation. If necessary some of the people should have been trained before erection starts.

The production manager, the maintenance engineer and a few more of the technical personnel may very well be present from the very beginning of the implementation. They should form a project implementation team.

The total initial investment costs for the two pre-production years as shown on the computer print-outs are as follows:

| | Dhs '000 | |
|---|---|---|
| Year | 1 | 2 |
| Fixed investment costs<br>Land site preparation and development | 600 | 75 |
| Buildings and civil works | 5300 | 1210 |
| Incorporated fixed assets | 75 | 175 |
| Plant machinery and equipment | 8324 | 20048 |
| Total fixed investment costs | 14299 | 21508 |
| Pre-production capital expenditure | 6460 | 3714 |
| Working capital | | 2302 |
| Total initial investment costs | 20759 | 27524 |
| % foreign currency | 44.19 | 82.84 |

The cost for the project implementation is shown in schedule 9.1

Schedule 9.1 Estimate of investment cost

Dhs '000

| Category | Foreign currency | Local currency | Total |
|---|---|---|---|
| 1. Management of project implement | | 750 | 750 |
| 2. Detail engineering, tendering | 250 | 250 | 500 |
| 3. Supervison, coordination, test run and take over of civil works, equipment and plant | 500 | 1500 | 2000 |
| 4. Build-up of administration, recruitment and training of staff and labour | 50 | 100 | 150 |
| 5. Arrangements for supplies | | 25 | 25 |
| 6. Arrangements for marketing | 25 | 25 | 50 |
| 7. Build-up of connections | | 10 | 10 |
| 8. Preliminary and capital issue expenses | 25 | 25 | 50 |
| 9. Financial cost during construction | — | 25 | 25 |
| Total | 850 | 2710 | 3560 |

Several parts of the project implementation have been discussed and evaluated by the prospective share holders of the glass plant and some decisions have been taken.

The site for the plant has been selected and it is understood, that there will be no cost for the land.

Tendering and evaluation of the bids have been started and the fianl evaluation of the bids could be finished within a few months. (Before end of 1984)

Arrangements for finacing does not seem to create any fundamental problems.

The two most important phases to be cleared before a final decision can be taken are the processing of local raw materials and the decision by the authorities regarding the use of non-returnable bottles in the market region for the projected glass plant.

These points are further discussed in chapters I, III. and IV.

IX:2 Schedule of project implementation.

| Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signing of contract | x | | | | | | | | | | | | | | | | | | | | | | | |
| Drawings for buildings | | x | x | x | | | | | | | | | | | | | | | | | | | | |
| Detailed drawings | | | x | x | x | x | x | x | x | x | | | | | | | | | | | | | | |
| Site preparation | | | x | x | x | | | | | | | | | | | | | | | | | | | |
| Foundations | | | | | x | x | | | | | | | | | | | | | | | | | | |
| Training | | | | | x | x | x | x | x | x | | | | | | | | | | | | | | |
| Erection of buildings | | | | | | | x | x | x | x | x | x | x | x | | | | | | | | | | |
| 1.st shipment at site | | | | | | | | | | x | | | | | | | | | | | | | | |
| Last shipment at site | | | | | | | | | | | | | | | | | x | | | | | | | |
| Erection | | | | | | | | | | | | | x | x | x | x | x | x | | | | | | |
| Cold test run | | | | | | | | | | | | | | | | | | | x | | | | | |
| Commissioning | | | | | | | | | | | | | | | | | | | | | x | x | | |

## X FINANCIAL AND ECONOMIC EVALUATION

The viability of this glass container project was evaluated by the use of COMFAR (Computer Model for Feasibility Analysis and Reporting) in conjunction with the UNIDO Manual for the preparation of industrial feasibility studies. The software programme of COMFAR has been developed by UNIDO for the Apple III computer.

Some computer prints and schedules for various alternatives are attached as appendices.

### X.1 The basic alternative

The first alternative of this glass container project evaluated by the computer is described in the previous chapters.

It is assumed that 90 % of the production can be sold in the domestic market and that there is an export market in Bahrain and Qatar. It is also believed, that non-returnable bottles will be allowed to be used in the region without any restrictions.

It is also understood in the basic alternative, that indigenous sand, limestone (and/or dolomite) and pegmatite will be available at the glass factory ready to be used as glass raw materials.

The following rate of exchange, U.A.E. Dirhams to US Dollars has been used:

US $ 1 = Dhs 3.70

### X.2 Total investment cost

As is shown in the computer print-outs (and in chapter IX Implementation Scheduling) the total initial investment costs for the first pre-production year are (in 1000 Dhs) 20759 and in the second year 27524. This makes a total of Dhs '000 48283.

In the production year 6 and 12 the furnace must be re-built. The cost for this is 7350 + 7000 = 14350 all in Dhs '000. In addition some transport equipment has to be purchased in years 5, 10 and 15 for 3 x 150 = 450 Dhs '000.

The total fixed investment costs will thus be 63083 Dhs '000.

## X.3 Project financing

The promoters are considering to pay 50 % of the total investment cost as equity. The remaining 50 % will be paid for by arranging a bank loan. It is assumed that the interest on this loan will be 12 %. The repayment time of the loan will be five years after a grace period of two years.

As an alternative it may be possible for the promoters to arrange an equity equal to 100 % of the total investment cost. This alternative has been run through the computer as well.

## X.4 Alternative studies

The following four alternatives were run through the computer:

1. The basic version (FUJAI 2)
2. No export of bottles (FUJAI 3)
3. All raw materials imported (FUJAI 4)
4. 100 % equity (FUJAI 5)

All the input and data for the basic version are taken from the preceeding chapters of this study.

In the second version it was assumed, that no bottles could be exported. The same quantity of bottles are produced as in the basic version but there is an increase of cullet and a reduction of the raw materials by 10 %. The cost of energy used is the same as in the basic version.

In the third version it is assumed, that all raw materials have to be imported. In the basic version the silica sand, the limestone and the pegmatite were assumed to be supplied from local sources in Fujairah. A Turkish offer for these three raw materials was selected, if necessary to import.

The following figures have been used:

| | Dhs/ton | | Dhs/ton glass | |
|---|---|---|---|---|
| | Basic version | Turkish offer | Basic version | Turkish offer |
| Sand | 60 | 229.40 | 29.94 | 114.47 |
| Limestone | 60 | 321.90 | 6.00 | 32.19 |
| Pegmatite | 60 | 358.90 | 6.06 | 36.25 |
| Other materials | | | 94.72 | 94.72 |
| Total | | | 136.72 | 277.63 |

In the fourth version (FUJAI 5) it has been assumed, that the equity will be 100 % of the cost of the investment. This alternative was calculated in order to see the effect on the cash flow for financial planning. Without paying any interest or any repayment, it should be possible to finace the project if there is additional equity available during the first two years to finace the cash deficit (-3122.11 and -120.57 in 1000 Dhs).

In that case the re-building of the furnace in the 6th production year could be financed by using the "cumulated cash balance." (see appendix XI.8 as written by Dr Ewald Brunner). All the alternative studies have been run by Dr Brunner through the computer. He has given the following foot notes concerning the four versions:

FN 1: Table "Total initial investment costs in 1000 Dhs", line "Working capital": 2301.75 inventory of spare parts; corresponding correction for years 1 and 2 has been made because of the assumption, that these stocked spare parts will be used first.

FN 2: Table"Total current investment costs in 1000 Dhs", line "Working capital": negative figures in year 1988 (explanation see FN 1) and years 1992, 1998: replacement of the furnace is reducing production (to 3/4) and therefore less working capital is necessary.

FN 3: Cashflow Discounting: only b) interest payable on loan added back to net-cashflow shows the internal rate of return (IIR) on total investment at future value (FVAL) which should be used.

FN 4: "Total production costs in 1000 Dhs", line "Factory overheads": This line is containing three cost elements factory overheads: 264.6 per year, 100 % fixed and cost adjustments for energy:

- reductions in years 1992 and 1998 of 25% because of the replacement of the furnace which will decrease the production to 3/4 of possible production
- Increases in years 1993 to 2001; the assumption is that for producing more than the reference tonnage of glass (15 594 tons or 100 %) the energy input has to be increased by about the same percentage as production will be increased:
  e.g. year 1993---> increase of production 20 %----> increase of energy (5274 x 20 % ≅ +1054)---> 264.6 + 1054=> 1318; actually a little bit less (1294.6) is considered as total under "Factory overheads".

This is because there was due to a limited storage capacity no free line for "Cost adjustments" in COMFAR.

FN 5: Table "Total production costs in 100 Dhs", line "Direct costs, sales and distribution":
This line is containing the direct distribution costs
a) shrink palletizing } per ton of glass x tons of distributed
b) freight } glass

## X.5 Financial evaluation

### Basic version

a) The project shows a loss for the first six years of 37 126.33 Dhs '000 and then there is a profit during the next nine years of 56 322.75 Dhs '000. The reserves as retained profit after 15 years are 19 196.4 Dhs '000.

b) The cumulated cash balances are negative for the first ten years and then positive through out.

There will be a bank overdraft from the second pre-production year to the tenth year of production.

c) The net present value at 12 % discount rate is negative (-32 509.76 Dhs '000)

d) The internal rate of return is 3.39 %.

e) The pay back period is 10.9 years.

### "No export" alternative

a) The project shows a loss for the first seven years of 41 111.46 Dhs '000 and then there is a profit during the next eight years of 36 362.29 Dhs '000. The reserves as retained profit after 15 years are negative (-4 749.17 Dhs '000).

b) The cumulated cash balances are negative for the first 14 years. There will be a bank overdraft from the second pre-production year to the 14th year of production.

c) The net present value at 12 % discount rate is negaitve (-40 621.47 Dhs '000).

d) The internal rate of return is 0.37 %.

e) The pay back period is 14.1 years.

The alternative of importing all raw materials

a) The project shows a loss for the first seven years of 50 088.39 Dhs '000 and then there is a profit during the next eight years of 29 020.57 Dhs '000. The reserves as retained profit after 15 years are negative (-21 067.82 Dhs '000).

b) The cumulated cash balances are negative for all the 15 years. There will be a bank overdraft from the second pre-production year to the 15th year of production.

c) The net present value at 12 % discount rate is negative (-49 755.91 Dhs '000).

d) The internal rate of return is recorded as zero on the computer print-out. It may be negative, which will not be recorded by the computer.

e) The pay back period is more than 15 years.

100 % equity alternative

a) The project shows a loss for the first six years of 25 779.99 Dhs '000 and then there is a profit during the next nine years of 56 324.74 Dhs '000. The reserves as retained profit after 15 years are 30 544.76 Dhs '000.

b) The cumulated cash balances are negative for the first four years and then positive through out. There will be a bank overdraft for the first four and for the sixth year of operation.

c) The net present value at 12 % discount rate is negative (-31 195.61 Dhs '000).

d) The internal rate of return is 3.62 %.

e) The pay back period is 4.2 years.

## X.6 Cost of packaging the bottles

As is mentioned in part VI:2:2e there are three common ways of packaging bottles by the glass supplier.

- Packaging in cartons
- Packaging on pallets with shrink on foils
- Packaging in plastic crates

The cost of cartons is approximately 350 Dhs per ton of glass. The cost using pallets and shrink foil will be:

| | |
|---|---|
| Wooden pallets | 74.49 Dhs/ton glass |
| Shrink foil | 7.74 -"- |
| Cardboard | 31.29 -"- |
| Total | 113.52 -"- |

None of these two methods of packaging the bottles is fully satisfactory for the beverage plants. They have to buy some additonal packaging material particularly when distributing beverages in returnable containers. This also applies to one-way bottles being distributed and sold in the shops as "6-packs" or in some other convenient ways.

In this study it has been assumed, that the glass plant will distribute the bottles on pallets with shrinkable foil. The cost for this has been assumed to be Dhs 113.52 per ton of glass. This, however, is based on the assumption, that the wooden pallets will only be used once. Most often the pallets are returned to the glass plant and used several times.

Once the distribution system is developed between a glass plant and the bottling plants in the same region it is normal to use the wooden pallets at an average of five times. This means that the cost of using this kind of packaging will decrease from Dhs 113.52 per ton glass to Dhs 53.93. This will decrease the cost of production by Dhs 59.59 per ton glass.

For the reference year 5, when 12 868 tons of glass bottles are sold, it means a reduction in the cost of production of Dhs 766 804.

For the total quantity of the bottles distributed by the glass plant over the 15 years period being studied, it means a decreased cost of about Dhs 14 million.

When plastic crates are used, these are purchased by the beverage companies and sent free of charge to the glass plants. This is a competitive advantage for the local glass plant. A similar arrangement is not possible with a foreign glass container supplier.

## X.7 Foreign exchange effect

It may be assumed, that the price of imported bottles is the same as that of bottles being delivered from a plant in Fujairah. The saving in foreign exchange will then be the same as the price of bottles shown in schedule 3-1.

Figures for import of equipment and production materials are shown in table X.7 below. The production figures are based on the figures shown in schedule 4-2. Import figures are ahown as negative. The table shows, that there is a deficit in foreign exchange during the pre-production years and the first two years of production.

The total saving in foreign exchange is approximately Dhs 233 million by producing bottles in Fujairah instead of importing them as calculated for the first 15 years of production.

Table X.7

Foreign exchange effest in Dhs 1000

| Year | Import fixed investm. | Import prod. material | Bottles import saving | Bottles exported | Differ. per year | Cumulative difference |
|---|---|---|---|---|---|---|
| -2 | -9173 | | | | -9173 | -9173 |
| -1 | -22801 | | | | -22801 | -31974 |
| 1 | | -2540 | 12776 | | 10236 | -21738 |
| 2 | | -2794 | 13430 | 707 | 11343 | -10395 |
| 3 | | -3073 | 14850 | 782 | 12559 | 2164 |
| 4 | | -3381 | 15983 | 1296 | 13898 | 16062 |
| 5 | -150 | -3722 | 17658 | 1432 | 15218 | 31280 |
| 6 | -7350 | -3068 | 14230 | 1582 | 5394 | 36674 |
| 7 | | -4500 | 20954 | 2327 | 1877 | 55446 |
| 8 | | -4950 | 23114 | 2568 | 20732 | 76178 |
| 9 | | -5445 | 25501 | 2833 | 22889 | 99067 |
| 10 | -150 | -5989 | 28125 | 3124 | 25110 | 124177 |
| 11 | | -5989 | 28125 | 3124 | 25260 | 149437 |
| 12 | -7000 | -4492 | 20984 | 2455 | 11974 | 161384 |
| 13 | | -5989 | 28125 | 3124 | 25260 | 186644 |
| 14 | | -5989 | 28125 | 3124 | 25260 | 211904 |
| 15 | -150 | -5989 | 28125 | 3124 | 21110 | 233014 |

## X.8 Import of raw materials

In the basic version it is assumed, that silica sand, limestone and pegmatite will be supplied from local sources in Fujairah.

In the alternative run where all raw materials are imported it is shown, that the internal rate of return will be 0 % or less. The prices of raw materials used for this alternative are from a Turkish offer.

The IRR shows that raw materials with prices as those indicated from Turkey can not be used. The prices should not be higher than those shown in schedule 4-1.

This shows that it is of fundamental importance for the project to make further studies regarding the quality and cost of the local raw materials in Fujairah.

After having run the various alternatives through the computer, the consultant has been informed about prices for raw materials in Saudi Arabia. These are very similar to the ones used in this study. It is therefore suggested that the quality and prices for the raw materials used in Saudi Arabia should be studied in detail.

# APPENDIX XI.1

## BASIC DATA FOR THE PROJECT

Schedule 3-1 Estimate of Sales revenue

A Returnable bottles

Dhs '000

| Year | Unit Price | Quantity sold (tons) | | | Sales revenue | | |
|---|---|---|---|---|---|---|---|
| | Dhs/ton | Export | Local | Total | Export | Local | Total |
| 1 | 1304 | - | 3400 | 3400 | - | 4434 | 4434 |
| 2 | 1304 | 170 | 3230 | 3400 | 222 | 4212 | 4434 |
| 3 | 1304 | 170 | 3230 | 3400 | 222 | 4212 | 4434 |
| 4 | 1304 | 255 | 3145 | 3400 | 333 | 4101 | 4434 |
| 5 | 1304 | 255 | 3145 | 3400 | 333 | 4101 | 4434 |
| 6 | 1304 | 255 | 2295 | 2550 | 333 | 2993 | 3326 |
| 7 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 8 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 9 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 10 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 11 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 12 | 1304 | 340 | 2210 | 2550 | 443 | 2882 | 3325 |
| 13 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 14 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| 15 | 1304 | 340 | 3060 | 3400 | 443 | 3990 | 4433 |
| | B Non-returnable bottles | | | | | | |
| 1 | 1548 | - | 5389 | 5389 | - | 8342 | 8342 |
| 2 | 1548 | 313 | 5955 | 6268 | 485 | 9218 | 9703 |
| 3 | 1548 | 362 | 6872 | 7234 | 560 | 10638 | 11198 |
| 4 | 1548 | 622 | 7676 | 8298 | 963 | 11882 | 12845 |
| 5 | 1548 | 710 | 8758 | 9468 | 1099 | 13557 | 14656 |
| 6 | 1548 | 807 | 7259 | 8066 | 1249 | 11237 | 12486 |
| 7 | 1548 | 1217 | 10953 | 12170 | 1884 | 16955 | 18839 |
| 8 | 1548 | 1373 | 12354 | 13727 | 2125 | 19124 | 21249 |
| 9 | 1548 | 1544 | 13896 | 15440 | 2390 | 21511 | 23901 |
| 10 | 1548 | 1732 | 15591 | 17323 | 2681 | 24135 | 26816 |
| 11 | 1548 | 1732 | 15591 | 17323 | 2681 | 24135 | 26816 |
| 12 | 1548 | 1300 | 11694 | 12994 | 2012 | 18102 | 20114 |
| 13 | 1548 | 1732 | 15591 | 17323 | 2661 | 24135 | 26816 |
| 14 | 1548 | 1732 | 15591 | 17323 | 2681 | 24135 | 26816 |
| 15 | 1548 | 1732 | 15591 | 17323 | 2681 | 24135 | 26816 |

Schedule 3-1 (continued) C Total bottles (Dhs 1000)

| Year | Export | Local | Total |
|---|---|---|---|
| 1 | - | 12776 | 12776 |
| 2 | 707 | 13430 | 14137 |
| 3 | 782 | 14850 | 15632 |
| 4 | 1296 | 15983 | 17279 |
| 5 | 1432 | 17658 | 19090 |
| 6 | 1582 | 14230 | 15812 |
| 7 | 2327 | 20945 | 23272 |
| 8 | 2568 | 23114 | 25682 |
| 9 | 2833 | 25501 | 28334 |
| 10 | 3124 | 28125 | 31249 |
| 11 | 3124 | 28125 | 31249 |
| 12 | 2455 | 20984 | 23439 |
| 13 | 3124 | 28125 | 31249 |
| 14 | 3124 | 28125 | 31249 |
| 15 | 3124 | 28125 | 31249 |

Schedule 3-2 Estimate of production costs

Sales and distribution costs

| | Foreign currency | Local currency | Total |
|---|---|---|---|
| 1. Sales costs (Dhs 1000 per year) | | | |
| Training of sales men and merchants | 5 | 15 | 20 |
| Advertising | 10 | 10 | 20 |
| Travel expenses | 15 | 5 | 20 |
| After sales service communications | 10 | 5 | 15 |
| Sub-total | 40 | 35 | 75 |
| 2. Distribution costs (Dhs per ton of glass) | | | |
| a) Shrink palletizing | | | |
| Wooden pallets | | 74.49 | 74.49 |
| Shrink foil | 7.74 | | 7.74 |
| Cardboard | | 31.29 | 31.29 |
| Sub-total | 7.74 | 105.78 | 113.52 |
| b) Freight (Dhs per ton glass) | | | |
| For local market | | 20 | |
| For export market | | 65 | |

Schedule 3-3 Production programme

Returnable bottles

| Year | 100 % acceptance tons | Acceptance %-age | Saleable bottles, tons |
|---|---|---|---|
| 1 | 4722 | 72 | 3400 |
| 2 | 4474 | 76 | 3400 |
| 3 | 4304 | 79 | 3400 |
| 4 | 4146 | 82 | 3400 |
| 5 | 4048 | 84 | 3400 |
| 6 | 3036 | 84 | 2550 |
| 7 | 4048 | 84 | 3400 |
| 8 | 4000 | 85 | 3400 |
| 9 | 4000 | 85 | 3400 |
| 10 | 4000 | 85 | 3400 |
| 11 | 3953 | 86 | 3400 |
| 12 | 3000 | 85 | 2550 |
| 13 | 3953 | 86 | 3400 |
| 14 | 3953 | 86 | 3400 |
| 15 | 3953 | 86 | 3400 |

Non-returnable bottles

| Year | 100 % acceptance tons | Acceptance %-age | Saleable bottles, tons |
|---|---|---|---|
| 1 | 7485 | 72 | 5389 |
| 2 | 8357 | 75 | 6268 |
| 3 | 9274 | 78 | 7234 |
| 4 | 10373 | 80 | 8298 |
| 5 | 11546 | 82 | 9468 |
| 6 | 9837 | 82 | 8066 |
| 7 | 14663 | 83 | 12170 |
| 8 | 16342 | 84 | 13727 |
| 9 | 18165 | 85 | 15440 |
| 10 | 20143 | 86 | 17323 |
| 11 | 20143 | 86 | 17323 |
| 12 | 15287 | 85 | 12994 |
| 13 | 20143 | 86 | 17323 |
| 14 | 20143 | 86 | 17323 |
| 15 | 20143 | 86 | 17323 |

Schedule 3-3 Total quantity of bottles
(continued)

| Year | 100 % acceptance tons | Saleable bottles, tons |
|---|---|---|
| 1 | 12207 | 8789 |
| 2 | 12831 | 9668 |
| 3 | 13578 | 10634 |
| 4 | 14519 | 11698 |
| 5 | 15594 | 12686 |
| 6 | 12873 | 10616 |
| 7 | 18711 | 15570 |
| 8 | 20342 | 17127 |
| 9 | 22165 | 18840 |
| 10 | 24143 | 20723 |
| 11 | 24096 | 20723 |
| 12 | 18287 | 15544 |
| 13 | 24096 | 20723 |
| 14 | 24096 | 20723 |
| 15 | 24096 | 20723 |

Schedule 3-4 Estimate of production cost

Emissions disposal

| | Local Dhs |
|---|---|
| Disposal in sewage system Dhs 800/month | 9600 |

The following sales can then be estimated.

| Year | Returnabel tons | Non-returnable tons | Total tons |
|---|---|---|---|
| 1987 | 3 400 | 5 389 | 8 789 |
| 1988 | 3 400 | 6 268 | 9 668 |
| 1989 | 3 400 | 7 234 | 10 634 |
| 1990 | 3 400 | 8 298 | 11 698 |
| 1991 | 3 400 | 9 468 | 12 868 |
| 1992 | 3 400 | 10 755 | 10 616 |
| 1993 | 3 400 | 12 170 | 15 570 |
| 1994 | 3 400 | 13 727 | 17 127 |
| 1995 | 3 400 | 15 440 | 18 840 |
| 1996 | 3 400 | 17 323 | 20 723 |
| 1997 | 3 400 | 17 323 | 20 723 |
| 1998 | 3 400 | 12 142 | 15 542 |
| 1999 | 3 400 | 17 323 | 20 723 |
| 2000 | 3 400 | 17 323 | 20 723 |
| 2001 | 3 400 | 17 323 | 20 723 |

The market of Oman is not included in these figures.

IV: 3:3 Summary sheet - Production cost

Production year No. 5 taken as basic year

12 868 tons saleable glass

15 594 tons glass produced

| | Dhs '000 | | |
|---|---|---|---|
| | Foreign currency | Local currency | Total |
| Raw materials | 1477.06 | 654.95 | 2132.01 |
| Utilities | | 5274.67 | 5274.67 |
| Lubricants | 330 | | 330 |
| Moulds | 215 | | 215 |
| Spare parts | 1700 | | 1700 |
| Repair cost | | 850 | 850 |
| Total | 3722.06 | 6779.62 | 10501.68 |

IV: 3:1 Estimate of production costs

Materials and inputs

| Raw materials | Unit cost | Foreign | Local | Total |
|---|---|---|---|---|
| | | | Dirhams/ton glass | |
| Sand, 499 kg | 60/ton | | 29.94 | 29.94 |
| Limestone, 100 kg | 60/ton | | 6.00 | 6.00 |
| Pegmatite, 101 kg | 60/ton | | 6.06 | 6.06 |
| Soda ash, 157 kg | 580/ton | 91.06 | | 91.06 |
| Sodium sulphate, 4 kg | 290/ton | 1.16 | | 1.16 |
| Sodium nitrate, 2 kg | 925/ton | 1.85 | | 1.85 |
| Selenium, 4 g | 110/kg | 0.44 | | 0.44 |
| Cobalt oxide, 1 g | 30/kg | 0.03 | | 0.03 |
| Arsenic, 50 g | 3.50/kg | 0.18 | | 0.18 |
| Glass cullet, 250 kg | --- | | | |
| Sub-total per ton of glass | | 94.72 | 42.00 | 136.72 |
| **Utilities** | | | | |
| LPG gas 2.15 x $10^6$ kcal per ton=79 $m^3$ | 3.42 | | 270 | 270 |
| Electricity 800 kWhr | 0.075 | | 60 | 60.0 |
| Water 2.5 $m^3$ | 3.30 | | 8.25 | 8.25 |
| Subtotal per ton of glass | | | 338.25 | 338.25 |
| Materials and utilities per ton of glass | | 94.72 | 380.25 | 474.97 |

IV: 3:2 Estimate of production cost (Dhs 1000)

| | Foreign currency | Local currency | Total |
|---|---|---|---|
| Lubricants, sundry, etc | 330 | | 330 |
| Moulds, 5 sets per year | 215 | | 215 |
| Spare parts of approx. 4 % of initial fixed investment cost | 1700 | | 1700 |
| Repair cost at approx. 2 % of initial fixed investment cost | | 850 | 850 |
| Total | 2245 | 850 | 3095 |

Schedule 6-2 **Estimate of investment cost**

**Equipment** (Dhs 1000 Foreign currency)

| | | |
|---|---|---|
| 1. Production equipment | | |
| Batch plant | 2154.05 | US $ 1 = Dhs 3.70 |
| Furnace | 6360.75 | |
| Glass forming equipment | 7525.65 | |
| Moulds | 429.00 | |
| Annealing lehrs | 867.90 | |
| Inspection equipment | 718.50 | |
| Equipment for decoration | 1796.85 | |
| Packing and transport equipment | 722.70 | |
| Equipment for cullet handling | 228.65 | |
| Sub-total | 20804.05 | |
| 2. Auxiliary equipment | | |
| Workshops | 475.50 | |
| Laboratory equipment | 267.65 | |
| Cars and transport equipment | 150.00 | |
| Office equipment | 100.00 | |
| Sub-total | 993.15 | |
| 3. Service equipment | | |
| Compressor plant | 1006.50 | |
| Water supply system | 330.00 | |
| Fuel storage and distribution system | 486.75 | |
| Piping | 435.40 | |
| Electrical installation | 2392.50 | |
| Energy power supply | 235.60 | |
| Sub-total | 4886.75 | |
| 4. Spare parts | | |
| Sub-total | 2301.75 | |
| Total cost FOB | 28985.70 | |
| Sea freight and insurance | 1388.30 | |
| Total cost CIF Fujairah | 30374.00 | |
| Inland transport to site | 300.00 | |
| Total cost at site | 30674.00 | |

Schedule 6-3 Summary sheet

Investment cost: Equipment (Dhs 1000)

| | Foreign currency | Local currency | Total |
|---|---|---|---|
| Production equipment | 20804.05 | | 20804.05 |
| Auxiliary equipment | 993.15 | | 993.15 |
| Service equipment | 4886.75 | | 4886.75 |
| Spare parts | 2301.75 | | 2301.75 |
| Sub-total | 28985.70 | | 28985.70 |
| Sea freight and insurance | 1388.30 | | 1388.30 |
| Total cost CIF Fujairah | 30374.00 | | 30374.00 |
| Inland transport to site | | 300.00 | 300.00 |
| Total cost at site | 30374.00 | 300.00 | 30674.00 |

Schedule 6-4 Estimate of investment cost

Civil engineering works (Dhs 1000)

| | Foreign currency | Local currency | Total |
|---|---|---|---|
| 1. Site preparation and development | | 675 | 675 |
| 2. Buildings and special civil works | | 6020 | 6020 |
| 3. Outdoor works | | 490 | 490 |
| Total | | 7185 | 7185 |

Schedule 6-5 Summary Sheet

Investment cost

Civil engineering works (Dhs 1000)

| | Foreign currency | Local currency | Total |
|---|---|---|---|
| 1. Site preparation | | 675 | 675 |
| 2. Buildings and special civil works | | 6020 | 6020 |
| 3. Outdoor works | | 490 | 490 |
| Total | | 7185 | 7185 |

Schedule 6-6 <u>Estimate of production cost</u>

<u>Civil engineering works</u> (Dhs 1000)

Maintenance and repair works:

| | Local currency |
|---|---|
| 1. Site preparation and development | 10 |
| 2. Buildings and special civil works | 25 |
| 3. Outdoor works | 5 |
| Total | 40 |

Schedule 6-7 <u>Summary sheet - Production cost</u>

Maintenance and repair works:

| | Local currency |
|---|---|
| Site preparation and development | 10 |
| Buildings and civil works | 25 |
| Outdoor works | 5 |
| Total | 40 |

Schedule 7

Overhead costs

| | Service cost centre | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Social service | Plant management | Off-site transport | Purchasing | Stores | Repair and maintenance | Power, heat, light | Steam | Water supply | Laboratories | Effluent disposal | Sub-total | General administration | Personnel | Training | Accounting and book keeping | Subtotal | Total |
| A. Maintenance | | | | | | 40 | | | | | | 40 | | | | | | |
| B. Insurance | | | | | | | | | | | | | 120 | | | | | |
| C. Communication | | | | 5 | | | | | | | | 5 | 5 | | | | | |
| D. Travel | | | | 10 | | | | | | | | 10 | 20 | | | | | |
| E. Rents | | | | | | | | | | | | | | | | | | |
| F. Land charges | | | | | | | | | | | | | | | | | | |
| G. Royalties | | | | | | | | | | | | | | | | | | |
| H. Property taxes | | | | | | | | | | | | | | | | | | |
| I. Effluents | | | | | | | | | | | 9.6 | | | | | | | |
| J. Licenses, fees | | | | | | | | | | | | | | | | | | |
| K. Subtotal | | | | 15 | | 40 | | | | | 9.6 | 55 | 145 | | | | 145 | |

| | | |
|---|---|---|
| L. Depreciation | | |
| Buildings | | |
| Furnace | | |
| Machinery | | |
| Office Equipment | | |
| Cars | | |
| M. Subtotal | | |
| N. Total | 15 | 40 |

| | | | | |
|---|---|---|---|---|
| | | | 359.25 | |
| | | | 1272.15 | |
| | | | 3067.40 | |
| | | | 20.00 | |
| | | | 37.50 | |
| | | | 4756.30 | |
| 9.6 | 55 | 145 | 4756.30 | 5020.90 |

The required number of manpower for the glass plant is shown below.

Table VIII:1 Manpower required.

| Function | Number |
|---|---|
| General manager | 1 |
| Production manager | 1 |
| Sales manager | 1 |
| Purchasing manager | 1 |
| Accountant | 1 |
| Asst. accountant | 1 |
| Sales men | 2 |
| Office staff | 3 |
| Engineers | 2 |
| Glass technologist | 1 |
| Maintenance engineer | 1 |
| Supervisors | 7 |
| Production staff | 8 |
| Skilled labours | 59 |
| Unskilled labours | 56 |
| Total | 145 |

It is believed that out of these people, there will only be one local man - the general manager.

Schedule 8 Manning Table

Production department

| Department | Engineer | Super visor | Staff | Skilled labour | Unskilled labour |
|---|---|---|---|---|---|
| Raw material | | | | 4 | 4 |
| Batch house | | 1 | | | 4 |
| Furnace | 1 | | | 4 | 4 |
| Forming dept | 1 | 1 | 1 | 8 | 8 |
| Annealing, insp. | | 1 | | 4 | 8 |
| Shrink wrapping | | | | 4 | 4 |
| Screen printing | | 1 | | 6 | 4 |
| Ware house | | 1 | | 3 | 4 |
| Qual. control lab | 1 | | 4 | 6 | 4 |
| Work shops | | 1 | 2 | 6 | 6 |
| Maintenance | 1 | | 1 | 6 | 4 |
| El. station | | 1 | | 2 | |
| Fuel station | | | | 1 | |
| Compr. station | | | | 1 | |
| Service group | | | | 4 | 2 |
| Total | 4 | 7 | 8 | 59 | 56 |

Schedule 8-1 Manning table - Labour-Production

| Department | Shift | Skilled | Unskilled | Total |
|---|---|---|---|---|
| Raw material | 1 | 1 | 1 | 2 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| Batch house | 1 | | 1 | 1 |
| | 2 | | 1 | 1 |
| | 3 | | 1 | 1 |
| | 4 | | 1 | 1 |
| Furnace | 1 | 1 | 1 | 2 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| Forming dept. | 1 | 2 | 2 | 4 |
| | 2 | 2 | 2 | 4 |
| | 3 | 2 | 2 | 4 |
| | 4 | 2 | 2 | 4 |
| Annealing, insp | 1 | 1 | 2 | 3 |
| | 2 | 1 | 2 | 3 |
| | 3 | 1 | 2 | 3 |
| | 4 | 1 | 2 | 3 |
| Shrink wrapping | 1 | 1 | 1 | 2 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| Screen printing | 1 | 3 | 1 | 4 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| Ware house | 1 | 1 | 1 | 2 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | | 1 | 1 |
| Qual. control | 1 | 3 | 1 | 4 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| Work shop | 1 | 3 | 3 | 6 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |

8-1 (Continued)

| Department | Shift | Skilled | Unskilled | Total |
|---|---|---|---|---|
| Maintenance | 1 | 3 | 1 | 4 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | 1 | 2 |
| | 4 | 1 | 1 | 2 |
| El. station | 1 | 1 | | 1 |
| | 2 | 1 | | 1 |
| | 3 | | | |
| | 4 | | | |
| Fuel Station | 1 | | | |
| | 2 | | | |
| | 3 | 1 | | 1 |
| | 4 | | | |
| Compr. station | 1 | | | |
| | 2 | | | |
| | 3 | | | |
| | 4 | 1 | | 1 |
| Service group | 1 | 1 | 1 | 2 |
| | 2 | 1 | 1 | 2 |
| | 3 | 1 | | 1 |
| | 4 | 1 | | 1 |
| Total | | 59 | 56 | 115 |

Schedule 8-2 Estimate of production cost: wages

All foreign workers

| Fixed | Skilled | Unskilled |
|---|---|---|
| Maintenance | 6 | 4 |
| Service group | 4 | 2 |
| Total | 10 | 6 |

| | | | |
|---|---|---|---|
| Wages: | 10 x 1000 x 12 | = Dhs 120000 | |
| Wages: | 6 x 750 x 12 | = Dhs 54000 | |
| Meals: | 16 x 220 x 12 | = Dhs 42240 | |
| Air tickets: | 16 x 2200 | = Dhs 35200 | Dhs 1000 |
| Sub-total | | | 251.44 |
| **Variable** | | | |
| Wages: | 49 x 1000 x 12 | = Dhs 588000 | |
| Wages: | 50 x 750 x 12 | = Dhs 450000 | |
| Meals: | 99 x 220 x 12 | = Dhs 261360 | |
| Air tickets: | 99 x 2200 | = Dhs 217800 | |
| Sub-total | | | 1517.16 |
| Total cost wages | | | 1768.60 |

Schedule 8-3 Manning table - staff

| Administration | Number | Dhs/month | Total Dhs '000 |
|---|---|---|---|
| General manager | 1 | 10000 | 120 |
| x Production manager | 1 | 10000 | 120 |
| Sales manager | 1 | 5000 | 60 |
| Purchasing manager | 1 | 2500 | 30 |
| Accountant | 1 | 3000 | 36 |
| Asst. accountant | 1 | 2000 | 24 |
| Sales men | 2 | 2500 | 60 |
| Office staff | 3 | 1500 | 54 |
| Sub-total | 11 | | 504 |
| **Production** | | | |
| Engineers | 2 | 4000 | 96 |
| x Glass technologist | 1 | 8000 | 96 |
| x Maintenance engineer | 1 | 8000 | 96 |
| Supervisors | 7 | 1500 | 126 |
| Production staff | 8 | 1200 | 115.20 |
| Sub-total | 19 | | 529.20 |
| Air tickets 29 x 2200 | | | 63.80 |
| Total (Local Currency 120 + For. cur. 977) | | | 1097 |

x expatriates

only general manager local

Schedule 9.1 <u>Estimate of investment cost</u>

Dhs '000

| Category | Foreign currency | Local currency | Total |
|---|---|---|---|
| 1. Management of project implement | | 750 | 750 |
| 2. Detail engineering, tendering | 250 | 250 | 500 |
| 3. Supervison, coordination, test run and take over of civil works, equipment and plant | 500 | 1500 | 2000 |
| 4. Build-up of administration, recruitment and training of staff and labour | 50 | 100 | 150 |
| 5. Arrangements for supplies | | 25 | 25 |
| 6. Arrangements for marketing | 25 | 25 | 50 |
| 7. Build-up of connections | | 10 | 10 |
| 8. Preliminary and capital issue expenses | 25 | 25 | 50 |
| 9. Financial cost during construction | ___ | 25 | 25 |
| Total | 850 | 2710 | 3560 |

Schedule 10-1/1 Initial fixed investment costs (Dhs '000)

| | Foreign currency | Local currency | Total |
|---|---|---|---|
| 1. Land | | | - |
| 2. Site preperation and development | | 675 | 675 |
| 3. Structures and civil works | | | |
| a) Buildings and civil works | | 6020 | 6020 |
| b) Auxiliary and service facilities | | 490 | 490 |
| 4. Incorporated fixed asstets | | | - |
| 5. Plant machinery and equipment | 30674 | | 30674 |
| Total initial fixed investment cost | 30674 | 7185 | 37859 |

Schedule 10-1/2 Fixed investment costs

| | Year - 2 | | | Year - 1 | | |
|---|---|---|---|---|---|---|
| Construction period | FC | LC | Tt | FC | LC | Tt |
| 1. Land | | | - | | | - |
| 2. Site preperation | | 600 | 600 | | 75 | 75 |
| 3. Structures and civil works | | 5300 | 5300 | | 1210 | 1210 |
| 4. Plant and machinery | 15674 | | 15674 | 15000 | | 15000 |
| Sub-total | 15674 | 5900 | 21574 | 15000 | 1285 | 16285 |
| Operation period | Year 6 | | | Year 12 | | |
| 4. Furnace | 7000 | 350 | 7350 | 7000 | | 7000 |
| Sub-total | 7000 | 350 | 7350 | 7000 | - | 7000 |

| | FC | LC | Tt |
|---|---|---|---|
| Total | 44674 | 7535 | 52209 |

Schedule 10-2/1 Preproduktion capital expenditure

| Category | From table | Foreign currency | Local currency | Total |
|---|---|---|---|---|
| 1. Pre-investment studies | 2 | | | - |
| 2. Prepatory investigations | 2 | | | - |
| 3. Management of project implementation | 9 | 200 | 550 | 750 |
| 4. Detail planning, tendering | 9 | 250 | 250 | 500 |
| 5. Supervision, co-ordination test run, take over of civil works, equipment and labour camp | 9 | 500 | 6700 | 7200 |
| 6. Build-up of administration, recruitment and training of staff and labour | 9 | 50 | 100 | 150 |
| 7. Arrangements for supplies | 9 | | 25 | 25 |
| 8. Arrangements for marketing | | 25 | 25 | 50 |
| 9. Build-up of connections | 9 | | 10 | 10 |
| 10. Preliminary and capital issue expenses | 9 | 25 | 25 | 50 |
| 11. Financial cost during construction | 9 | | 25 | 25 |
| Total | | 1050 | 7710 | 8760 |

Schedule 10-2/2 Pre- Production capital expenditure, by year ('000)

| | Foreign currency | Local currency | Total |
|---|---|---|---|
| Construction year 1 | 775 | 5685 | 6460 |
| Construction year 2 | 275 | 2025 | 2300 |
| Total | 1050 | 7710 | 8760 |

Schedule 10-3/2 Working capital requirements Year 5

| | Days | Dhs'000 |
|---|---|---|
| I Current assets | | |
| A. Accounts receivable | 30 | 1284 |
| B. Inventory | | |
| Local raw materials | 365 | 655 |
| Imported raw materials | 90 | 369 |
| Other materials | 90 | 369 |
| Utilities | 60 | 879 |
| Packaging materials | 180 | 730 |
| Spare parts | 180 | 575 |
| Work in progress | 9 | 371 |
| Finished products | 15 | 629 |
| C. Cash in hand | 15 | 229 |
| D. Current assets | | 5994 |
| II Current liabilities | | |
| Accounts payable | | 875 |
| Net working capital | | 5119 |

Schedule 10-3/2 Working capital requirements Year 11

| I Current assets | Days | Dhs'000 |
|---|---|---|
| A. Accounts receivable | 30 | 1712 |
| B. Inventory | | |
| Local raw materials | 365 | 1012 |
| Imported raw materials | 90 | 571 |
| Other materials | 90 | 273 |
| Utilities | 60 | 1358 |
| Packaging materials | 180 | 1176 |
| Spare parts | 180 | 575 |
| Work in progress | 9 | 494 |
| Finished products | 15 | 835 |
| C. Cash in hand | 15 | 250 |
| D. Current assets | | 8256 |
| II Current liabilities | | |
| Accounts payable | | 1212 |
| Net working caoital | | 7044 |

**Depreciation**

| | |
|---|---|
| Buildings | 20 years |
| Furnace | 5 years |
| Machinery | 10 years |
| Office equipment | 5 years |
| Cars | 4 years |

**Depreciation per year**

| | | Dhs '000 |
|---|---|---|
| Buildings | 7 185 000:2 = | 359.25 |
| Furnace | 6 360 750:5 = | 1272.15 |
| Machinery | 30 674 000:10= | 3067.40 |
| Office equipment | 100 000:5 = | 20 |
| Cars | 150 000:4 = | 37.50 |
| Total | | 4756.30 |

# THE GLASS BOTTLE MARKET IN UAE, QATAR AND BAHRAIN

PRESENTED BY

THE GULF ORGANIZATION FOR INDUSTRIAL CONSULTING
GOIC

DECEMBER 1983

AG/pvs.

CONTENTS

CONTENTS PAGE

## 1. INTRODUCTION

The Government of Fujairah is seriously considering the establishment of a glass factory to produce glass bottles.

As part of the Government's review procedure more detailed market information was felt necessary. Consequently GOIC's assistance was requested to carry out a survey of the glass bottle market in the UAE, Bahrain and Qatar.

This report presents the results of GOIC's market survey on glass bottles in the UAE, Bahrain, and Qatar. Information for the report came from existing "in-house" data and contacts and particularly from specific interviews with six soft drink companies located in the UAE, three in Bahrain, and three in Qatar.

Work related to the report spanned the period November 9th to December 15th 1983. The interviews were conducted between 26th November and December 7th 1983.

The report is presented in six sectors:

1. Introduction
2. Summary
3. Present Market
4. Future Market
5. Position of Proposed Fujairah Glass Plant
6. Appendices

## 2. SUMMARY

### 1. Present Market

The major users of glass bottles throughout the GOIC Member States are soft drink companies who use them namely for carbonated beverages.

Two types of glass bottle are in use - the traditional heavy weight (approximately 410 gram) returnable glass bottle and the newer light weight (approximately 195 grams) non-returnable bottles (NR) strong competition is experienced from metal cans which account for at least one third of carbonated drink sales in GCC state markets with the exception of Bahrain (5%). The returnable glass bottle still (1983) represents close to half the market in all GCC states with the exception of Bahrain (89%) and Saudi Arabia (24%). The non-returnable glass bottle represented between 15 and 22 per cent of the market, again with the exception of Bahrain (5%).

Bottling companies all report a strong swing away from returnable containers to non-returnable cans and latterly NR glass bottles.

In terms of tonnage the glass market in Bahrain, UAE and Qatar in 1983 was as follows:

| | Returnable | NR | Total |
|---|---|---|---|
| Tons | 4540 | 6545 | 11,085 |

However tonnage above is a very power measure of the glass bottle market. Account must be taken of the various types (specifications) of bottles and colours demanded. Pepsi Cola bottlers for example require a quite different shape colour and weight bottle to "7-Up" or "Canada Dry" bottlers. During this study some 16 different bottle types were identified. Of these, however, it may well be worth while considering the manufacturer of less than half this number.

Plastic bottles have todate made little impact in the carbonated beverage market. Although currently Pepsi Cola International is test marketing a bottle made of Polyethylene terephthalate (PET) in Saudi Arabia as a possible replacement or alternative non-returnable container to the NR glass bottle.

All bottles used by UAE, Qatar, and Bahrain are imported - predominently from the Singapore Glass Company. Other suppliers include Malaysia, Pakistan, Turkey, India, Taiwan and the UK.

Prices have fallen sharply since 1979 and the present, end-1983 contract prices seem to represent a historical low (US$) :

| | | |
|---|---|---|
| Returnable (flint) | $ 22-19 C & F/gross* | : $ 373-332/ton |
| Returnable (green) | $ 21 C & F/gross* | : $ 394/ton |
| NR (flint) | $ 12.50-11 C & F/gross* | : $ 445-392/ton |

* Gross = 144

The glass bottle market is strongly seasonal with orders being placed between October and December for deliveries during the following February to March/April.

Approval of a bottle supplier by the bottler's franchiser is absolutely essential for marketing. The bottle supplier must have an approval mould and several batches of bottles will be tested by the franchising groups (e.g. Pepsi Cola International, Canada Dry International etc.). If satisfactory the bottle plant gets an approval certificate and goes on the best of approval bottle suppliers. This supplies to both returnable and non-returnable bottles.

Government attitude to glass bottles is a very important feature of the market. Presently the use of glass bottles of any type in schools in Qatar is banned by the authorities and it is understood there are also some restrictions in the use of glass bottles in schools in UAE. In the general market there have been recent moves by the municipality authorities in UAE to ban the use of NR glass bottles. Currently there is a six month stay of execution or trial period while the authorities watch the situation and the bottlers make efforts to collect and dispose of NR glass bottles discarded in the Dubai and Sharjah areas. There appear to have been no such moves in any other GCC state. Clearly, however, if there is any banning of NR glass bottles this will have an enormous effect on the future size of the glass bottle market - in short if it happens there will be no growth.

2. Future Market

This is a particularly uncertain time at which to make forecasts of soft drinks consumption and the use of alternative types of containers within the soft drinks market. All the bottlers interviewed were uncertain of the future on both counts. In this review a conservative 5 per cent compound growth for carbonated drinks has been assumed for the 1983 to 1988 period.

As for the relative positions of glass bottles it is very clear that there will be no growth in the absolute number (and hence bottle sales to bottlers) of returnable glass bottles. Any growth at all in the glass bottle market is dependent on the acceptance of NR glass bottles by the authorities and the consumer. In the case of the latter both in the Regional Markets and in international markets this acceptance seems to be there. Any legislation however, to ban the NR glass bottle will bill the glass bottle market for both existing and any new supplier.

On the assumption that there is no banning of NR glass bottles then the volume of future business depends of the penetration of NR glass bottles in the total carbonated drinks market. Present indications are that this penetration, achieved in a very short time, is of the order of 15-20% in various individual markets. The possible range of penetration is felt to lie between 20% and 40% of the market and the tonnage measurement of this range calculated as follows:

Qatar, Bahrain, UAE

| NR glass bottle market penetration | 1986 | 1988 |
|---|---|---|
| 20 % | 18,700 tons | 20,600 tons |
| 40 % | 37,400 tons | 41,100 tons |

The above plus Oman

| NR glass bottle market penetration | | |
|---|---|---|
| 20 % | 24,300 tons | 26,700 tons |
| 40 % | 48,600 tons | 53,200 tons |

Of this tonnage 75% can be expected to be flint glass and 25% green glass.

Future Supply. 1983 and 1984 offers the bottling companies a "buyers market" for both returnable and NR glass bottles.

To this competitive situation will be added two new regional glass plants in 1984. One of 30,000 tons in Kuwait and one of 39,000 tons in Jeddah, Saudi Arabia. There are in addition to the Fujairah project two other possible Regional Projects - in Oman and in Sharjah.

This supply side together with the possible introduction of the PET bottle and the continued presence of the can means that, ever with "unrestricted take-off" of the NR glass bottle all the elements of the buyers market will remain.

3. Position of Proposed Fujairah Glass Plant

Unless the NR glass bottle market becomes an important long-term feature of the local soft drink market the market potential for a new bottle plant would be extremely limited.

Recommendations. These are as follows:

1) Because of the considerable uncertainty in the position of the NR glass bottle the whole market situation should be carefully monitored for at least the next months and probably a year before any decision is made on the proposed project.

2) Contact with the new Kuwait glass company may be valuable in terms of technical and commercial experience.

3) Contact with possible technology suppliers and joint venture partners may also be valuable.

4) The position regarding proposed glass plants in Oman and Sharjah should be clarified. There may be prospects of joint ventures in both these situations.

## 3. PRESENT MARKET

### 3.1 Introduction

The major users of glass bottles throughout the GOIC Member States are soft drink companies. These companies use glass bottles mainly for carbonated beverages and to a much lesser extent for fruit juices and cordials. There are several drinking water bottling companies located throughout the member states but these all use plastic (PVC) bottles.

Regional soft drink companies traditionally used and sold drinks in only one type of container - the returnable glass bottle. This is a strong glass bottle weighing between 370 to 450 grams depending on the specifications of the particular soft drink company. This bottle is returned to the bottling plant many times and is refilled. Using the returnable glass bottle the soft drink companies require to purchase a large number of glass bottles. When initially starting-up or expanding operations (e.g. additional bottling lines) but thereafter purchases are much smaller and simply to cover breakages and otherwise spoiled bottles.

In many markets outside the Gulf Region, for example North America, Western Europe and Japan, the returnable glass bottle has almost disappeared as the result of the introduction and rapid acceptance by consumers of non-returnable containers. These non-returnable containers are metal cans (tin plate or aluminium), non-returnable glass bottles, and most recently plastic bottles. The plastic bottles are made from polyvinyl chloride (PVC) and increasingly from polythylene terephthalate (PET) since the latter seems to be regarded as providing no possibility of health risks. The non-returnable glass bottles are much lighter than the returnable glass bottles; on average of 195 grams compared with say 410 grams.

This trend towards non-returnable containers is also increasingly apparent in the Arab Gulf State's markets. The Regional soft drink manufacturers are well aware of this trend and are increasingly offering alternative non-returnable containers to their retailers and consumers.

Within the last few years regional soft drink companies have started to sell canned soft drinks, initially on a filled imported basis, but several have now installed lines for making-up and filling cans. Soft drinks in cans have probably moved from less than 10 per cent of the totalled carbonated drink market in the mid-1970's in the GCC countries to approaching 50 percent in 1983.

More recently an alternative third container - the non-returnable glass bottle (NR glass bottle) has been offered by the Regional soft drink companies. While soft drinks in non-returnable glass bottles have featured in the GCC markets for some years they have been traditionally imported by import agents/wholesalers rather than by the soft drink companies. Within the last four years (and for several companies this year, 1983) local soft drink companies have started offering drinks in non-returnable glass bottles. Until this year (1983) all these drinks in non-returnable glass bottles were imported filled. This year, however, two soft drink factories in UAE started to import empty non-returnable glass bottles for filling at their own plants and several other companies are expecting to follow suit in 1984. NR glass bottles probably account for about 20 per cent of all carbonated soft drink sales in 1983 within the GCC countries.

As yet, Plastic bottles for carbonated drinks are almost non-existent in GCC markets. Some imported filled large ( 1½ - 2 litre) PET bottles have recently appeared and Pepsi Cola International is currently test marketing 0.25 litre NR PET bottles in Saudi Arabia as a possible replacement or alternative to NR glass bottles.

## 3.2 Demand for Glass Bottles

### 3.2.1 Present Demand for Carbonated Beverages by Container Type in GCC countries.

It is estimated that total consumption of carbonated beverages in the GCC countries was equivalent to 138 million cases (24 units per case) of 0.25 litre containers in 1983. This is the most popular size of soft drink container units in the Region although there are variations in actual sizes ranging up to 1.5 litres. This estimate covers both imported and locally produced beverages. Table 1 presents the detached estimates of consumption by country and container type and is based on market information provided by Pepsi-Cola International (Dubai). On the basis of this information the Saudi Arabian Market is very much the largest in the Region.

Table 2 re-presents Table 1 data so as to show the proportions (percentages) of returnable glass bottles, cans and non-returnable glass (NR glass) within total demand estimates. Overall cans are the most popular container type (47%) followed by returnable glass bottles (33%) and NR glass bottles (20%). There are, however, considerable variations between countries. In Bahrain, for example, returnable glass bottles strongly predominate (89%) this compares with the position in Saudi Arabia (24%), UAE (42%), and Qatar (48%). In 1983, plastic bottles for carbonated beverages are used only in insignificant numbers.

TABLE 1

Estimated Consumption(1) of Carbonated Beverages by Container Type, 1983

(Million Cases - All numbers rounded)

| Country | Unit | Returnable Bottles | Cans | Non-returnable bottles | Total |
|---|---|---|---|---|---|
| UAE | Million Cases- | 3.7 | 4.0 | 1.2 | 8.9 |
| Oman | 250 ml size | 2.5 | 1.9 | 0.8 | 5.2 |
| Bahrain | equivalent | 4.8 | 0.3 | 0.3 | 5.4 |
| Qatar | | 1.4 | 0.9 | 0.6 | 2.9 |
| S. Arabia | | 22.9 | 52.4 | 21.0 | 96.3 |
| Kuwait | | 9.5 | 5.7 | 3.8 | 19.0 |
| Total of above | | 44.8 | 65.2 | 27.7 | 137.7 |

Note: 1) Includes locally produced and imported.

Case = 24 containers

Source: GOIC estimates based on indications provided by Pepsi Cola International (Dubai)

TABLE 2

Estimated Consumption(*) of Carbonated Beverages By Container Type, 1983

( % rounded )

| Country | Returnable Bottles ** | Cans | Non-returnable bottles ** | Total |
|---|---|---|---|---|
| UAE | 41.5 | 44.7 | 13.8 | 100.0 |
| Oman | 47.3 | 36.4 | 16.4 | 100.0 |
| Bahrain | 89.2 | 5.4 | 5.4 | 100.0 |
| Qatar | 48.4 | 32.3 | 19.3 | 100.0 |
| Saudi Arabia | 23.8 | 54.5 | 21.8 | 100.0 |
| Kuwait . | 50.0 | 30.0 | 20.0 | 100.0 |
| Average of above | 32.5 | 47.4 | 20.1 | 100.0 |

Note: * Includes locally produced and imported.

** Glass

Source: GOIC estimates based on Market indications provided by Pepsi Cola International (Dubai)

3.2.2 Present Demand for Glass Bottles in Qatar, Bahrain and UAE

Based on information given during interviews with 11 soft drink manufacturers and the regional office of Pepsi Cola International the market in 1983 for glass bottles in UAE, Bahrain and Qatar in broad terms is as follows:

TABLE 3

Summary in Broad Terms of Glass Bottle Demand, UAE, Bahrain, Qatar, 1983

| Units | Returnable | | Non-Returnable | | Total | | |
|---|---|---|---|---|---|---|---|
| | Flint or white | Green | Flint | Green | Flint | Green | Both Colours |
| 1000 gross* | 58.1 | 19.7 | 233.0 | - | 291.1 | 19.7 | 310.8 |
| Tons** | 3460 | 1080 | 6545 | - | 9005 | 1080 | 11,085 |

Note: * Gross - 144

** See table 4 for conversion basis of bottle units to tons

Source: GOIC Estimates (see Table 4)

Two colours of glass, flint or white and green, are the only ones in regular demand by the 12 bottling units in the three countries.

However the broad numbers of bottles and tonnage estimates are not the important features for a supplier or potential supplier of glass bottles. What is important are the types of bottles demand, returnable and non-returnable, their colour and then, particularly, the specific individual types of bottles demanded by the various bottling companies. Each bottling company is buying bottles according to a strict specification laid down and enforced by the international Franchising group e.g. "7-Up" International, Pepsi-Cola International, Canada Dry International etc. This applies to whether the bottles are returnable or non-returnable. All the bottling companies are holders of Franchisis and consequently are governed by strict specifications which vary considerably not only between major groups, e.g. Pepsi and Canada Dry, but within the individual brand ranges, e.g. Pepsi range, there are several types of bottle. The non-returnable glass bottle does appear to be more uniform in specifications (e.g. weight) but variations between bottlers requirements still exist in shape and plastic coating/lables/caps.

In practice in 1983 among the 12 bottling companies there were found to exist 9 different types of flint/white returnable bottles, 5 different types of green returnable bottles, and 2 different types of flint non-returnable bottles. This detailed pattern of 1983 demand is shown in Table 4.

As far as the potential bottle supplier is concerned to meet the specifications of a particular bottler he must have a specially designed and approved bottle mould. One informent suggested that the cost of a single bottle mould would not be less than US$ 3000. Thus to fully satisfy the 1983 glass bottle market in UAE, Qatar and Bahrain a glass bottle producer would require 16 different moulds. In practice as Table 4 shows some types of bottles are required in very small quantities only and would be uneconomic for a new producer to supply.

At the present time the larger volume type of bottles are (8 different moulds):

| | Company/Type | Tons | Colour |
|---|---|---|---|
| RETURNABLE | | | |
| | Pepsi | 1950 | Flint |
| | "7-Up" | 850 | Green |
| | Canada Dry "Utility" | 490 | Flint |
| | "7-Up" | 375 | Flint |
| | Canada Dry | 230 | Flint |
| | Alkola | 150 | Flint |
| NR | | | |
| | PC Cola | 4215 | Flint |
| | Double Cola | 2330 | Flint |

Demand for glass bottles exhibits a strong seasonal pattern. All the bottlers contacted place their orders between October and December for delivery the next February and March and less frequently April. This is a very concentrated buying pattern.

TABL

ESTIMATED PURCHASES OF GLASS BOTTLES BY SOFT DRI

(1000 gro

| BOTTLE TYPE / COUNTRY | FLINT (WHITE) BOTTLES | | | | | |
|---|---|---|---|---|---|---|
| | PEPSI (410 gms) | "7-UP" (370 gms) | Canada Dry Spot Kola (450 gms) | Canada Dry "Utility" (450 gms) | Canada Dry "Mixes" (250 gms) | Alkola (410 gms) |
| RETURNABLE | | | | | | |
| QATAR | 5.0/10.0 | 4.5/4.5 | 1.5/1.0 | 1.0/1.0 | 0.3/0.3 | - |
| BAHRAIN | 15.0/15.0 | 2.5/2.5 | 2.0/2.0 | 3.5/3.5 | 0.3/0.3 | - |
| UAE | 8.0/8.0 | - | - | 3.0/3.0 | 1.0/1.0 | 2.5/2.5 |
| TOTAL OF ABOVE | 28.0/33.0 | 7.0/7.0 | 3.5/3.0 | 7.5/7.5 | 1.6/1.6 | 2.5/2.5 |
| TOTAL RETURNABLE (TONS) | | | | | | |
| 1982 | 1650 | 375 | 230 | 490 | 60 | 150 |
| 1983 | 1950 | 375 | 230 | 490 | 60 | 150 |
| NON-RETURNABLE (NR) | (195 gms) | (195 gms) | (195 gms) | (195 gms) | (195 gms) | (195 gms) |
| QATAR | - | - | - | - | - | - |
| BAHRAIN | - | - | - | - | - | - |
| UAE | - | - | - | - | - | - |
| TOTAL NR | - | - | - | - | - | - |
| TOTAL NR (TONS)** | | | | | | |
| 1982 | - | - | - | - | - | - |
| 1983 | - | - | - | - | - | - |

NOTES: * Gross = 144

** Converted to tons on following basis: 195 gms = 28.08 kg/gross | 400
250 gms = 36.00 " " | 410
370 gms = 53.28 " " | 450

SOURCE: GOIC Estimates based on interviews with leading soft drink manufacturers.

COMPANIES IN QATAR, BAHRAIN, UAE - 1982/1983

* rounded)

| | | | | GREEN BOTTLES | | | | |
|---|---|---|---|---|---|---|---|---|
| lkola oda/ onic ) gms) | RC Cola (400 gms) | Mazza/ Limca (400 gms) | "Double Cola" | PEPSI "Team" (410 gms) | "7-UP" (370 gms) | Canada Dry "Hi-Spot" (450 gms) | Canada Dry Ginger Ale (250 gms) | Alkola Zaamzam" (400 gms) |
| - | - | - | - | 0.2/0.2 | 2.5/2.5 | 0.4/0.4 | - | - |
| - | - | - | - | 1.0/1.0 | 5.5/5.5 | 1.5/1.5 | 0.2/0.2 | - |
| 5/0.5 | - | 3.0/3.0 | - | 0.4/0.4 | 8.0/8.0 | - | - | - |
| 5/0.5 | - | 3.0/3.0 | - | 1.6/1.6 | 16.0/16.0 | 1.9/1.9 | 0.2/0.2 | - |
| 30 | - | 175 | - | 95 | 850 | 125 | 10 | - |
| 30 | - | 175 | - | 95 | 850 | 125 | 10 | - |
| 5 gms) | (195 gms) | (195 gms) | (195 gms) | (195 gms) | (195 gms) | (195 gms) | (195 gms) | (195 gms) |
| - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - |
| - | 0/150.0 | - | /83.0 | - | - | - | - | - |
| - | 0/150.0 | - | /83.0 | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - |
| - | 0/4215 | - | 0/2330 | - | - | - | - | - |

= 57.60 kgs/gross
= 59.04 " "
= 64.80 " "

## 3.3 Supply of Glass Bottles

### 3.3.1 Imports

Import statistics for glass products are not sufficiently or consistenly available to provide any worthwhile guidance in ascertaining the present market size or sources of supply. Reliance has therefore been placed on information provided by the various bottling companies interviewed.

10 of the 11 bottling companies interviewed reported buying bottles from Singapore - Singapore Glass Company. Although this company was not always the sole source of bottles it is probably supplying (1983) about 75% of all returnable bottles but less than 50% of non-returnable bottles. In the case of returnable bottles Malaysia, Taiwan and UK were given as alternative sources and in 1983 probably Malaysia supplied more NR bottles than any other supplier. Several buyers stated that the Malaysian supplier was a "Sister" company to Singapore Glass.

In 1984 it is understood that the leading suppliers of bottles will be Singapore Glass (returnable and NR) Taiwan (NR), Malaysia (NR).

Actual purchases in 1982 and 1983 were reported from the following countries:

| Returnable | Non-returnable |
|---|---|
| Singapore | Singapore |
| Malaysia | Malaysia |
| Pakistan | — |
| Turkey | — |
| India | — |
| — | Taiwan |
| — | U.K. |

In addition to the above quotations were received from Spain (NR) and E. Europe (returnables). Almost all bottlers interviewed spoke very highly of Singapore Glass quality and of their competitive prices and good service.

In the case of bottlers in UAE, Bahrain and Qatar all bottle supplies are imported from outside the GOIC Region.

3.3.2 Local (GCC Region) Bottle Supply Sources.

At the present time there is only one bottle glass plant in operation. This plant is the National Glass Company and is located in Dammam. The company has been in operation since about 1970 and has a single 50 ton/day furnace and two bottle moulding lines. Annual capacity is quoted as about 15,000 tons. Glass sand is brought in by truck from the Riyadh region.

None of the 11 bottling companies interviewed currently purchase from National Glass. Several companies stated that in the mid-1970's they had purchased from National Glass but had found the quality of bottles and their packaging to be entirely unsatisfactory to the extent that they will now not even consider any offers from the company.

In the future this situation will change with a new 30,000 ton glass bottle factory consuming on steam in April 1984 in Kuwait and also the possibility of a 39,000 ton plant in Jeddah (Saudi Arabia) also going into production in 1984/5. Table 5 below gives details.

TABLE 5

New Glass Plants in GCC Region 1984/85

| Company | Location | Annual Capacity (tons) | Products/comments |
|---|---|---|---|
| Gulf Glass Manufacturing | Sebhan Industrial Estate (Kuwait) | 30,000 | Returnable and NR glass bottles. [Kuwait Industrial Bank Supported Project]. Start-up April 1984. |
| Saudi Glass Company | Jeddah (Saudi Arabia) | 39,000 | Returnable and NR glass bottles. (Project reported to be under implementation). Possible start-up 1984/4. |

Sources: GOIC Information

In addition two other plants are known to be under consideration but their exact status is unknown at this time. The first is in Oman, where the Ministry of Commerce and Industry has commissed a feasibility study for a 20,000 ton glass bottle plant with expectations that upto 75% of the sales will be outside Oman to other GCC states, Yemen and East Africa. The Ministry is understood to be trying to get the three bottling companies in Oman to invest in the project.

The other project mentioned to the GOIC study team is for a glass bottle plant (to produce mainly NR bottles) of unknown capacity to be located in Sharjah using flared gas as furnace fuel. A Sharjah investment company (which also owns Allied Beverages - "Double Cola") is the promotor of this project. The seriousness and exact status of this project is unknown to the GOIC study team.

Although not strictly a local supply source it is worth mentioning that a new glass plant using Japanese technology was started up in Pakistan in 1983 by a prominent Qatari businessmen. Todate only trial orders have been secured for the Pepsi bottling plant in Doha and it is understood that quality control problems are being experienced not on glass quality but on the applied ceramic table operation.

### 3.3.3 Prices of Glass Bottles

Prices of glass bottles have been falling over the last three years and currently (December 1983) bottlers are benefiting from the lowest price quotes ever. Competition is very strong and it all bottlers receive several quotations and experience a "buyers market".

The following is the recent and present prices of various types of glass bottles purchased by soft drink companies in UAE, Qatar and Bahrain. Overall it was found that prices paid by bottlers were fairly closely ranged.

TABLE 6

Recent Price Indications for Glass Bottles in UAE, Qatar and Bahrain

| Bottle Type | Source | Price | | Terms |
|---|---|---|---|---|
| | | US$ gross(1) | US$ ton(2) | (3) |
| Returnable (flint) (410 grams) | Singapore | 1981 $ 32 | 542 | C + F |
| | | 1982 $ 27 | 457 | C + F |
| | | 1983 $ 22-19 | 373-322 | C + F |
| Returnable (Green) (370 grams) | Singapore | 1981 $ 33 | 619 | C + F |
| | Malaysia | 1982 $ 24-26 | 488-450 | C + F |
| | | 1983 $ 21 | 394 | C + F |
| NR (Flint) (195 grams) | Singapore | 1983 $ 11.0 | 392 | C + F |
| | Spain | 12.50 | 445 | |
| | Taiwan | | | |
| | Malaysia | | | |

Note: (1) Gross = 144
(2) Conversion to tons as per table 4
(3) All prices include cardboard carton packaging

Source: GOIC Estimates based on information supplied by 11 soft drink companies.

Traditionally the terms of contracts have been on the basis of sight drafts but at the end of 1983 30 days and even 90 days credit (Taiwan) was apparently being offered for 1984 deliveries.

Packaging is in cardboard cartons (Returnables) often on wooden pallets (these pallets are charged extra) NR bottles may be in cardboard cartons or on cardboard trays shrink-wrapped in plastic film. Again the cartons are palletised. The cardboard cartons are sometimes used by the bottlers to packaged the filled bottles.

Printing. A bottle supplier must be able to supply bottles printed according to the buyers specification. In the case of returnable bottles this can be up to 3 colours by the ACL process (applied ceramic lable).

In the case of NR bottles these are supplied with and without lables/printing. At the present time the two bottlers filling NR's have different specifications. Double Cola bottles have a "Plastic Shield" which is made of polystyrene and is printed in two colours. RC Cola NR bottles are imported plain and paper lables are put on by the bottler. Pepsi Cola will in the future probably be importing unlabled bottles and adding a plastic lable at the bottling plant.

Approval of a bottle supplier by the bottler's Franchiser (e.g. Pepsi Cola, Canada Dry, etc.) is absolutely essential for marketing. The bottle supplier must have an approved mould and several batches of bottles will be tested by the Franchising groups. If satisfactory, the bottle plant gets an approval certificate and goe onto the list of approved bottle suppliers. This supplies to both returnable and non-returnable bottles.

## 3.4 Government Attitude to Glass Bottles

This is an important feature of the glass bottle market. The use of glass bottles of any type is understood to be banned by education authorities in Qatar. This does yet appear to be a fact yet in Bahrain. It was understood from one informat in UAE that non-returnable glass bottles are not allowed in schools, although it was not clear if this was all schools or elementary schools only.

On a general market front there have been moves by the Municipal Authorities in UAE to completely ban the use of non-returnable glass bottles on the grounds that discarded bottles increase litter and create hazards. A meeting between bottlers and the Municipality authorities in October 1983 appears to have resulted in an agreement to the effect that NR glass bottles will be allowed to continue for a six month trial period. In the meanwhile those companies using NR glass bottles and intending to introduce them (e.g Pepsi Cola) will establish a joint NR glass bottle collection company with five vehicles covering Dubai and Sharjah. This company will endeavor to collect discarded NR glass bottles. In the short term these will be stored in a yard and in the longer term they may be recycled either by reusing in bottle plants or sold to glass plants for use as cullet.

The UAE is the only state where any moves to restrict NR glass bottles appears to have taken place. Clearly, however, if NR glass containers are banned this has an enormous effect on the present and future size of glass bottle market. As pointed out in sections 3.2.2 / 3.2.3 above, NR glass bottles already in 1983, represent the largest tonnage of glass sales.

Because of this uncertain situation some bottlers, who are not already filling NR glass bottles, are undecided as to whether they will fill NR bottles next year (1984). They intend to follow events closely and to investigate the potential of plastic (PET) bottles. The most advanced in this latter activity appears to be Pepsi-Cola International (PCI) and its various Franchise holders. PCI is currently test marketing 0.25 litre PET bottles in Jeddah and informing its Regional Franchise holders of the results. The objective appears to be two fold - a fall back position if NR glass bottles are banned and even if they are not an alternative pack and hence marketing innovation for Pepsi Cola bottlers over their competitors.

## 4. FUTURE MARKET FOR GLASS BOTTLES

### 4.1 Demand Side.

#### 4.1.1 General Factors.

This is dependent on the growth of the soft drink market as a whole and on the relative shares that glass containers, returnable and non-returnable, are able to retain (returnable) or reach (NR glass bottles).

#### 4.1.2 Growth in Soft Drink Demand.

This is a particularly difficult time at which to try to make demand forecasts. All the bottlers interviewed were very uncertain about future levels of sales - with the exception of the one new entry (Allied Beverages - Double Cola) all bottlers had experienced a fall in demand in 1983. A 10 per cent fall during 1982 to 1983 was indicated several times. Previously total sales of soft drinks were felt to have been growing at between 10 and 15 per cent a year.

Some bottlers appear to anticipate relatively slow growth in carbonated beverages and have consequently introduced new product lines in fruit juice based or type non-carbonated drinks packaged in aluminium foil, paper/ foil composite packs or in plastic cups. None of these companies was contemplating the use of glass bottles or indeed PET bottles for this type of product.

At this point in time it does not seem unreasonable to project a 5 per cent compound growth based on 1983 market size estimate given in table 1 in section 3.2.1 above.

The results of such a projection in terms of number of cases are shown below. These estimates include locally produced and imported carbonated beverages. It is expected that locally produced beverages will increase their share of consumption at the expense of imports as product lines are expanded (cans) and new product lines added e.g. diet beverages.

TABLE 6

Projections of Total Carbonated Beverage

Demand 1983 - 1988

(Million cases*)

| Country | 1983 | 1986 | 1988 | Compound Growth Rate 1983-88 |
|---|---|---|---|---|
| Qatar | 2.9 | 3.36 | 3.70 | 5% |
| Bahrain | 5.4 | 6.25 | 6.89 | 5% |
| UAE | 8.9 | 10.30 | 11.36 | 5% |
| Oman | 5.2 | 6.02 | 6.64 | 5% |
| Total of Above | 22.4 | 25.93 | 28.59 | 5% |

NOTE : * Case = 24 units.

SOURCE : GOIC Estimates

4.1.3 Relative Future Positions of Glass Containers in Soft Drink Market.

This is especially difficult to try and predict at the present time, not only for the GOIC study team, but for every bottler in the industry.

What is clear is that returnable glass bottles will not increase in absolute numbers and there will consequently be a decrease in their share of the soft drink market. As a result the number of returnable bottles and tonnage estimates for 1983 shown in table 4 and throughout section 3.2.2 can be regarded as the maximum future demand in UAE, Qatar and Bahrain. Very broadly this means a maximum demand for flint returnable bottles of 3500 tons and 1100 tons of green returnable bottles. Within these total tonnages there are of course 14 different types of bottle.

The key question is what will be the position of the NR glass bottle. Clearly if legislation is enacted banning NR glass containers or restricting their use there may be no place whatever for NR glass bottles. This extreme position may be unlikely and while worried about the prospect of government restrictions most bottlers feel that NR glass containers are good containers with high consumer and retailer appeal. Several bottlers are installing or ordering new bottling lines which will handle NR glass containers. Some bottlers because of the uncertainty are ordering lines which will be extremely flexible in the type of container that they can handle - ranging from cans to large size PET bottles.

In 1983 it is estimated that 6550 tons of NR glass bottles were imported into UAE for filling by two bottling plants (see section 3.2.2 above). In 1984 Pepsi Cola franchise holders in Qatar and UAE will be running NR glass bottle lines while existing NR glass bottlers intend to expand their output at the expense of returnables and cans. Based on indications given by 4 major bottlers (3 in UAE, and 1 in Qatar) the demand for NR glass containers could rise from 6550 tons to 22,150 tons in 1984. This demand would involve 3 types of bottle. Without restrictions on NR glass bottles, other bottlers will definitely follow suit since they feel that they cannot compete effectively without also offering NR bottles. PET bottles are regarded as a possible alternative but much will depend on the results of the current test marketing programme of Pepsi-Cola in Saudi Arabia. Todate no one seems sure of the price of the PET bottle (0.25 litre size). It is felt that the PET bottle will, at least initially, be more expensive than NR glass bottles, but that in any case the PET package needs to be thoroughly tested as to shelf life and consumer reaction before serious commercial inquiries or negotiations are entered into.

In these uncertain circumstances the best that can be done is to indicate the position if NR glass bottles are not legislated against and achieve various levels of market penetration. This is presented below in Table 7 where market penetration assumptions are ranged from 20% (approximately the current 1983 level) to 40%.

TABLE 7

Indicated Tonnage for NR Glass Bottles in Qatar, UAE, Bahrain and Oman 1983 - 88.

A Carbonated Beverage Demand (Million cases - rounded)

| Country(1) | 1983 | 1986 | 1988 |
|---|---|---|---|
| Qatar | 2.9 | 3.4 | 3.7 |
| Bahrain | 5.4 | 6.3 | 6.9 |
| UAE | 8.9 | 10.3 | 11.4 |
| Total of Above | 17.2 | 20.0 | 22.0 |
| Oman | 5.2 | 6.0 | 6.5 |
| Total of Above | 22.4 | 26.0 | 28.5 |

B Tonnage of Glass Required at Indicated NR glass bottle penetration (tons/year rounded)(2)

| Qatar, UAE, Bahrain NR Market Share(3) | | | |
|---|---|---|---|
| 20% | 16,100 | 18,700 | 20,600 |
| 25% | 20,100 | 23,400 | 25,700 |
| 35% | Not applicable | 32,800 | 36,100 |
| 40% | Not applicable | 37,400 | 41,100 |
| **Above plus Oman** | | | |
| 20% | 21,000 | 24,300 | 26,700 |
| 25% | 26,200 | 30,400 | 33,300 |
| 35% | Not applicable | 42,600 | 46,700 |
| 40% | Not applicable | 48,600 | 53,200 |

SOURCES: (1) Table 6

(2) Based on conversion factor of 4.68 kgs/case.

(3) GOIC assumptions.

The above analysis indicates a market for NR glass bottles in UAE, Bahrain and Qatar of between 21,000 (12% market penetration) to 41,000 tons (40% market penetration) in 1988.

If Oman is included in this assessment the tonnages are increased to approximately 27,000 and 53,200 tons respectively.

Of this tonnage about 75% can be expected to be flint glass and 25% green glass.

4.2 Supply Side.

1983 and 1984 appear to offer the bottlers a "buyers market" in both returnable and NR glass bottles. Prices are lower than those of the late 1970's and for 1984 deliveries credit is being offered for the first time.

Bottlers appear to have a wide choice of suppliers. At the moment these are all outside the GOIC region since none of the bottlers contacted consider the National Glass Company in Dammam as offering high enough quality products. During 1984 two additional regional based suppliers will come on steam in Kuwait (30,000 tons) and in Jeddath, Saudi Arabia (39,000 tons).

Possible Regional Projects in addition to that of Fujariah are in Oman where a plant of 20,000 tons is under consideration by the Ministry of Commerce and Industry and in Sharjah where an investment group (owners of Allied Beverage - Double Cola) is reported to have made some studies for a plant to produce NR glass bottles for their own use as well as those of other bottlers.

Even if these possible projects are not implemented there will remain very strong competition from the established foreign suppliers such as Singapore Glass, Malaysia, Taiwan and possibly from the new plant in Pakistan. North Yemen is also understood to be considering establishing a bottle plant.

So even if NR glass bottles have an "unrestricted-take-off" the elements of a buyers market may remain since it is difficult to foresee any capacity shortage.

If the PET bottle is introduced as an alternative to the NR glass bottle this will add a new competitive element for existing and new bottle supply companies and keep downward pressure on NR glass bottle prices.

## 4.3 Attitude of Bottling Companies to a potential new supplier of Glass Bottles.

The general attitude of bottling companies interviewed was positive. They generally welcome the idea of another supplier and particularly one located in the Region. The advantages which they saw a regional supplier offering were shorter delivery times and the possibility of spreading deliveries. At the present time it seems that bottlers receive several large deliveries of bottles before the summer season. A local supplier might be able to offer alternative and less lumpy scheduling of deliveries.

All bottlers stressed that any new plant must be an approved supplier and offer good quality products consistently.

In terms of price all bottlers stressed that prices must match those of imported suppliers.

## 5. POSITION OF PROPOSED FUJARIAH GLASS PLANT.

### 5.1 Market Areas

Unless the NR glass bottle becomes an important long term feature of the soft drink market the market potential for a new bottle plant would be extremely limited.

If the NR glass bottle is acceptable to governament and consumers then the obvious regional market areas for a Fujariah plant would be UAE, Qatar, Bahrain and Oman. The latter market, however, will depend on what happens about the proposed glass bottle project there. Outside the Region the Yemen's and East Africa may be possibilities.

### 5.2 Product Mix

Depending on the economics of production runs the plant should offer only a limited range of the most popular returnable glass bottles - principally the "Pepsi" and "7-Up" ranges. Most production would probably be concentrated on NR glass bottles. Probably about 75% of output would be for flint glass and 25% for green glass.

### 5.3 Product Approval

This will be absolutely necessary if any sales are to be made at all. Approval of moulds and product quality will need to be sought from the leading off drink franchising companies and particularly Pepsi-Cola, Canada Dry, "7-Up", RC cola, and Double Cola.

5.4 Product Quality

It will be necessary for this to be first class - at least equal to standards offered, for example, by Singapore Glass.

5.5 Prices

In the present circumstances it is unlikely that any new plant could command any sort of price premium (without protection).

5.6 Attitude of Bottlers to New Supplier

This is positive but quality and price must be right. Competition is likely to be very strong from other suppliers and no premium for local supply seems likely to be obtainable.

5.7 Possible Cash Flow Problem

At the present time all the major bottlers contacted concentrate their ordering in the period October to December and take delivery mainly in February and March. The production of glass is a continuous process consequently on the basis of the present system of ordering/delivery the new glass plant would be producing and financing stocks. More flexible delivery schedules may be possible from a regional based plant and should be investigated.

5.8 Recommendations

5.8.1 In view of the considerable uncertainty of the position of the NR glass bottle it is recommended that the market situation be monitored closely over the next six months and possibly 12 months before any decision is made regarding the project.

5.8.2 The items to be monitored include the government attitude to NR glass, the six month trial period of NR bottle collecting in Dubai and Sharjah, the result of the PET bottle test marketing by Pepsi Cola in Saudi Arabia, the movement of bottle prices, and actual developments eg. new bottling lines etc. at the leading soft drinks companies in the Region.

5.8.3 Contact with the new Kuwait Glass plant company may be valuable in terms of both technical and commercial experience.

5.8.4 Contact with possible technology suppliers and joint venture partners may also be valuable.

5.8.5 The position regarding the projects proposed in Oman and Sharjah should be ascertained. There may be joint venture prospects in both these situations.

# 5. APPENDICES

APPENDIX I

## LIST OF MAIN ORGANIZATIONS CONTACTED

QATAR

Pepsi Cola Factory - Doha

Qatar Refreshment Company - Doha
("7-Up")

Al Sharif Beverages Organization - Doha
( "Canada Dry")

BAHRAIN

Ahmadis Industries Ltd. - Manama
("Pepsi Cola")

Refreshment Trading Company of Bahrain - Bahrain
( "7-Up")

Canada Dry Bottling Plant - Manama

UAE

Dubai Refreshment Company - Dubai
( "Pepsi Cola")

National Refreshments Company - Dubai
( "7-Up" & "Canada Dry")

Allied Beverages Company - Sharjah
( "Double Cola")

Dubai Mineral Water Company - Dubai
("Alkola", "Zam Zam")

Union Beverages - Sharjah
( "RC Cola" "Mazza" "Limca")

Dixi Cola - Canning & Beverages - Dubai

Pepsi Cola International Ltd. - Dubai
(Pepsi Cola Regional Office)

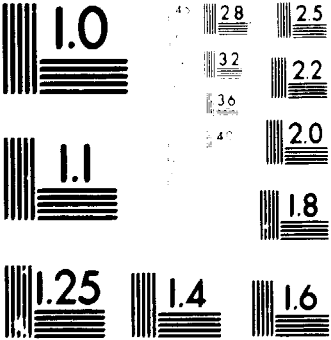
pvs.

# APPENDIX - II

## OUTLINE QUESTIONNAIRE FOR GLASS BOTTLE AND OTHER GLASS CONTAINERS USERS

OUTLINE QUESTIONNAIRE FOR GLASS BOTTLE AND OTHER GLASS CONTAINERS USERS

| | | |
|---|---|---|
| 1. | DATE OF INTERVIEW | |
| 2. | COMPANY NAME: | |
| | ADDRESS/LOCATION: | |
| | TELEX: | |
| | TELEPHONE: | |
| | DATE OF START-UP | |
| 3. | RESPONDENT NAME: | |
| | POSITION | |


1.0
2.8
2.5
3.2
2.2
3.6
4.0
2.0
1.1
1.8
1.25
1.4
1.6

4. COMPANY PRODUCTS

| Product Name/Description | Output Quantity | | | | |
|---|---|---|---|---|---|
| | 1980 | 1981 | 1982 | 1983 | Future |
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |

Any Comments

| |
|---|
| |
| |

5. GLASS CONTAINER USAGE

| Product used for | Glass Containers Used | | Quantities used | | | |
|---|---|---|---|---|---|---|
| | Type | Specifications | 1980 | 1981 | 1982 | 1983 |
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| 5. | | | | | | |

Any Comments e.g. seasonality

| |
|---|
| |
| |
| |

## 6. GLASS CONTAINERS - SUPPLY AND PRICES

| Container Type | Specification | Supply Source Country/Company | Price 1982 | Price 1983 |
|---|---|---|---|---|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |

Any Comments - e.g. Price trends. Latest price offers etc.

## 7. NON-GLASS/COMPETITIVE CONTAINER USAGE

| Product | Container | | Quantities used | | | |
|---|---|---|---|---|---|---|
| | Type | Specifications | 1980 | 1981 | 1983 | 1984 |
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| 5. | | | | | | |

Any Special Features/Comments

## 8. NON-GLASS CONTAINERS - SUPPLY AND PRICES

| Container type | Specifications | Supply sources | Prices | |
|---|---|---|---|---|
| | | | 1982 | 1983 |
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |

Comments - Price trends, latest price offers

## 9. COMMENTS ON GLASS VERSUS NON-GLASS CONTAINERS USAGE

e.g. Reasons for choice/substitution/expected/possible changes etc.

## 10. FORECAST OF GLASS CONTAINER USAGE

| Product | Containers | | Quantities | |
|---|---|---|---|---|
| | Type | Specifications | 1985 | 1990 |
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |

Any Special Features/Comments

| |
|---|
| |

## 11. PURCHASING POLICY FOR GLASS CONTAINERS

| Container Type | Frequency of Purchase | FOB/CIF Basis | Credit Terms |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

Any Comments

| |
|---|
| |

## 12. ATTITUDE TO NEW (LOCAL) SUPPLIER

1. Prepared to consider?

2. What conditions must new supplier satisfy?

kB/

Feasibility Studies Section,
UNIDO,
P.O.Box 300,
A-1400 Vienna.

P.O.Box 550,
Muscat,
Oman.

15th May, 1984.

Dear Mr. Behrens,

<u>Glass Bottle Manufacture in UAE</u>.

A soon as possible after my return here I looked into the position of the local glass project and had a talk with the person concerned, who advised me as follows.

1. A preliminary licence has been granted to Mohsin Haider Darwish to establish a plant to make glass products and especially non-returnable glass bottles for the soft drink industry. For a full licence formal approval is needed from the Council for Conservation of the Environment, but Gordon Wain, our UNIDO Pollution Control Expert, advises me that this should present no problem.
2. The shareholding of the new Company, probably to be called Oman Glass Manufacturing Co LLC, involves the two major soft drink companies, thereby securing most of their market.
3. The plant is expected to produce 10,000 tons packed weight of bottles initially and their calculations show it to be viable on the basis of the local demand, but there will be some surplus for possible export. They expect to go out to tender shortly. Total investment capital of about 3.5million Omani Rials is proposed. The Consultants MAUL INTERNATIONAL of New Jersey and Bombay will be visiting shortly to help to finalise details, but they believe that there is satisfactory raw material in Oman, though some beneficiation will probably be necessary in the case of both quartz and quartzite. Dolomite and Limestone according to testing are suitable.
4. Tata were the consultants, who did the first feasibility study, with which I disagreed as it did not include non-returnable bottles, and are no longer involved.
5. They are going ahead with this project as quickly as they can and expect start-up to be mid to late 1986.
6. Pepsi's tests with PET plastic bottles are said to have been a failure and PET has been dismissed as unsuitable for the high ambient temperatures of the Gulf. The non-returnable bottles, which have been agreed with the Municipal Authorities have a plastic sleeve shrunk on to minimise risk of broken glass. Glass bottle collection points and services are also to be

P.T.O.

set up by the soft drink companies and the glass manufacturer. There was apparently some talk of a levy on non-returnable bottles coming in from UAE, which sounds like a neat non-tariff barrier!

My recommendation would be to advise Fujairah to proceed with a similar sized plant and product range but not to rely on the Oman market. With a little judicious cooperation the two plants could make some lower demand sizes of glass containers for both markets. Similarly raw materials might be obtained from Oman rather than establishing their own beneficiation facilities. They might also use the services of MAUL EASTERN, the Bombay branch of Maul International of New Jersey as-consultants.

With six bottling companies in UAE there should be a large sustainable demand for non-returnable bottles and once glass containers are available locally other uses for them will develop viz sauces, jams, breaking bulk for products like coffee, baby foods etc.. Some intelligent market creation should use up any spare capacity, if the plant is reasonably flexible in its capabilities and available moulds.

Best Wishes,

Yours sincerely,

Patrick Davies

Patrick Davies.
UNIDO Adviser in Market Research.

PS Some cheaper sources of bottles have proved unsatisfactory.

TAPC FOR PRODUCT =A= foreign : GLASS

| | YEAR: 1 | YEAR: 2 | YEAR: 3 | YEAR: 4 |
|---|---|---|---|---|
| raw material | 1156.24 | 1215.35 | 1286.10 | 1375.24 |
| other raw materials | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities | 545.00 | 545.00 | 545.00 | 545.00 |
| energy | 0.0 | 0.0 | 0.0 | 0.0 |
| labour | 0.0 | 0.0 | 0.0 | 0.0 |
| maintenance | 0.0 | 0.0 | 0.0 | 0.0 |
| spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| factory overheads | 0.0 | 0.0 | 0.0 | 0.0 |
| sub-total ( factory costs ) | 3401.24 | 3460.35 | 3531.10 | 3620.24 |
| of these variable | 1156.24 | 1215.35 | 1286.10 | 1375.24 |
| administrative overheads | 40.00 | 40.00 | 40.00 | 40.00 |
| of these labour | 0.0 | 0.0 | 0.0 | 0.0 |
| total before depreciation and interests | 3441.24 | 3500.35 | 3571.10 | 3660.24 |
| depreciation | 0.0 | 0.0 | 0.0 | 0.0 |
| total before interests | 3441.24 | 3500.35 | 3571.10 | 3660.24 |
| interests, payable on deb'tures | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs | 3441.24 | 3500.35 | 3571.10 | 3660.24 |
| of it variable | 1156.24 | 1215.35 | 1286.10 | 1375.24 |
| of it labour ( total, direct and indirect ) | 0.0 | 0.0 | 0.0 | 0.0 |

| | YEAR: 9 | YEAR:10 | YEAR:11 | YEAR:12 |
|---|---|---|---|---|
| raw material | 2099.46 | 2286.82 | 2282.37 | 1732.14 |
| other raw materials | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities | 545.00 | 545.00 | 545.00 | 545.00 |
| energy | 0.0 | 0.0 | 0.0 | 0.0 |
| labour | 0.0 | 0.0 | 0.0 | 0.0 |
| maintenance | 0.0 | 0.0 | 0.0 | 0.0 |
| spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| factory overheads | 0.0 | 0.0 | 0.0 | 0.0 |
| sub-total ( factory costs ) | 4344.46 | 4531.82 | 4527.37 | 3977.14 |
| of these variable | 2099.46 | 2286.82 | 2282.37 | 1732.14 |
| administrative overheads | 40.00 | 40.00 | 40.00 | 40.00 |
| of these labour | 0.0 | 0.0 | 0.0 | 0.0 |
| total before depreciation and interests | 4384.46 | 4571.82 | 4567.37 | 4017.14 |
| depreciation | 0.0 | 0.0 | 0.0 | 0.0 |
| total before interests | 4384.46 | 4571.82 | 4567.37 | 4017.14 |
| interests, payable on deb'tures | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs | 4384.46 | 4571.82 | 4567.37 | 4017.14 |
| of it variable | 2099.46 | 2286.82 | 2282.37 | 1732.14 |
| of it labour ( total, direct and indirect ) | 0.0 | 0.0 | 0.0 | 0.0 |

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APPENDIX XI.4

"BASIC VERSION"

| YEAR: 5 | YEAR: 6 | YEAR: 7 | YEAR: 8 |
|---|---|---|---|
| 1477.06 | 1219.33 | 1772.30 | 1926.79 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| 545.00 | 545.00 | 545.00 | 545.00 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| ********* | ********* | ********* | ********* |
| 3722.06 | 3464.33 | 4017.30 | 4171.79 |
| 1477.06 | 1219.33 | 1772.30 | 1926.79 |
| 40.00 | 40.00 | 40.00 | 40.00 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| ********* | ********* | ********* | ********* |
| 3762.06 | 3504.33 | 4057.30 | 4211.79 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| ********* | ********* | ********* | ********* |
| 3762.06 | 3504.33 | 4057.30 | 4211.79 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| ********* | ********* | ********* | ********* |
| 3762.06 | 3504.33 | 4057.30 | 4211.79 |
| 1477.06 | 1219.33 | 1772.30 | 1926.79 |
| 0.0 | 0.0 | 0.0 | 0.0 |

| YEAR:13 | YEAR:14 | YEAR:15 |
|---|---|---|
| 2282.37 | 2282.37 | 2282.37 |
| 0.0 | 0.0 | 0.0 |
| 545.00 | 545.00 | 545.00 |
| 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 |
| 1700.00 | 1700.00 | 1700.00 |
| 0.0 | 0.0 | 0.0 |
| ********* | ********* | ********* |
| 4527.37 | 4527.37 | 4527.37 |
| 2282.37 | 2282.37 | 2282.37 |
| 40.00 | 40.00 | 40.00 |
| 0.0 | 0.0 | 0.0 |
| ********* | ********* | ********* |
| 4567.37 | 4567.37 | 4567.37 |
| 0.0 | 0.0 | 0.0 |
| ********* | ********* | ********* |
| 4567.37 | 4567.37 | 4567.37 |
| 0.0 | 0.0 | 0.0 |
| ********* | ********* | ********* |
| 4567.37 | 4567.37 | 4567.37 |
| 2282.37 | 2282.37 | 2282.37 |
| 0.0 | 0.0 | 0.0 |

TABC FOR PRODUCT «A» local : GLASS

| | YEAR: 1 | YEAR: 2 | YEAR: 3 | YEAR: 4 |
|---|---|---|---|---|
| raw material | 512.70 | 538.90 | 570.28 | 609.80 |
| other raw materials | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities | 0.0 | 0.0 | 0.0 | 0.0 |
| energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| labour | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| maintenance | 850.00 | 850.00 | 850.00 | 850.00 |
| spares | 0.0 | 0.0 | 0.0 | 0.0 |
| factory overheads | 264.60 | 264.60 | 264.60 | 264.60 |
| sub-total ( factory costs ) | 8670.56 | 8696.77 | 8720.15 | 8767.67 |
| of these variable | 512.70 | 538.90 | 570.28 | 609.80 |
| administrative overheads | 1292.00 | 1292.00 | 1292.00 | 1292.00 |
| of these labour | 1097.00 | 1097.00 | 1097.00 | 1097.00 |
| total before depreciation and interests | 9962.56 | 9988.77 | 10020.15 | 10057.67 |
| depreciation | 5740.98 | 5740.98 | 5740.98 | 5740.98 |
| total before interests | 15703.54 | 15729.75 | 15761.12 | 15800.64 |
| interests, payable on deb'tures | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs | 15703.54 | 15729.75 | 15761.12 | 15800.64 |
| of it variable | 512.70 | 538.90 | 570.28 | 609.80 |
| of it labour ( total, direct and indirect ) | 2865.60 | 2865.60 | 2865.60 | 2865.60 |

| | YEAR: 9 | YEAR:10 | YEAR:11 | YEAR:12 |
|---|---|---|---|---|
| raw material | 930.93 | 1014.01 | 1012.04 | 768.06 |
| other raw materials | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities | 0.0 | 0.0 | 0.0 | 0.0 |
| energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| labour | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| maintenance | 850.00 | 850.00 | 850.00 | 850.00 |
| spares | 0.0 | 0.0 | 0.0 | 0.0 |
| factory overheads | 2439.60 | 3088.60 | 3088.60 | 1064.60 |
| sub-total ( factory costs ) | 11263.80 | 11995.88 | 11993.90 | 9725.93 |
| of these variable | 930.93 | 1014.01 | 1012.04 | 768.06 |
| administrative overheads | 1292.00 | 1292.00 | 1292.00 | 1292.00 |
| of these labour | 1097.00 | 1097.00 | 1097.00 | 1097.00 |
| total before depreciation and interests | 12555.80 | 13287.88 | 13285.90 | 11017.93 |
| depreciation | 3958.98 | 3931.48 | 1866.75 | 396.75 |
| total before interests | 16524.78 | 17219.36 | 15152.65 | 11414.68 |
| interests, payable on deb'tures | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs | 16524.78 | 17219.36 | 15152.65 | 11414.68 |
| of it variable | 930.93 | 1014.01 | 1012.04 | 768.06 |
| of it labour ( total, direct and indirect ) | 2865.60 | 2865.60 | 2865.60 | 2865.60 |

=====================================================================

=====================================================================

| YEAR: 5 | YEAR: 6 | YEAR: 7 | YEAR: 8 |
|---|---|---|---|
| 654.95 | 540.67 | 785.86 | 854.37 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| 850.00 | 850.00 | 850.00 | 850.00 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| 264.60 | -4053.90 | 1274.60 | 1842.60 |
| ========= | ========= | ========= | ========= |
| 8812.82 | 7380.04 | 9973.73 | 10590.24 |
| 654.95 | 540.67 | 785.86 | 854.37 |
| 1292.00 | 1292.00 | 1292.00 | 1292.00 |
| 1097.00 | 1097.00 | 1097.00 | 1097.00 |
| ========= | ========= | ========= | ========= |
| 10104.82 | 8672.04 | 11265.73 | 11882.24 |
| 5703.48 | 2498.98 | 3968.98 | 3968.98 |
| ========= | ========= | ========= | ========= |
| 15808.29 | 11171.01 | 15234.71 | 15851.21 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= |
| 15808.29 | 11171.01 | 15234.71 | 15851.21 |
| 654.95 | 540.67 | 785.86 | 854.37 |
| 2865.60 | 2865.60 | 2865.60 | 2865.60 |

| YEAR:13 | YEAR:14 | YEAR:15 |
|---|---|---|
| 1012.04 | 1012.04 | 1012.04 |
| 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 |
| 5274.67 | 5274.67 | 5274.67 |
| 1768.60 | 1768.60 | 1758.60 |
| 850.00 | 850.00 | 850.00 |
| 0.0 | 0.0 | 0.0 |
| 3038.60 | 3088.60 | 3088.60 |
| ========= | ========= | ========= |
| 11993.90 | 11993.90 | 11993.90 |
| 1012.04 | 1012.04 | 1012.04 |
| 1292.00 | 1292.00 | 1292.00 |
| 1097.00 | 1097.00 | 1097.00 |
| ========= | ========= | ========= |
| 13285.90 | 13285.90 | 13285.90 |
| 1796.75 | 1796.75 | 1759.25 |
| ========= | ========= | ========= |
| 15082.65 | 15082.65 | 15045.15 |
| 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= |
| 15082.65 | 15082.65 | 15045.15 |
| 1012.04 | 1012.04 | 1012.04 |
| 2865.60 | 2865.60 | 2865.60 |

## Total initial investment costs in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| Fixed investment costs | | |
| Land site preparation and development | 600.00 | 75.00 |
| Buildings and civil works | 5300.00 | 1210.00 |
| Auxiliary and service facilities | 0.0 | 0.0 |
| Incorporated fixed assets | 75.00 | 175.00 |
| Plant machinery and equipment | 8324.00 | 20048.25 |
| Total fixed investment costs | 14299.00 | 21508.25 |
| Pre-production capital expendit | 6460.00 | 3714.14 |
| Working capital | 0.0 | 2301.75 |
| Total initial investment costs | 20759.00 | 27524.14 |
| Of it foreign, in % | 44.19 | 82.04 |

1)

197



## Total current investment costs in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 0.0 | 0.0 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 0.0 | 0.0 | 0.0 |
| Total fixed investment costs | 0.0 | 0.0 | 0.0 | 0.0 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 3395.28 | -499.64 | 117.38 | 147.04 |
| Total current investment costs | 3395.28 | -499.64 | 117.38 | 147.04 |
| Of it foreign, % | 7.75 | 111.61 | 36.45 | 39.53 |

2)



COMFAR 1.0 - UNIDO Vienna

## Total current investment costs in 1000 DHS

| Year | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 150.00 | 0.0 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 7350.00 | 0.0 | 0.0 |
| Total fixed investment costs | 150.00 | 7350.00 | 0.0 | 0.0 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 166.43 | -591.44 | 1207.33 | 324.65 |
| Total current investment costs | 316.43 | 6758.56 | 1207.33 | 324.65 |
| Of it foreign, % | 66.95 | 106.51 | 27.84 | 29.00 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

## Total current investment costs in 1000 DHS

| Year | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 0.0 | 150.00 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 0.0 | 0.0 | 7000.00 |
| Total fixed investment costs | 0.0 | 150.00 | 0.0 | 7000.00 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 360.43 | 391.53 | -6.67 | -1151.62 |
| Total current investment costs | 360.43 | 541.53 | -6.67 | 5848.38 |
| Of it foreign, % | 29.19 | 48.78 | 39.67 | 113.99 |





## Total current investment costs in 1000 DHS

| Year | 1999 |
|---|---|
| Fixed investment costs: | |
| Land, site preparation and development | 0.0 |
| Buildings and civil works | 0.0 |
| Auxiliary and service facilities | 0.0 |
| Incorporated fixed assets | 0.0 |
| Plant, machinery and equipment | 0.0 |
| Total fixed investment costs | 0.0 |
| Preproduction capitals expend's | 0.0 |
| Working capital | 1151.62 |
| Total current investment costs | 1151.62 |
| Of it foreign, % | 28.96 |

## Cashflow tables, construction in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| Total CF-inflow | 20759.00 | 26110.00 |
| . Financial resources | 20759.00 | 26110.00 |
| . Sales | 0.0 | 0.0 |
| Total CF-outflow | 20759.00 | 27524.14 |
| . Total assets | 20759.00 | 26110.00 |
| . Operating costs | 0.0 | 0.0 |
| . Debt service and interest | 0.0 | 1414.14 |
| . Repayment | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 |
| Surplus ( deficit ) | 0.0 | -1414.14 |
| Cumulated cash balance | 0.0 | -1414.14 |
| Inflow local currency | 10379.50 | 26110.00 |
| Outflow local currency | 11585.00 | 4724.14 |
| Surplus ( deficit ) local currency | -1205.50 | 21385.86 |
| Inflow foreign currency | 10379.50 | 0.0 |
| Outflow foreign currency | 9174.00 | 22800.00 |
| Surplus ( deficit ) foreign currency | 1205.50 | -22800.00 |

200.

## Cashflow tables, production in 1000DHS

| Year | 1987 | 1988 |
|---|---|---|
| Total CF-inflow | 15569.30 | 14236.83 |
| . Financial resources | 2793.53 | 100.36 |
| . Sales | 12775.77 | 14136.46 |
| Total CF-outflow | 21519.69 | 21904.51 |
| . Total assets | 4065.94 | -494.90 |
| . Operating costs | 14625.48 | 14852.29 |
| . Debt service and interest | 2828.28 | 2833.31 |
| . Repayment | 0.0 | 4713.80 |
| . Corporate tax | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 |
| Surplus ( deficit ) | -5950.39 | -7657.68 |
| Cumulated cash balance | -7364.53 | -15032.21 |
| Inflow local currency | 22713.04 | 22718.92 |
| Outflow local currency | 17626.39 | 19578.28 |
| Surplus ( deficit ) local currency | 5086.64 | 3140.64 |
| Inflow foreign currency | 1358.53 | 722.67 |
| Outflow foreign currency | 3873.30 | 2326.23 |
| Surplus ( deficit ) foreign currency | -2504.77 | -1603.55 |

GLASS BOTTLE PROJECT

## Cashflow tables, production in 1000DHS

| Year | 1992 | 1993 |
|---|---|---|
| Total CF-inflow | 15811.37 | 23272.76 |
| . Financial resources | 0.0 | 0.0 |
| . Sales | 15811.37 | 23272.76 |
| Total CF-outflow | 25659.37 | 18950.48 |
| . Total assets | 6664.64 | 1392.15 |
| . Operating costs | 17694.47 | 17549.55 |
| . Debt service and interest | 569.68 | 2.01 |
| . Repayment | 4730.58 | 16.78 |
| . Corporate tax | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 |
| Surplus ( deficit ) | -9848.00 | 4322.28 |
| Cumulated cash balance | -38953.86 | -34631.58 |
| Inflow local currency | 15260.97 | 20928.71 |
| Outflow local currency | 16362.78 | 16574.94 |
| Surplus ( deficit ) local currency | -1101.81 | 4353.77 |
| Inflow foreign currency | 1501.76 | 2327.28 |
| Outflow foreign currency | [illegible]6.59 | 2375.55 |
| Surplus ( deficit ) foreign cu[illegible]y | [illegible].93 | -48.27 |

GLASS BOTTLE PROJECT

| | | |
|---|---|---|
| 1989 | 1990 | 1991 |
| 15631.83 | 17278.90 | 19090.06 |
| 0.0 | 0.0 | 0.0 |
| 15631.83 | 17278.90 | 19090.06 |
| 22216.98 | 21970.80 | 21886.66 |
| 123.06 | 154.19 | 324.60 |
| 15090.66 | 15381.01 | 15694.13 |
| 2272.69 | 1705.02 | 1137.35 |
| 4730.58 | 4730.58 | 4730.58 |
| 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 |
| -6595.15 | -4691.89 | -2796.60 |
| -21617.36 | -26309.26 | -29105.85 |
| 22320.53 | 21529.43 | 21100.85 |
| 19285.98 | 19385.87 | 19165.97 |
| 3034.55 | 2143.56 | 1934.89 |
| 782.06 | 1295.38 | 1431.60 |
| 2931.00 | 2584.93 | 2720.69 |
| -2148.94 | -1289.55 | -1289.09 |





| | | |
|---|---|---|
| 1994 | 1995 | 1996 |
| 25683.00 | 28334.72 | 31249.60 |
| 0.0 | 0.0 | 0.0 |
| 25683.00 | 28334.72 | 31249.60 |
| 18910.68 | 20041.82 | 21415.69 |
| 367.48 | 407.44 | 592.61 |
| 18543.20 | 19634.38 | 20823.08 |
| 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 |
| 6772.31 | 8292.90 | 9833.92 |
| -27859.26 | -19565.37 | -9732.45 |
| 23114.23 | 25501.25 | 28125.11 |
| 16858.29 | 18038.80 | 19322.89 |
| 6255.95 | 7462.44 | 8802.21 |
| 2563.76 | 2833.47 | 3124.50 |
| 2052.40 | 2003.02 | 2092.80 |
| 516.37 | 830.46 | 1.70 |

## Cashflow tables, production in 1000DHS

| Year | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Total CF-inflow | 31249.60 | 23436.82 | 31249.60 | 31249.60 | 31249.60 |
| . Financial resources | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Sales | 31249.60 | 23436.82 | 31249.60 | 31249.60 | 31249.60 |
| Total CF-outflow | 20809.62 | 23070.92 | 22124.84 | 20816.65 | 20816.65 |
| . Total assets | -7.03 | 5691.61 | 1308.19 | 0.0 | 0.0 |
| . Operating costs | 20816.65 | 17379.11 | 20816.65 | 20816.65 | 20816.65 |
| . Debt service and interest | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Repayment | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Surplus ( deficit ) | 10439.98 | 365.69 | 9124.76 | 10432.96 | 10432.96 |
| Cumulated cash balance | 707.53 | 1073.43 | 10198.19 | 20631.15 | 31064.10 |
| Inflow local currency | 28125.11 | 20982.60 | 28125.11 | 28125.11 | 28125.11 |
| Outflow local currency | 18998.76 | 14578.72 | 19946.97 | 19002.89 | 19002.89 |
| Surplus ( deficit ) local currency | 9126.35 | 6403.68 | 8178.13 | 9122.22 | 9122.22 |
| Inflow foreign currency | 3124.50 | 2454.21 | 3124.50 | 3124.50 | 3124.50 |
| Outflow foreign currency | 1810.87 | 8492.20 | 2177.87 | 1813.76 | 1813.76 |
| Surplus ( deficit ) foreign currency | 1313.63 | -6037.99 | 946.63 | 1310.74 | 1310.74 |

202.

3)

**Cashflow Discounting:**

a) interest payable on loan = cash-outflow:

| | | |
|---|---|---|
| Net present value at | 12.00 % = | -41029.82 |
| Internal Rate of Return | 1.83 % | |

b) interest payable on loan added back to net-cashflow:

| | | |
|---|---|---|
| Net present value at | 12.00 % = | -37609.76 |
| Internal Rate of Return | 3.39 % | |

Note: NPV is computed for the year before production starts, using the Future Value of cashflows during pre-production.

c) Future Value of cashflow during pre-production:

| | | |
|---|---|---|
| Total cash-outflow at | 12.00 % , FVAL = | 50774.22 |
| Total cash-outflow, Nominal value | NVAL = | 48283.14 |

203



## Total production costs in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 | |
|---|---|---|---|---|---|---|
| % of nom. capacity (single product only). | 78.28 | 82.28 | 87.07 | 93.11 | 100.00 | |
| Raw material 1 | 1668.94 | 1754.25 | 1856.38 | 1995.04 | 2132.01 | |
| Other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 | |
| Utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 | |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | |
| Repair | 850.00 | 850.00 | 850.00 | 850.00 | 550.00 | |
| Spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 4) |
| Factory overheads | 264.60 | 264.60 | 264.60 | 264.60 | 264.60 | |
| Factory costs | 12071.81 | 12157.12 | 12259.25 | 12397.91 | 12534.86 | |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 | 1332.00 | 1332.00 | |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Direct costs, sales and distribution | 1221.67 | 1363.17 | 1499.41 | 1651.10 | 1827.25 | 5) |
| Depreciation | 5740.98 | 5740.98 | 5740.98 | 5740.98 | 5703.48 | |
| Financial costs | 2828.28 | 2833.31 | 2272.69 | 1705.02 | 1137.35 | |
| Total manufacturing costs | 23194.73 | 23426.58 | 23104.32 | 22027.01 | 22534.96 | |
| Costs per unit ( single product ) | 1.90 | 1.83 | 1.70 | 1.57 | 1.45 | |
| Of it foreign, % | 14.84 | 15.31 | 15.87 | 16.72 | 17.46 | |
| Of it variable,% | 12.46 | 13.31 | 14.52 | 15.97 | 17.57 | |
| Of it direct. % | 57.31 | 57.71 | 59.55 | 61.55 | 63.73 | |
| Total labour | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | |



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## Total production costs in 1000 DHS

| Year | 1992 | 1993 | 1994 | 1995 | 1996 | |
|---|---|---|---|---|---|---|
| % of nom. capacity (single product only). | 82.55 | 119.99 | 130.45 | 142.14 | 154.82 | |
| Raw material 1 | 1760.[illegible] | 2558.17 | 2781.16 | 3030.40 | 3300.83 | |
| Other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 | |
| Utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 | |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | |
| Repair | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | |
| Spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 4) |
| Factory overheads | -1053.90 | 1294.60 | 1842.60 | 2439.60 | 3088.60 | |
| Factory costs | 10844.37 | 13991.04 | 14762.03 | 15608.27 | 16527.70 | |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 | 1332.00 | 1332.00 | |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Direct costs, sales and distribution | 1518.10 | 2226.51 | 2449.17 | 2694.12 | 2963.38 | 5) |
| Depreciation | 2468.98 | 3968.98 | 3968.98 | 3968.98 | 3931.48 | |
| Financial costs | 569.68 | 2.01 | 0.0 | 0.0 | 0.0 | |
| Total manufacturing costs | 16763.13 | 21520.54 | 22512.17 | 23603.76 | 24754.55 | |
| Costs per unit ( single product ) | 1. | 1.15 | 1.11 | 1.06 | 1. | |
| Of it foreign, % | 22.04 | 20.15 | 20.07 | 20.00 | 19.97 | |
| Of it variable,% | 19.56 | 22.23 | [illegible] | 24.75 | 25.31 | |

204.

## Total production costs in 1000 DHS

| Year | 1997 | 1998 | 1999 |
|---|---|---|---|
| % of nom. capacity (single product only). | 154.52 | 117.27 | 154.52 |
| Raw material 1 | 3294.40 | 2500.20 | 3294.40 |
| Other raw materials | 0.0 | 0.0 | 0.0 |
| Energy | 5274.67 | 5274.67 | 5274.67 |
| Utilities | 545.00 | 545.00 | 545.00 |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 |
| Repair | 850.00 | 850.00 | 850.00 |
| Spares | 1700.00 | 1700.00 | 1700.00 |
| Factory overheads | 3028.60 | 1064.60 | 3088.60 |
| Factory costs | 16571.27 | 13703.07 | 16521.27 |
| Administrative overheads | 1372.00 | 1332.00 | 1332.00 |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 |
| Direct costs, sales and distribution | 2963.38 | 2344.05 | 2963.38 |
| Depreciation | 1866.75 | 396.75 | 1796.75 |
| Financial costs | 0.0 | 0.0 | 0.0 |
| Total manufacturing costs | 22683.40 | 17775.86 | 22613.40 |
| Costs per unit ( single product ) | 0.94 | 0.97 | 0.94 |
| Of it foreign, % | 21.77 | 24.25 | 21.84 |
| Of it variable,% | 27.59 | 27.75 | 27.67 |
| Of it direct, % | 85.90 | 90.27 | 86.16 |
| Total labour | 2865.60 | 2865.60 | 2865.60 |

| 2000 | 2001 | |
|---|---|---|
| 154.52 | 154.52 | |
| 3274.40 | 3274.40 | |
| 0.0 | 0.0 | |
| 5274.67 | 5274.67 | |
| 545.00 | 545.00 | |
| 1768.60 | 1758.60 | |
| 850.00 | 650.00 | |
| 1700.00 | 1700.00 | |
| 3088.60 | 3088.60 | 4) |
| ---------- | ---------- | |
| 16521.27 | 16521.27 | |
| 1332.00 | 1332.00 | |
| 0.0 | 0.0 | |
| 2963.38 | 2963.38 | 5) |
| 1796.75 | 1757.25 | |
| 0.0 | 0.0 | |
| ---------- | ---------- | |
| 22613.40 | 22575.90 | |
| ========== | ========== | |
| 0.94 | 0.94 | |
| 21.84 | 21.87 | |
| 27.67 | 27.72 | |
| 86.16 | 86.31 | |
| 2865.60 | 2865.60 | |

## Projected balance sheets, construction in 1000 DHS

| | | |
|---|---|---|
| Year | 1985 | 1986 |
| Total assets | 20759.00 | 48283.14 |
| Fixed assets, net of depreciation | 0.0 | 20759.00 |
| Construction in progress | 20759.00 | 25222.39 |
| Current assets | 0.0 | 2301.75 |
| Cash, bank | 0.0 | 0.0 |
| Cash surplus, finance available | -0.0 | 0.0 |
| Total liabilities | 20759.00 | 48283.14 |
| Equity capital | 20759.00 | 23300.00 |
| Reserves, retained profit | 0.0 | 0.0 |
| Profit,(loss) | 0.0 | 0.0 |
| Long and medium term debt | 0.0 | 23569.00 |
| Current liabilities | 0.0 | 0.0 |
| Bank overdraft, finance required | 0.0 | 1414.14 |
| Total debt | 0.0 | 24983.14 |
| Equity, % of liabilities | 100.00 | 4[illegible] 71 |

## Projected balance sheet, production in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|
| Total assets | 46608.10 | 40372.22 | 34754.30 | 29167.52 | 23788.64 |
| Fixed assets, net of depreciation | 40240.41 | 34499.44 | 28758.46 | 23017.49 | 17314.01 |
| Construction in progress | 0.0 | 0.0 | 0.0 | 0.0 | 150.00 |
| Current assets | 6121.22 | 5626.32 | 5749.38 | 5903.56 | 6078.16 |
| Cash, bank | 246.47 | 246.47 | 246.47 | 246.47 | 246.47 |
| Cash surplus, finance available | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total liabilities | 46609.10 | 40372.22 | 34754.30 | 29167.52 | 23788.64 |
| Equity capital | 24705.00 | 24705.00 | 24705.00 | 24705.00 | 24705.00 |
| Reserves, retained profit | 0.0 | -10418.96 | -19709.08 | -27181.58 | -32729.68 |
| Profit,(loss) | -10418.96 | -9290.12 | -7472.49 | -5548.10 | -3444.90 |
| Long and medium term debt | 23569.00 | 10939.09 | 14208.51 | 9477.93 | 4747.36 |
| Current liabilities | 670.66 | 675.40 | 581.07 | 688.22 | 696.39 |
| Bank overdraft, finance required | 8082.40 | 15761.82 | 22341.30 | 27026.04 | 29814.47 |
| Total debt | 32322.06 | 35376.30 | 37230.88 | 37192.20 | 35258.21 |
| Equity, % of liabilities | 64.13 | 100.38 | 199.03 | 1153.64 | -409.98 |





## Projected balance sheet, production in 1000 DHS

| Year | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| Total assets | 27954.30 | 25367.48 | 21765.98 | 18204.45 | 14865.58 |
| Fixed assets, net of depreciation | 14965.04 | 18346.06 | 14377.09 | 10408.12 | 6476.64 |
| Construction in progress | 7350.00 | 0.0 | 0.0 | 0.0 | 150.00 |
| Current assets | 5447.74 | 6732.03 | 7075.69 | 7459.24 | 7874.81 |
| Cash, bank | 191.53 | 289.38 | 312.22 | 337.09 | 364.13 |
| Cash surplus, finance available | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total liabilities | 27954.31 | 25367.47 | 21765.98 | 18204.45 | 14865.58 |
| Equity capital | 24705.00 | 24705.00 | 24705.00 | 24705.00 | 24705.00 |
| Reserves, retained profit | -36174.57 | -37126.33 | -35374.10 | -32203.28 | -27471.92 |
| Profit,(loss) | -951.76 | 1752.23 | 3170.82 | 4731.36 | 6495.05 |
| Long and medium term debt | 16.78 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities | 602.46 | 777.28 | 820.11 | 867.15 | 918.21 |
| Bank overdraft, finance required | 39756.39 | 35259.30 | 28444.15 | 20104.24 | 10219.24 |
| Total debt | 40375.63 | 36036.58 | 29264.26 | 20971.37 | 11137.45 |
| Equity, % of liabilities | -209.33 | -249.75 | -369.94 | -1300.40 | 531.71 |

## Projected balance sheet, production in 1000 DHS

| Year | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Total assets | 13212.18 | 18716.57 | 27509.34 | 36145.55 | 44819.25 |
| Fixed assets, net of depreciation | 4759.89 | 4363.14 | 9566.39 | 7769.64 | 6010.39 |
| Construction in progress | 0.0 | 7000.00 | 0.0 | 0.0 | 0.0 |
| Current assets | 7867.78 | 6643.92 | 7867.78 | 7867.78 | 7867.78 |
| Cash, bank | 364.13 | 279.80 | 364.13 | 364.13 | 364.13 |
| Cash surplus, finance available | 220.38 | 429.71 | 9711.04 | 20144.00 | 30576.95 |
| Total liabilities | 13212.18 | 18716.57 | 27509.34 | 36145.55 | 44819.25 |
| Equity capital | 24705.00 | 24705.00 | 24705.00 | 24705.00 | 24705.00 |
| Reserves, retained profit | -20976.87 | -12410.66 | -6749.71 | 1886.49 | 10522.70 |
| Profit,(loss) | 8566.21 | 5660.95 | 8636.21 | 8636.21 | 8573.71 |
| Long and medium term debt | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities | 917.85 | 761.28 | 917.85 | 917.85 | 917.85 |
| Bank overdraft, finance required | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total debt | 917.85 | 761.28 | 917.85 | 917.85 | 917.85 |
| Equity, % of liabilities | 186.99 | 132.00 | 89.81 | 68.35 | 55.12 |

## Net income statement in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|
| Total sales, including sales tax | 12775.77 | 14136.46 | 15631.83 | 17278.90 |
| Less: variable costs, including sales tax | 2890.61 | 3117.42 | 3355.79 | 3646.14 |
| Variable margin | 9805.16 | 11019.04 | 12276.04 | 13632.77 |
| As % of total sales | 77.37 | 77.95 | 78.53 | 78.90 |
| Non-variable costs, including depreciation | 17475.84 | 17475.84 | 17475.85 | 17475.85 |
| Operational margin | -7590.68 | -6456.80 | -5199.80 | -3643.08 |
| As % of total sales | -59.41 | -45.67 | -33.26 | -22.24 |
| Cost of finance | 2828.28 | 2833.31 | 2272.69 | 1705.02 |
| Gross profit | -10418.96 | -9290.12 | -7472.49 | -5548.10 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | -10418.96 | -9290.12 | -7472.49 | -5548.10 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | -10418.96 | -9290.12 | -7472.49 | -5548.10 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | -10418.96 | -9290.12 | -7472.49 | -5548.10 |
| Accumulated undistributed profit | -10418.96 | -19709.08 | -27181.58 | -32729.68 |
| Gross profit, % of total sales | -81.55 | -65.72 | -47.80 | -32.11 |
| Net profit, % of total sales | -81.55 | -65.72 | -47.80 | -32.11 |
| Net profit, % of equity | -39.93 | -35.58 | -28.62 | -21.25 |
| Net profit + interest, % of investment | -14.86 | -12.62 | -10.14 | -7.47 |

209.



## Net income statement in 1000 DHS

| Year | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|
| Total sales, including sales tax | 19090.06 | 15911.37 | 23272.76 | 25663.00 |
| Less: variable costs, including sales tax | 3959.26 | 3278.10 | 4784.68 | 5230.33 |
| Variable margin | 15130.80 | 12533.27 | 18488.08 | 20432.67 |
| As % of total sales | 79.26 | 79.27 | 79.44 | 79.64 |
| Non-variable costs, including depreciation | 17438.35 | 12915.34 | 16733.84 | 17281.84 |
| Operational margin | -2307.54 | -382.07 | 1754.24 | 3170.82 |
| As % of total sales | -12.09 | -2.42 | 7.54 | 12.35 |
| Cost of finance | 1137.35 | 569.68 | 2.01 | 0.0 |
| Gross profit | -3444.90 | -951.76 | 1752.23 | 3170.82 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | -3444.90 | -951.76 | 1752.23 | 3170.82 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | -3444.90 | -951.76 | 1752.23 | 3170.82 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | -3444.90 | -951.76 | 1752.23 | 3170.82 |
| Accumulated undistributed profit | -36174.57 | -37126.33 | -35374.10 | -32203.28 |
| Gross profit, % of total sales | -18.05 | -6.02 | 7.53 | 12.35 |
| Net profit, % of total sales | -18.05 | -6.02 | 7.53 | 12.35 |
| Net profit, % of equity | -13.19 | -3.65 | 6.71 | 12.14 |
| Net profit + interest, % of investment | -4.46 | -0.65 | 2.94 | 5.28 |

## Net income statement in 1000 DHS

| Year | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|
| Total sales, including sales tax | 28334.72 | 31249.60 | 31249.60 | 23436.82 |
| Less: variable costs, including sales tax | 5724.52 | 6264.21 | 6257.78 | 4844.24 |
| Variable margin | 22610.21 | 24985.40 | 24991.82 | 18592.57 |
| As % of total sales | 79.80 | 79.95 | 79.97 | 79.33 |
| Non-variable costs, including depreciation | 17878.85 | 18490.35 | 16425.62 | 12931.62 |
| Operational margin | 4731.36 | 6495.05 | 8566.21 | 5660.95 |
| As % of total sales | 16.70 | 20.78 | 27.41 | 24.15 |
| Cost of finance | 0.0 | 0.0 | 0.0 | 0.0 |
| Gross profit | 4731.36 | 6495.05 | 8566.21 | 5660.95 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | 4731.36 | 6495.05 | 8566.21 | 5660.95 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | 4731.36 | 6495.05 | 8566.21 | 5660.95 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | 4731.36 | 6495.05 | 8566.21 | 5660.95 |
| Accumulated undistributed profit | -27471.92 | -20976.87 | -12410.66 | -6749.71 |
| Gross profit, % of total sales | 16.70 | 20.78 | 27.41 | 24.15 |
| Net profit, % of total sales | 16.70 | 20.78 | 27.41 | 24.15 |
| Net profit, % of equity | 18.12 | 24.88 | 32.81 | 21.68 |
| Net profit + interest, % of investment | 7.83 | 10.66 | 14.06 | 8.48 |

## Net income statement in 1000 DHS

| Year | 1999 | 2000 | 2001 |
|---|---|---|---|
| Total sales, including sales tax | 31249.60 | 31249.60 | 31249.60 |
| Less: variable costs, including sales tax | 6257.78 | 6257.78 | 6257.78 |
| Variable margin | 24991.82 | 24991.87 | 24991.87 |
| As % of total sales | 79.97 | 79.97 | 79.97 |
| Non-variable costs, including depreciation | 16355.62 | 16355.62 | 16318.12 |
| Operational margin | 8636.21 | 8636.21 | 8673.71 |
| As % of total sales | 27.64 | 27.64 | 27.76 |
| Cost of finance | 0.0 | 0.0 | 0.0 |
| Gross profit | 8636.21 | 8636.21 | 8673.71 |
| Allowances | 0.0 | 0.0 | 0.0 |
| Taxable profit | 8636.21 | 8636.21 | 8673.71 |
| Tax | 0.0 | 0.0 | 0.0 |
| Net profit | 8636.21 | 8636.21 | 8673.71 |
| Dividends paid | 0.0 | 0.0 | 0.0 |
| Undistributed profit | 8636.21 | 8636.21 | 8673.71 |
| Accumulated undistributed profit | 1886.49 | 10522.70 | 19196.40 |
| Gross profit, % of total sales | 27.64 | 27.64 | 27.76 |
| Net profit, % of total sales | 27.64 | 27.64 | 27.76 |
| Net profit, % of equity | 33.08 | 33.08 | 33.22 |
| Net profit + interest, % of investment | 12.71 | 12.71 | 12.77 |

Source of finance, construction in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| Equity, ordinary | 20759.00 | 2541.00 |
| Equity, preference | 0.0 | 0.0 |
| Subsidies, grants | 0.0 | 0.0 |
| Loan AF | 0.0 | 0.0 |
| Loan BF | 0.0 | 0.0 |
| Loan CF | 0.0 | 0.0 |
| Loan AL | 0.0 | 23569.00 |
| Loan BL | 0.0 | 0.0 |
| Loan CL | 0.0 | 0.0 |
| Total loan | 0.0 | 23569.00 |
| Current liabilities | 0.0 | 0.0 |
| Bank overdraft | 0.0 | 1414.14 |
| Total funds available | 20759.00 | 27524.14 |

## Source of finance, production in 1000 DHS

| Year .................... | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|
| Equity, ordinary ........ | 2793.53 | 16.47 | 0.0 | 0.0 | 0.0 | 0.0 |
| Equity, preference ...... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Subsidies, grants ....... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AL ............... | 0.0 | -4713.80 | -4713.80 | -4713.80 | -4713.80 | -4713.80 |
| Loan BL ............... | 0.0 | 83.89 | -16.78 | -16.78 | -16.78 | -16.78 |
| Loan CL ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total loan .............. | 0.0 | -4629.91 | -4730.58 | -4730.58 | -4730.58 | -4730.58 |
| Current liabilities ..... | 670.66 | 4.74 | 5.67 | 7.15 | 8.17 | -93.92 |
| Bank overdraft .......... | 8082.40 | 7679.42 | 6579.48 | 4684.74 | 2788.43 | 9941.92 |
| Total funds available ... | 11546.59 | 3070.72 | 1854.58 | -38.69 | -1933.98 | 5117.42 |



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## Source of finance, production in 1000 DHS

| Year .................... | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Equity, ordinary ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Equity, preference ...... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Subsidies, grants ....... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AL ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BL ............... | -16.78 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CL ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total loan .............. | -16.78 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities ..... | 174.82 | 42.83 | 47.01 | 51.08 | -0.36 | -156.57 |
| Bank overdraft .......... | -4497.09 | -6815.15 | -8339.91 | -9885.00 | -10219.24 | 0.0 |
| Total funds available ... | -4339.06 | -6772.32 | -8292.89 | -9833.92 | -10219.60 | -156.57 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

## Source of finance, production in 1000 DHS

| | |
|---|---|
| Year | 1999 |
| Equity, ordinary | 0.0 |
| Equity, preference | 0.0 |
| Subsidies, grants | 0.0 |
| Loan AF | 0.0 |
| Loan BF | 0.0 |
| Loan CF | 0.0 |
| Loan AL | 0.0 |
| Loan BL | 0.0 |
| Loan CL | 0.0 |
| Total loan | 0.0 |
| Current liabilities | 156.57 |
| Bank overdraft | 0.0 |
| Total funds available | 156.57 |

## Net working capital in 1000 DHS

| Year | mdc | coto | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable | 30 | 12.0 | 1218.79 | 1237.69 | 1257.55 | 1281.75 |
| Inventary and materials | 278 | 1.3 | 1711.78 | 1791.79 | 1888.18 | 2009.59 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | 850.00 | 850.00 | 850.00 | 850.00 |
| Work in progress | 9 | 40.0 | 301.80 | 303.93 | 306.48 | 309.70 |
| Finished products | 15 | 24.0 | 558.49 | 562.05 | 566.30 | 571.66 |
| Cash in hand | 15 | 24.0 | 246.47 | 246.47 | 246.47 | 246.47 |
| Total current assets | | | 5765.94 | 5871.04 | 5994.09 | 6148.28 |
| Current liabilities and | | | | | | |
| Accounts payable | 20 | 18.0 | 670.66 | 675.40 | 681.07 | 688.22 |
| Net working capital | | | 5095.28 | 5195.64 | 5313.02 | 5460.06 |
| Increase in working capital | | | 2793.53 | 100.36 | 117.38 | 147.04 |
| Net working capital, local currency | | | 3132.18 | 3190.20 | 3264.79 | 3353.70 |
| Net working capital, foreign currency | | | 1963.10 | 2005.44 | 2048.23 | 2106.36 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .





## Net working capital in 1000 DHS

| Year | mdc | coto | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable | 30 | 12.0 | 1307.84 | 1141.21 | 1462.46 | 1545.27 |
| Inventory and materials | 278 | 1.3 | 2148.29 | 1797.21 | 2550.47 | 2760.91 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | 850.00 | 850.00 | 850.00 | 850.00 |
| Work in progress | 9 | 40.0 | 313.37 | 271.11 | 349.78 | 367.05 |
| Finished products | 15 | 24.0 | 577.79 | 507.35 | 638.46 | 676.58 |
| Cash in hand | 15 | 24.0 | 246.47 | 191.53 | 269.38 | 312.22 |
| Total current assets | | | 6322.88 | 5637.52 | 7019.66 | 7387.14 |
| Current liabilities and | | | | | | |
| Accounts payable | 20 | 18.0 | 696.38 | 602.46 | 777.28 | 820.11 |
| Net working capital | | | 5626.49 | 5035.05 | 6242.38 | 6567.03 |
| Increase in working capital | | | 166.43 | -591.44 | 1207.33 | 324.65 |
| Net working capital, local currency | | | 3458.29 | 3018.61 | 3889.85 | 4120.33 |
| Net working capital, foreign currency | | | 2168.20 | 2016.44 | 2352.54 | 2446.70 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

## Net working capital in 1000 DHS

| Year | mdc | coto | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable | 30 | 12.0 | 1636.20 | 1735.26 | 1734.72 | 1449.26 |
| Inventory and materials | 278 | 1.3 | 2996.13 | 3251.34 | 3245.28 | 2495.76 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | 850.00 | 850.00 | 850.00 | 850.00 |
| Work in progress | 9 | 40.0 | 390.21 | 413.19 | 413.03 | 342.58 |
| Finished products | 15 | 24.0 | 705.84 | 744.15 | 743.89 | 626.46 |
| Cash in hand | 15 | 24.0 | 337.09 | 364.13 | 364.13 | 279.60 |
| Total current assets | | | 7794.58 | 8237.19 | 8230.16 | 6921.97 |
| Current liabilities and | | | | | | |
| Accounts payable | 20 | 18.0 | 867.13 | 918.21 | 917.85 | 761.28 |
| Net working capital | | | 6927.46 | 7318.99 | 7312.32 | 6160.69 |
| Increase in working capital | | | 360.43 | 391.53 | -6.67 | -1151.62 |
| Net working capital, local currency | | | 4375.56 | 4652.91 | 4648.89 | 3830.80 |
| Net working capital, foreign currency | | | 2551.90 | 2666.07 | 2663.43 | 2329.89 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .



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## Net working capital in 1000 DHS

| Year | mdc | coto | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | |
| Current assets & | | | | | |
| Accounts receivable | 30 | 12.0 | 1734.72 | 1734.72 | 1734.72 |
| Inventory and materials | 278 | 1.3 | 3245.28 | 3245.28 | 3245.28 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | 850.00 | 850.00 | 850.00 |
| Work in progress | 9 | 40.0 | 413.03 | 413.03 | 413.03 |
| Finished products | 15 | 24.0 | 743.89 | 743.89 | 743.89 |
| Cash in hand | 15 | 24.0 | 364.13 | 364.13 | 364.13 |
| Total current assets | | | 8230.16 | 8230.16 | 8230.16 |
| Current liabilities and | | | | | |
| Accounts payable | 20 | 18.0 | 917.85 | 917.85 | 917.85 |
| Net working capital | | | 7312.32 | 7312.32 | 7312.32 |
| Increase in working capital | | | 1151.62 | 0.0 | 0.0 |
| Net working capital, local currency | | | 4648.89 | 4648.89 | 4648.89 |
| Net working capital, foreign currency | | | 2663.43 | 2663.43 | 2663.43 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

THRC FOR PRODUCT *A* foreign : GLASS

| | YEAR: 1 | YEAR: 2 |
|---|---|---|
| raw material .................................... | 1040.62 | 1093.81 |
| other raw materials ............................. | 0.0 | 0.0 |
| utilities ....................................... | 545.00 | 545.00 |
| energy .......................................... | 0.0 | 0.0 |
| labour .......................................... | 0.0 | 0.0 |
| maintenance ..................................... | 0.0 | 0.0 |
| spares .......................................... | 1700.00 | 1700.00 |
| factory overheads ............................... | 0.0 | 0.0 |
| sub-total ( factory costs ) ..................... | 3285.62 | 3338.81 |
| of these variable ............................... | 1040.62 | 1093.81 |
| administrative overheads ........................ | 40.00 | 40.00 |
| of these labour ................................. | 0.0 | 0.0 |
| total before depreciation and interests ........ | 3325.62 | 3378.81 |
| depreciation .................................... | 0.0 | 0.0 |
| total before interests .......................... | 3325.62 | 3378.81 |
| interests, payable on deb'tures ................ | 0.0 | 0.0 |
| total manufacturing costs ....................... | 3325.62 | 3378.81 |
| of it variable .................................. | 1040.62 | 1093.81 |
| of it labour ( total, direct and indirect ) .... | 0.0 | 0.0 |

| | YEAR: 9 | YEAR:10 |
|---|---|---|
| raw material .................................... | 1889.52 | 2058.14 |
| other raw materials ............................. | 0.0 | 0.0 |
| utilities ....................................... | 545.00 | 545.00 |
| energy .......................................... | 0.0 | 0.0 |
| labour .......................................... | 0.0 | 0.0 |
| maintenance ..................................... | 0.0 | 0.0 |
| spares .......................................... | 1700.00 | 1700.00 |
| factory overheads ............................... | 0.0 | 0.0 |
| sub-total ( factory costs ) ..................... | 4134.52 | 4303.14 |
| of these variable ............................... | 1889.52 | 2058.14 |
| administrative overheads ........................ | 40.00 | 40.00 |
| of these labour ................................. | 0.0 | 0.0 |
| total before depreciation and interests ........ | 4174.52 | 4343.14 |
| depreciation .................................... | 0.0 | 0.0 |
| total before interests .......................... | 4174.52 | 4343.14 |
| interests, payable on deb'tures ................ | 0.0 | 0.0 |
| total manufacturing costs ....................... | 4174.52 | 4343.14 |
| of it variable .................................. | 1889.52 | 2058.14 |
| of it labour ( total, direct and indirect ) .... | 0.0 | 0.0 |

APPENDIX XI.5

+UJH13

"NO EXPORT"

| YEAR: 3 | YEAR: 4 | YEAR: 5 | YEAR: 6 | YEAR: 7 | YEAR: 8 |
|---|---|---|---|---|---|
| 1157.49 | 1237.71 | 1329.35 | 1097.39 | 1595.07 | 1734.11 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 545.00 | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= | ========= | ========= |
| 3402.49 | 3482.71 | 3574.35 | 3342.40 | 3840.07 | 3979.11 |
| 1157.49 | 1237.71 | 1329.35 | 1097.39 | 1595.07 | 1734.11 |
| 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= | ========= | ========= |
| 3442.49 | 3522.71 | 3614.35 | 3382.40 | 3880.07 | 4019.11 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= | ========= | ========= |
| 3442.49 | 3522.71 | 3614.35 | 3382.40 | 3880.07 | 4019.11 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= | ========= | ========= |
| 3442.49 | 3522.71 | 3614.35 | 3382.40 | 3880.07 | 4019.11 |
| 1157.49 | 1237.71 | 1329.35 | 1097.39 | 1595.07 | 1734.11 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| YEAR:11 | YEAR:12 | YEAR:13 | YEAR:14 | YEAR:15 |
|---|---|---|---|---|
| 2054.13 | 1558.93 | 2054.13 | 2054.13 | 2054.13 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= | ========= |
| 4299.13 | 3803.93 | 4299.13 | 4299.13 | 4299.13 |
| 2054.13 | 1558.93 | 2054.13 | 2054.13 | 2054.13 |
| 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= | ========= |
| 4339.13 | 3843.93 | 4339.13 | 4339.13 | 4339.13 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= | ========= |
| 4339.13 | 3843.93 | 4339.13 | 4339.13 | 4339.13 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= | ========= |
| 4339.13 | 3843.93 | 4339.13 | 4339.13 | 4339.13 |
| 2054.13 | 1558.93 | 2054.13 | 2054.13 | 2054.13 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

TABC FOR PRODUCT *A* local : GLASS

| | YEAR: 1 | YEAR: 2 | YEAR: 3 |
|---|---|---|---|
| raw material ................................... | 461.43 | 485.01 | 513.25 |
| other raw materials ............................ | 0.0 | 0.0 | 0.0 |
| utilities ...................................... | 0.0 | 0.0 | 0.0 |
| energy ......................................... | 5274.67 | 5274.67 | 5274.67 |
| labour ......................................... | 1768.60 | 1768.60 | 1768.60 |
| maintenance .................................... | 850.00 | 850.00 | 850.00 |
| spares ......................................... | 0.0 | 0.0 | 0.0 |
| factory overheads .............................. | 264.60 | 264.60 | 264.60 |
| sub-total ( factory costs ) .................... | 8619.29 | 8642.88 | 8671.12 |
| of these variable .............................. | 461.43 | 485.01 | 513.25 |
| administrative overheads ....................... | 1292.00 | 1292.00 | 1292.00 |
| of these labour ................................ | 1097.00 | 1097.00 | 1097.00 |
| total before depreciation and interests ........ | 9911.29 | 9934.89 | 9963.12 |
| depreciation ................................... | 5740.98 | 5740.98 | 5740.98 |
| total before interests ......................... | 15652.27 | 15675.86 | 15704.09 |
| interests, payable on deb'tures ................ | 0.0 | 0.0 | 0.0 |
| total manufacturing costs ...................... | 15652.27 | 15675.86 | 15704.09 |
| of it variable ................................. | 461.43 | 485.01 | 513.25 |
| of it labour ( total, direct and indirect ) .... | 2865.60 | 2865.60 | 2865.60 |

| | YEAR: 9 | YEAR:10 | YEAR:11 |
|---|---|---|---|
| raw material ................................... | 837.84 | 912.61 | 910.83 |
| other raw materials ............................ | 0.0 | 0.0 | 0.0 |
| utilities ...................................... | 0.0 | 0.0 | 0.0 |
| energy ......................................... | 5274.67 | 5274.67 | 5274.67 |
| labour ......................................... | 1768.60 | 1768.60 | 1768.60 |
| maintenance .................................... | 850.00 | 850.00 | 850.00 |
| spares ......................................... | 0.0 | 0.0 | 0.0 |
| factory overheads .............................. | 2439.60 | 3088.60 | 3088.60 |
| sub-total ( factory costs ) .................... | 11170.71 | 11894.48 | 11892.70 |
| of these variable .............................. | 837.84 | 912.61 | 910.83 |
| administrative overheads ....................... | 1292.00 | 1292.00 | 1292.00 |
| of these labour ................................ | 1097.00 | 1097.00 | 1097.00 |
| total before depreciation and interests ........ | 12462.71 | 13186.48 | 13184.70 |
| depreciation ................................... | 3968.98 | 3931.48 | 1866.75 |
| total before interests ......................... | 16431.68 | 17117.96 | 15051.45 |
| interests, payable on deb'tures ................ | 0.0 | 0.0 | 0.0 |
| total manufacturing costs ...................... | 16431.68 | 17117.96 | 15051.45 |
| of it variable ................................. | 837.84 | 912.61 | 910.83 |
| of it labour ( total, direct and indirect ) .... | 2865.60 | 2865.60 | 2865.60 |

| YEAR: 4 | YEAR: 5 | YEAR: 6 | YEAR: 7 | YEAR: 8 |
|---|---|---|---|---|
| 548.82 | 589.46 | 486.60 | 707.28 | 768.93 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| 0.0 | 0.0 | 0 0 | 0.0 | 0.0 |
| 264.60 | 264.60 | -1053.90 | 1294.60 | 1842.60 |
| ========= | ========= | ========= | ========= | ========= |
| 8706.69 | 8747.32 | 7325.97 | 9895.15 | 10504.80 |
| 548.82 | 589.46 | 486.60 | 707.28 | 768.93 |
| 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 |
| 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 |
| ========= | ========= | ========= | ========= | ========= |
| 9998.69 | 10039.32 | 8617.97 | 11187.15 | 11796.80 |
| 5740.98 | 5703.48 | 2498.98 | 3968.98 | 3968.98 |
| ========= | ========= | ========= | ========= | ========= |
| 15739.66 | 15742.80 | 11116.95 | 15156.12 | 15765.77 |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= | ========= |
| 15739.66 | 15742.80 | 11116.95 | 15156.12 | 15765.77 |
| 548.82 | 589.46 | 486.60 | 707.28 | 768.93 |
| 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 |

| YEAR:12 | YEAR:13 | YEAR:14 | YEAR:15 |
|---|---|---|---|
| 691.25 | 910.83 | 910.83 | 910.83 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| 850.00 | 850.00 | 850.00 | 850.00 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| 1064.60 | 3080.60 | 3080.60 | 3080.60 |
| ========= | ========= | ========= | ========= |
| 9649.12 | 11892.70 | 11892.70 | 11892.70 |
| 691.25 | 910.83 | 910.83 | 910.83 |
| 1292.00 | 1292.00 | 1292.00 | 1292.00 |
| 1097.00 | 1097.00 | 1097.00 | 1097.00 |
| ========= | ========= | ========= | ========= |
| 10941.12 | 13184.70 | 13184.70 | 13184.70 |
| 395.75 | 1796.75 | 1796.75 | 1759.25 |
| ========= | ========= | ========= | ========= |
| 11337.87 | 14981.45 | 14981.45 | 14943.95 |
| 0.0 | 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= | ========= |
| 11337.87 | 14981.45 | 14981.45 | 14943.95 |
| 691.25 | 910.83 | 910.83 | 910.83 |
| 2865.60 | 2865.60 | 2865.60 | 2865.60 |

## Total initial investment costs in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| **Fixed investment costs** | | |
| Land site preparation and development | 600.00 | 75.00 |
| Buildings and civil works | 5300.00 | 1210.00 |
| Auxiliary and service facilities | 0.0 | 0.0 |
| Incorporated fixed assets | 75.00 | 175.00 |
| Plant machinery and equipment | 8324.00 | 20048.25 |
| Total fixed investment costs | 14799.00 | 21508.25 |
| Pre-production capital expendit | 6460.00 | 3714.14 |
| Working capital | 0.0 | 2301.75 |
| Total initial investment costs | 20759.00 | 27524.14 |
| Of it foreign, in % | 44.19 | 82.84 |

## Total current investment costs in 1000 DHS.

| Year | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 0.0 | 0.0 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 0.0 | 0.0 | 0.0 |
| Total fixed investment costs | 0.0 | 0.0 | 0.0 | 0.0 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 3196.99 | -519.48 | 101.52 | 122.84 |
| Total current investment costs | 3196.99 | -519.48 | 101.52 | 122.84 |
| Of it foreign, % | 5.61 | 109.66 | 35.80 | 37.28 |



COMFAR 1.0 - UNIDO Vienna ---

## Total current investment costs in 1000 DHS

| Year | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 150.00 | 0.0 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 7350.00 | 0.0 | 0.0 |
| Total fixed investment costs | 150.00 | 7350.00 | 0.0 | 0.0 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 143.35 | -543.78 | 1091.52 | 291.58 |
| Total current investment costs | 293.35 | 6606.72 | 1091.52 | 291.58 |
| Of it foreign, % | 58.97 | 106.04 | 76.03 | 27.72 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

## Total current investment costs in 1000 DHS

| Year | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 0.0 | 150.00 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 0.0 | 0.0 | 7000.00 |
| Total fixed investment costs | 0.0 | 150.00 | 0.0 | 7000.00 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 323.45 | 351.38 | -5.72 | -1035.97 |
| Total current investment costs | 323.45 | 501.38 | -5.72 | 5964.03 |
| Of it foreign, % | 27.43 | 49.12 | 39.99 | 112.63 |





## Total current investment costs in 1000 DHS

| Year | 1999 |
|---|---|
| Fixed investment costs: | |
| Land, site preparation and development | 0.0 |
| Buildings and civil works | 0.0 |
| Auxiliary and service facilities | 0.0 |
| Incorporated fixed assets | 0.0 |
| Plant, machinery and equipment | 0.0 |
| Total fixed investment costs | 0.0 |
| Preproduction capitals expend's | 0.0 |
| Working capital | 1035.97 |
| Total current investment costs | 1035.97 |
| Of it foreign, % | 27.29 |

## Cashflow tables, construction in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| Total CF-inflow | 20759.00 | 26110.00 |
| . Financial resources | 20759.00 | 26110.00 |
| . Sales | 0.0 | 0.0 |
| Total CF-outflow | 20759.00 | 27524.14 |
| . Total assets | 20759.00 | 26110.00 |
| . Operating costs | 0.0 | 0.0 |
| . Debt service and interest | 0.0 | 1414.14 |
| . Repayment | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 |
| Surplus ( deficit ) | 0.0 | -1414.14 |
| Cumulated cash balance | 0.0 | -1414.14 |
| Inflow local currency | 10379.50 | 26110.00 |
| Outflow local currency | 11585.00 | 4724.14 |
| Surplus (-deficit ) local currency | -1205.50 | 21385.86 |
| Inflow foreign currency | 10379.50 | 0.0 |
| Outflow foreign currency | 9174.00 | 22800.00 |
| Surplus ( deficit ) foreign currency | 1205.50 | -22800.00 |

## Cashflow tables, production in 1000DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|
| Total CF-inflow | 15371.01 | 13510.78 | 14951.30 | 16016.24 | 17658.46 |
| . Financial resources | 2595.24 | 80.52 | 101.52 | 32.71 | 0.0 |
| . Sales | 12775.77 | 13430.26 | 14849.78 | 15983.53 | 17658.46 |
| Total CF-outflow | 21145.24 | 21617.28 | 21892.84 | 21565.56 | 21954.01 |
| . Total assets | 3858.39 | -515.21 | 106.63 | 129.27 | 300.70 |
| . Operating costs | 14458.59 | 14590.41 | 14809.79 | 15075.52 | 15808.20 |
| . Debt service and interest | 2828.28 | 2828.28 | 2262.62 | 1676.97 | 1131.31 |
| . Repayment | 0.0 | 4713.80 | 4713.80 | 4713.80 | 4713.80 |
| . Corporate tax | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Surplus ( deficit ) | -5774.23 | -8106.50 | -6941.54 | -5549.32 | -3795.54 |
| Cumulated cash balance | -7188.37 | -15294.86 | -22736.41 | -27765.72 | -31581.27 |
| Inflow local currency | 22548.99 | 23158.36 | 22811.82 | 22461.49 | 22140.73 |
| Outflow local currency | 17457.77 | 18805.14 | 18410.46 | 17992.60 | 17632.25 |
| Surplus ( deficit ) local currency | 5091.22 | 4353.21 | 4401.36 | 4468.89 | 4508.48 |
| Inflow foreign currency | 1190.24 | 80.52 | 101.52 | 32.71 | 0.0 |
| Outflow foreign currency | 3687.47 | 2812.14 | 3492.38 | 3572.96 | 3821.76 |
| Surplus ( deficit ) foreign currency | -2497.23 | -2731.61 | -3390.86 | -3540.25 | -3821.76 |



COMFAR 1.0 - UNIDO Vienna

## Cashflow tables, production in 1000DHS

| Year | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| Total CF-inflow | 14229.61 | 20945.48 | 23114.23 | 25501.25 | 28125.11 |
| . Financial resources | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Sales | 14229.61 | 20945.48 | 23114.23 | 25501.25 | 28125.11 |
| Total CF-outflow | 25322.69 | 18276.93 | 18291.62 | 19363.19 | 20673.06 |
| . Total assets | 6714.07 | 1261.90 | 333.17 | 369.08 | 550.95 |
| . Operating costs | 13328.37 | 17015.03 | 17958.46 | 18994.11 | 20122.11 |
| . Debt service and interest | 565.66 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Repayment | 4713.80 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Surplus ( deficit ) | -11093.08 | 2668.56 | 4822.61 | 6138.06 | 7452.04 |
| Cumulated cash balance | -42674.35 | -40005.79 | -35183.18 | -29045.12 | -21593.07 |
| Inflow local currency | 16471.96 | 20945.48 | 23114.23 | 25501.25 | 28125.11 |
| Outflow local currency | 14735.59 | 14085.12 | 14195.42 | 15091.32 | 16074.30 |
| Surplus ( deficit ) local currency | 1736.37 | 6860.37 | 8920.81 | 10409.92 | 12050.80 |
| Inflow foreign currency | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Outflow foreign currency | 10587. | 4191.81 | 4106.20 | 4271.86 | 4598 |
| Surplus ( deficit ) foreign currency | -10587.16 | -4191.81 | 4106.20 | -4271.86 | -4598. |

## Cashflow tables, production in 1000DHS

| Year | 1997 | 1998 | 1999 |
|---|---|---|---|
| Total CF-inflow | 28125.11 | 20982.60 | 28125.11 |
| . Financial resources | 0.0 | 0.0 | 0.0 |
| . Sales | 28125.11 | 20982.60 | 28125.11 |
| Total CF-outflow | 20110.28 | 22647.59 | [illegible] |
| . Total assets | -6.04 | 5811.97 | 1188.13 |
| . Operating costs | 20116.32 | 16835.71 | 20116.32 |
| . Debt service and interest | 0.0 | 0.0 | 0.0 |
| . Repayment | 0.0 | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 | 0.0 |
| Surplus ( deficit ) | 8014.83 | -1664.99 | 6820.66 |
| Cumulated cash balance | -13578.24 | -15243.23 | -8422.57 |
| Inflow local currency | 28125.11 | 20982.60 | 28125.11 |
| Outflow local currency | 15773.66 | 12113.85 | 16655.12 |
| Surplus ( deficit ) local currency | 12351.45 | 8859.75 | 11469.99 |
| Inflow foreign currency | 0.0 | 0.0 | 0.0 |
| Outflow foreign currency | 4336.62 | 10533.74 | 4649.32 |
| Surplus ( deficit ) foreign currency | -4336.62 | -10533.74 | -4649.32 |

| | |
|---|---|
| 2000 | 2001 |
| 28175.11 | 28175.11 |
| 0.0 | 0.0 |
| 28175.11 | 28175.11 |
| 20116.32 | 20116.32 |
| 0.0 | 0.0 |
| 20116.32 | 20116.32 |
| 0.0 | 0.0 |
| 0.0 | 0.0 |
| 0.0 | 0.0 |
| 0.0 | 0.0 |
| 8008.79 | 8008.79 |
| -413.79 | 7595.01 |
| 28175.11 | 28175.11 |
| 15777.19 | 15777.19 |
| 12347.92 | 12347.92 |
| 0.0 | 0.0 |
| 4339.13 | 4339.13 |
| -4339.13 | -4339.13 |

## Cashflow Discounting:

a) interest payable on loan = cash-outflow:

Net present value at 12.00 % = -49018.87
Internal Rate of Return 0.0 %

b) interest payable on loan added back to net-cashflow:

Net' present value at 12.00 % = -40621.47
Internal Rate of Return 0.37 %

Note: NPV is computed for the year before production starts, using
the Future Value of cashflows during pre-production.

c) Future Value of cashflow during pre-production:

Total cash-outflow at 12.00 % , FVAL = 50774.22
Total cash-outflow, Nominal value NVAL = 48283.14

## Total production costs in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|
| % of nom. capacity (single product only). | 78.29 | 82.28 | 87.07 | 93.11 | 100.00 |
| Raw material 1 | 1502.05 | 1578.83 | 1670.74 | 1766.53 | 1918.81 |
| Other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| Utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| Repair | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| Spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| Factory overheads | 264.60 | 264.60 | 264.60 | 264.60 | 264.60 |
| Factory costs | 11904.92 | 11961.70 | 12073.61 | 12189.40 | 12321.69 |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 | 1332.00 | 1332.00 |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Direct costs, sales and distribution | 1221.67 | 1276.71 | 1404.18 | 1504.12 | 1654.52 |
| Depreciation | 5740.98 | 5740.93 | 5740.98 | 5740.98 | 5703.48 |
| Financial costs | 2828.28 | 2828.28 | 2262.62 | 1696.97 | 1131.31 |
| Total manufacturing costs | 23027.84 | 23159.67 | 22813.39 | 22463.46 | 22142.98 |
| Costs per unit ( single product ) | 1.89 | 1.80 | 1.68 | 1.55 | 1.42 |
| Of it foreign, % | 14.44 | 14.59 | 15.09 | 15.68 | 16.32 |
| Of it variable,% | 11.83 | 12.33 | 13.48 | 14.65 | 16.14 |
| Of it direct, % | 57.00 | 57.25 | 59.08 | 60.96 | 63.12 |
| Total labour | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 |





## Total production costs in 1000 DHS

| Year | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| % of nom. capacity (single product only). | 82.55 | 119.99 | 130.45 | 142.14 | 154.82 |
| Raw material 1 | 1584.00 | 2302.35 | 2503.04 | 2727.36 | 2970.75 |
| Other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| Utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| Repair | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| Spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| Factory overheads | -1053.90 | 1294.60 | 1842.60 | 2439.60 | 3088.60 |
| Factory costs | 10668.37 | 13735.22 | 14493.91 | 15305.23 | 16197.62 |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 | 1332.00 | 1332.00 |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Direct costs, sales and distribution | 1328.00 | 1947.81 | 2142.55 | 2356.88 | 2592.49 |
| Depreciation | 2498.98 | 3968.98 | 3968.98 | 3968.98 | 3931.48 |
| Financial costs | 565.66 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total manufacturing costs | 16393.00 | 20984.00 | 21927.43 | 22763.08 | 24053.58 |
| Costs per unit ( single product ) | [illegible] | 1.12 | 1.08 | 1.04 | [illegible] |
| Of it foreign, % | 20.63 | 18.49 | 18.33 | 18.18 | 19.06 |
| [illegible] | 17.76 | 20.25 | 21.19 | 22.14 | 23.13 |

## Total production costs in 1000 DHS

| Year | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| % of nom. capacity (single product only). | 154.52 | 117.27 | 154.52 | 154.52 | 154.52 |
| Raw material 1 | 2964.96 | 2250.19 | 2964.96 | 2964.96 | 2964.96 |
| Other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| Utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| Repair | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| Spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| Factory overheads | 3088.60 | 1064.60 | 3088.60 | 3088.60 | 3088.60 |
| Factory costs | 16191.83 | 13453.05 | 16191.83 | 16191.83 | 16191.83 |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 | 1332.00 | 1332.00 |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Direct costs, sales and distribution | 2592.49 | 2050.87 | 2592.49 | 2592.49 | 2592.49 |
| Depreciation | 1866.75 | 396.75 | 1796.75 | 1796.75 | 1757.75 |
| Financial costs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total manufacturing costs | 21983.07 | 17232.46 | 21913.07 | 21913.07 | 21875.57 |
| Costs per unit ( single product ) | 0.91 | 0.94 | 0.91 | 0.91 | 0.91 |
| Of it foreign, % | 19.74 | 22.31 | 19.60 | 19.60 | 19.64 |
| Of it variable,% | 25.29 | 24.96 | 25.36 | 25.36 | 25.40 |
| Of it direct, % | 85.45 | 89.97 | 85.72 | 85.72 | 85.07 |
| Total labour | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 |

## Projected balance sheets, construction in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| Total assets | 20759.00 | 48283.14 |
| Fixed assets, net of depreciation | 0.0 | 20759.00 |
| Construction in progress | 20759.00 | 25222.39 |
| Current assets | 0.0 | 2301.75 |
| Cash, bank | 0.0 | 0.0 |
| Cash surplus, finance available | -0.0 | 0.0 |
| Total liabilities | 20759.00 | 48283.14 |
| Equity capital | 20759.00 | 23300.00 |
| Reserves, retained profit | 0.0 | 0.0 |
| Profit,(loss) | 0.0 | 0.0 |
| Long and medium term debt | 0.0 | 23569.00 |
| Current liabilities | 0.0 | 0.0 |
| Bank overdraft, finance required | 0.0 | 1414.14 |
| Total debt | 0.0 | 24983.14 |
| Equity, % of liabilities | 100.00 | 49.71 |

## Projected balance sheet, production in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|
| Total assets | 46400.54 | 40144.35 | 34510.01 | 28898.30 | 23495.53 |
| Fixed assets, net of depreciation | 40240.41 | 34479.44 | 28753.46 | 23017.47 | 17314.01 |
| Construction in progress | 0.0 | 0.0 | 0.0 | 0.0 | 154.00 |
| Current assets | 5913.66 | 5399.45 | 5505.08 | 5634.35 | 5785.05 |
| Cash, bank | 246.47 | 246.47 | 246.47 | 246.47 | 246.47 |
| Cash surplus, finance available | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total liabilities | 46400.54 | 40144.35 | 34510.01 | 28898.30 | 23495.53 |
| Equity capital | 24705.00 | 24705.00 | 24705.00 | 24705.00 | 24705.00 |
| Reserves, retained profit | 0.0 | -10252.07 | -19981.47 | -27945.08 | -34425.02 |
| Profit, (loss) | -10252.07 | -9729.41 | -7963.61 | -6479.94 | -4454.57 |
| Long and medium term debt | 23569.00 | 18855.20 | 14141.40 | 9427.60 | 4713.80 |
| Current liabilities | 651.78 | 665.65 | 670.76 | 677.17 | 684.54 |
| Bank overdraft, finance required | 7717.72 | 15899.97 | 22937.94 | 28513.54 | 32301.73 |
| Total debt | 31947.61 | 35420.82 | 37750.09 | 38618.33 | 37700.07 |
| Equity, % of liabilities | 63.06 | 101.90 | 213.49 | 6420.79 | -290.54 |





## Projected balance sheet, production in 1000 DHS

| Year | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| Total assets | 27711.42 | 25004.34 | 21768.54 | 17769.64 | 14789.12 |
| Fixed assets, net of depreciation | 14960.04 | 18346.06 | 14377.09 | 10409.12 | 6476.64 |
| Construction in progress | 7359.00 | 0.0 | 0.0 | 0.0 | 159.00 |
| Current assets | 5293.85 | 6368.90 | 5479.23 | 7022.44 | 7397.75 |
| Cash, bank | 191.53 | 289.33 | 313.22 | 337.09 | 364.13 |
| Cash surplus, finance available | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total liabilities | 27711.42 | 25004.34 | 21768.54 | 17769.64 | 14789.12 |
| Equity capital | 24705.00 | 24705.00 | 24705.00 | 24705.00 | 24705.00 |
| Reserves, retained profit | -36983.54 | -41072.93 | -41111.45 | -39934.65 | -37339.49 |
| Profit, (loss) | -2163.39 | -38.52 | 1176.80 | 2573.16 | 4071.53 |
| Long and medium term debt | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities | 592.69 | 767.07 | 804.66 | 850.39 | 757.87 |
| Bank overdraft, finance required | 43486.55 | 40647.73 | 35703.53 | 29599.84 | 22093.22 |
| Total debt | 44079.35 | 41410.79 | 36583.19 | 30450.13 | 22958.08 |
| Equity, % of liabilities | -156.61 | -157.93 | -171.38 | -208.91 | -320.42 |

230.



## Projected balance sheet, production in 1000 DHS

| Year | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Total assets | 12515.33 | 17930.46 | 17721.83 | 15525.09 | 20955.17 |
| Fixed assets, net of depreciation | 4759.87 | 4767.16 | 9566.39 | 7759.64 | 6910.39 |
| Construction in progress | 0.0 | 7000.00 | 0.0 | 0.0 | 0.0 |
| Current assets | 7391.31 | 6237.52 | 7791.31 | 7391.31 | 7391.31 |
| Cash, bank | 364.13 | 279.80 | 364.13 | 364.13 | 364.13 |
| Cash surplus, finance available | 0.0 | 0.0 | 0.0 | 0.0 | 7089.74 |
| Total liabilities | 12515.23 | 17930.46 | 17721.83 | 15525.09 | 20955.17 |
| Equity capital | 24765.00 | 24765.00 | 24765.00 | 24765.00 | 24765.00 |
| Reserves, retained profit | -33316.96 | -27172.92 | -23422.79 | -17210.75 | [illegible] |
| Profit, (loss) | 6142.04 | 3750.14 | 6212.04 | 6212.04 | 6247.79 |
| Long and medium term debt | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities | 899.55 | 747.39 | 899.55 | 899.55 | 899.55 |
| Bank overdraft, finance required | 14025.71 | 15900.85 | 8522.03 | 919.25 | 0.0 |
| Total debt | 14925.25 | 16648.24 | 9427.58 | 1818.79 | 899.55 |
| Equity, % of liabilities | -1575.19 | 1217.23 | 254.32 | 169.15 | 118.36 |

## Net income statement in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|
| Total sales, including sales tax | 12775.77 | 13430.26 | 14847.78 | 15983.53 |
| Less: variable costs, including sales tax | 2723.72 | 2855.54 | 3074.92 | 3290.65 |
| Variable margin | 10052.06 | 10574.72 | 11774.85 | 12692.88 |
| As % of total sales | 78.68 | 78.74 | 79.29 | 79.41 |
| Non-variable costs, including depreciation | 17475.84 | 17475.84 | 17475.84 | 17475.84 |
| Operational margin | -7423.79 | -6901.13 | -5700.99 | -4782.97 |
| As % of total sales | -58.11 | -51.38 | -38.39 | -29.92 |
| Cost of finance | 2828.28 | 2828.28 | 2262.62 | 1696.97 |
| Gross profit | -10252.07 | -9729.41 | -7963.61 | -6479.94 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | -10252.07 | -9729.41 | -7963.61 | -6479.94 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | -10252.07 | -9729.41 | -7963.61 | -6479.94 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | -10252.07 | -9729.41 | -7963.61 | -6479.94 |
| Accumulated undistributed profit | -10252.07 | -19981.47 | -27945.09 | -34425.02 |
| Gross profit, % of total sales | -80.25 | -72.44 | -53.63 | -40.54 |
| Net profit, % of total sales | -80.25 | -72.44 | -53.63 | -40.54 |
| Net profit, % of equity | -39.59 | -37.46 | -30.54 | -24.82 |
| Net profit + interest, % of investment | -14.59 | -13.54 | -11.17 | -9.34 |

## Net income statement in 1000 DHS

| Year | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|
| Total sales, including sales tax | 17659.46 | 14229.61 | 20945.48 | 23114.23 |
| Less: variable costs, including sales tax | [illegible] | 2912.00 | 4290.16 | 4645.57 |
| Variable margin | 14035.14 | 11317.61 | 16655.33 | 18469.66 |
| As % of total sales | 77.76 | 79.54 | 79.71 | 79.90 |
| Non-variable costs, including depreciation | 17478.34 | 12915.34 | 16733.85 | 17281.85 |
| Operational margin | -3357.21 | -1597.73 | -38.52 | 1186.90 |
| As % of total sales | -18.99 | -11.23 | -0.18 | 5.13 |
| Cost of finance | 1171.31 | 565.66 | 0.0 | 0.0 |
| Gross profit | -4404.52 | -2163.39 | -38.52 | 1186.90 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | -4404.52 | -2163.39 | -38.52 | 1186.90 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | -4404.52 | -2163.39 | -38.52 | 1186.90 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | -4404.52 | -2163.39 | -38.52 | 1186.90 |
| Accumulated undistributed profit | -38909.54 | -41072.93 | -41111.45 | -39924.55 |
| Gross profit, % of total sales | -25.49 | -15.20 | -0.18 | 5.13 |
| Net profit, % of total sales | -25.40 | -15.20 | -0.18 | 5.13 |
| Net profit, % of equity | -17.18 | -8.29 | -0.15 | 4.55 |
| Net profit + interest, % of investment | -6.51 | -2.74 | -0.06 | 1.97 |

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## Net income statement in 1000 DHS

| Year | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|
| Total sales, including sales tax | 25501.25 | 28125.11 | 28125.11 | 20982.60 |
| Less: variable costs, including sales tax | 5084.24 | 5563.23 | 5557.45 | 4300.84 |
| Variable margin | 20417.01 | 22561.87 | 22567.66 | 16681.76 |
| As % of total sales | 80.06 | 80.22 | 80.24 | 79.50 |
| Non-variable costs, including depreciation | 17878.84 | 18490.35 | 16425.62 | 12931.52 |
| Operational margin | 2538.16 | 4071.53 | 6142.04 | 3750.14 |
| As % of total sales | 9.95 | 14.48 | 21.84 | 17.87 |
| Cost of finance | 0.0 | 0.0 | 0.0 | 0.0 |
| Gross profit | 2538.16 | 4071.53 | 6142.04 | 3750.14 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | 2538.16 | 4071.53 | 6142.04 | 3750.14 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | 2538.16 | 4071.53 | 6142.04 | 3750.14 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | 2538.16 | 4071.53 | 6142.04 | 3750.14 |
| Accumulated undistributed profit | -37386.49 | -33314.96 | -27172.92 | -23422.79 |
| Gross profit, % of total sales | 9.95 | 14.48 | 21.84 | 17.87 |
| Net profit, % of total sales | 9.95 | 14.48 | 21.84 | 17.87 |
| Net profit, % of equity | 9.72 | 15.59 | 23.52 | 14.36 |
| Net profit + interest, % of investment | 4.23 | 6.73 | 10.15 | 5.64 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

## Net income statement in 1000 DHS

| Year | 1999 | 2000 | 2001 |
|---|---|---|---|
| Total sales, including sales tax | 28125.11 | 28125.11 | 28125.11 |
| Less: variable costs, including sales tax | 5557.45 | 5557.45 | 5557.45 |
| Variable margin | 22567.66 | 22567.66 | 22567.66 |
| As % of total sales | 80.24 | 80.24 | 80.24 |
| Non-variable costs, including depreciation | 16355.62 | 16355.62 | 16319.12 |
| Operational margin | 6212.04 | 6212.04 | 6249.54 |
| As % of total sales | 22.09 | 22.09 | 22.22 |
| Cost of finance | 0.0 | 0.0 | 0.0 |
| Gross profit | 6212.04 | 6212.04 | 6249.54 |
| Allowances | 0.0 | 0.0 | 0.0 |
| Taxable profit | 6212.04 | 6212.04 | 6249.54 |
| Tax | 0.0 | 0.0 | 0.0 |
| Net profit | 6212.04 | 6212.04 | 6249.54 |
| Dividends paid | 0.0 | 0.0 | 0.0 |
| Undistributed profit | 6212.04 | 6212.04 | 6249.54 |
| Accumulated undistributed profit | -17210.75 | -10998.71 | -4749.17 |
| Gross profit, % of total sales | 22.09 | 22.09 | 22.22 |
| Net profit, % of total sales | 22.09 | 22.09 | 22.22 |
| Net profit, % of equity | 27.79 | 27.79 | 27.94 |
| Net profit + interest, % of investment | 9.20 | 9.20 | 9.26 |

## Source of finance, construction in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| Equity, ordinary | 20759.00 | 2541.00 |
| Equity, preference | 0.0 | 0.0 |
| Subsidies, grants | 0.0 | 0.0 |
| Loan AF | 0.0 | 0.0 |
| Loan BF | 0.0 | 0.0 |
| Loan CF | 0.0 | 0.0 |
| Loan AL | 0.0 | 23569.00 |
| Loan BL | 0.0 | 0.0 |
| Loan CL | 0.0 | 0.0 |
| Total loan | 0.0 | 23569.00 |
| Current liabilities | 0.0 | 0.0 |
| Bank overdraft | 0.0 | 1414.14 |
| Total funds available | 20759.00 | 27524.14 |

## Source of finance, production in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|
| Equity, ordinary | 2595.24 | 80.52 | 101.52 | 32.71 | 0.0 | 0.0 |
| Equity, preference | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Subsidies, grants | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AL | 0.0 | -4713.80 | -4713.80 | -4713.80 | -4713.80 | -4713.80 |
| Loan BL | 0.0 | 0.0 | -0.0 | -0.0 | -0.0 | -0.0 |
| Loan CL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total loan | 0.0 | -4713.80 | -4713.80 | -4713.80 | -4713.80 | -4713.80 |
| Current liabilities | 661.38 | 4.27 | 5.11 | 6.43 | 7.35 | -91.85 |
| Bank overdraft | 7717.22 | 8182.75 | 7037.96 | 5575.60 | 3788.20 | 11184.93 |
| Total funds available | 10973.85 | 3553.74 | 2430.79 | 900.95 | -918.26 | 6379.28 |



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## Source of finance, production in 1000 DHS

| Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Equity, ordinary | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Equity, preference | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Subsidies, grants | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BL | -0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total loan | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities | 170.38 | 41.59 | 45.63 | 49.58 | -0.32 | -152.15 |
| Bank overdraft | -2838.94 | -4854.20 | -6183.69 | -7501.62 | -8014.51 | 1817.14 |
| Total funds available | -2668.56 | -4822.60 | -6138.06 | -7452.05 | -8014.83 | 1664.99 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

Source of finance, production in 1000 DHS

| Year | 1999 | 2000 | 2001 |
|---|---|---|---|
| Equity, ordinary | 0.0 | 0.0 | 0.0 |
| Equity, preference | 0.0 | 0.0 | 0.0 |
| Subsidies, grants | 0.0 | 0.0 | 0.0 |
| Loan AF | 0.0 | 0.0 | 0.0 |
| Loan BF | 0.0 | 0.0 | 0.0 |
| Loan CF | 0.0 | 0.0 | 0.0 |
| Loan AL | 0.0 | 0.0 | 0.0 |
| Loan BL | 0.0 | 0.0 | 0.0 |
| Loan CL | 0.0 | 0.0 | 0.0 |
| Total loan | 0.0 | 0.0 | 0.0 |
| Current liabilities | 152.15 | 0.0 | 0.0 |
| Bank overdraft | -6972.82 | -8008.79 | -919.25 |
| Total funds available | -6820.66 | -8008.79 | -919.25 |

## Net working capital in 1000 DHS

| Year | | | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable | 30 | 12.0 | [illegible] | 1215.87 | [illegible] | [illegible] |
| Inventory and materials | 259 | 1.4 | [illegible] | 1541.96 | [illegible] | 1726.99 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | 850.00 | 850.00 | 850.00 | 850.00 |
| Work in progress | 9 | 40.0 | 297.62 | 259.54 | [illegible] | 304.74 |
| Finished products | 16 | 21.8 | 696.69 | 610.21 | 655.42 | 613.73 |
| Cash in hand | 15 | 24.0 | 246.47 | 246.47 | 246.47 | 246.47 |
| Total current assets | | | 5558.38 | 5643.16 | 5747.79 | 5879.07 |
| Current liabilities and | | | | | | |
| Accounts payable | 20 | 18.0 | 661.38 | 665.65 | 678.76 | 677.19 |
| Net working capital | | | 4896.99 | 4977.51 | 5079.04 | 5201.88 |
| Increase in working capital | | | 2555.74 | 80.52 | 101.52 | 122.84 |
| Net working capital, local currency | | | 3017.67 | 3067.83 | 3133.00 | 3210.05 |
| Net working capital, foreign currency | | | 1879.32 | 1909.68 | 1946.04 | 1991.83 |

Notes: mdc = minimum days of coverage ; coto = coefficient of turnover ;

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GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

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## Net working capital in 1000 DHS

| Year | | | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable | 30 | 12.0 | 1275.68 | 1110.70 | 1417.92 | 1496.54 |
| Inventory and materials | 259 | 1.4 | 1944.67 | 1586.57 | 2186.15 | 2764.84 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | 850.00 | 850.00 | 850.00 | 850.00 |
| Work in progress | 9 | 40.0 | 308.04 | 286.71 | 343.38 | 362.10 |
| Finished products | 16 | 21.8 | 625.79 | 550.02 | [illegible] | 724.99 |
| Cash in hand | 15 | 24.0 | 246.47 | 191.53 | 239.79 | 313.72 |
| Total current assets | | | 6029.77 | 5394.63 | 6656.53 | 6987.70 |
| Current liabilities and | | | | | | |
| Accounts payable | 20 | 18.0 | 684.54 | 592.69 | 763.07 | 804.66 |
| Net working capital | | | 5345.23 | 4801.94 | 5893.46 | 6185.04 |
| Increase in working capital | | | 143.35 | -543.28 | 1091.52 | 291.58 |
| Net working capital, local currency | | | 3301.09 | 2890.21 | 3697.64 | 3909.85 |
| Net working capital, foreign currency | | | 2044.14 | 1911.73 | 2195.82 | 2275.19 |

239.

## Net working capital in 1000 DHS

| Year | mdc | coto | 1995 |
|---|---|---|---|
| Coverage:................................ | mdc | coto | |
| Current assets & | | | |
| Accounts receivable .................... | 30 | 12.0 | 1582.84 |
| Inventory and materials................ | 259 | 1.4 | 2564.56 |
| Energy ................................ | 60 | 6.0 | 879.11 |
| Spares ................................ | 180 | 2.0 | 850.00 |
| Work in progress ...................... | 9 | 40.0 | 382.63 |
| Finished products ..................... | 16 | 21.8 | 762.54 |
| Cash in hand .......................... | 15 | 24.0 | 337.09 |
| Total current assets .................. | | | 7358.78 |
| Current liabilities and | | | |
| Accounts payable ...................... | 20 | 18.0 | 850.29 |
| Net working capital ................... | | | 6508.49 |
| Increase in working capital ........... | | | 523.45 |
| Net working capital, local currency ... | | | 4144.59 |
| Net working capital, foreign currency ... | | | 2363.90 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

GLASS BOTTLE PROJECT

## Net working capital in 1000 DHS

| Year | mdc | coto | 1999 |
|---|---|---|---|
| Coverage:................................ | mdc | coto | |
| Current assets & | | | |
| Accounts receivable .................... | 30 | 12.0 | 1676.36 |
| Inventory and materials................ | 259 | 1.4 | 2776.11 |
| Energy ................................ | 60 | 6.0 | 879.11 |
| Spares ................................ | 180 | 2.0 | 850.00 |
| Work in progress ...................... | 9 | 40.0 | 404.80 |
| Finished products ..................... | 16 | 21.8 | 803.18 |
| Cash in hand .......................... | 15 | 24.0 | 364.13 |
| Total current assets .................. | | | 7753.69 |
| Current liabilities and | | | |
| Accounts payable ...................... | 20 | 18.0 | 899.55 |
| Net working capital ................... | | | 6854.14 |
| Increase in working capital ........... | | | 1035.97 |
| Net working capital, local currency ... | | | 4396.28 |
| Net working capital, foreign currency ... | | | 2457.86 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

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| 1996 | 1997 | 1998 |
|---|---|---|
| 1676.84 | 1676.36 | 1402.98 |
| 2781.26 | 2776.11 | 2139.70 |
| 879.11 | 879.11 | 879.11 |
| 850.00 | 850.00 | 850.00 |
| 404.94 | 404.90 | 336.33 |
| 803.44 | 803.18 | 677.65 |
| 364.13 | 364.13 | 279.80 |
| 7759.73 | 7753.69 | 6565.56 |
| 899.87 | 899.55 | 747.39 |
| 6859.86 | 6854.14 | 5818.17 |
| 351.38 | -5.72 | -1035.97 |
| 4399.71 | 4396.28 | 3642.99 |
| 2460.15 | 2457.86 | 2175.19 |

IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

------------------- COMFAR 1.0 - UNIDO Vienna ---

| 2000 | 2001 |
|---|---|
| 1676.36 | 1676.36 |
| 2776.11 | 2776.11 |
| 879.11 | 879.11 |
| 850.00 | 850.00 |
| 404.80 | 404.80 |
| 803.18 | 803.18 |
| 364.13 | 364.13 |
| 7753.69 | 7753.69 |
| 899.55 | 899.55 |
| 6854.14 | 6854.14 |
| 0.0 | 0.0 |
| 4396.28 | 4396.28 |
| 2457.86 | 2457.86 |

# APPENDIX XI.6

TODC FOR PRODUCT «A» foreign : GLASS

| | YEAR: 1 | YEAR: 2 | YEAR: 3 | YEAR: 4 | YEAR: 5 | YEAR: 6 | YEAR: 7 | YEAR: 8 |
|---|---|---|---|---|---|---|---|---|
| raw material | 3389.03 | 3562.27 | 3769.65 | 4030.91 | [illegible] | 3573.93 | 5194.73 | 5847.55 |
| other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| energy | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| labour | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| maintenance | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| factory overheads | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| sub-total ( factory costs ) | 5634.03 | 5807.27 | 6014.66 | 6275.91 | 6574.76 | 5818.93 | 7439.73 | 7892.55 |
| of these variable | 3389.03 | 3562.27 | 3769.66 | 4030.91 | 4329.76 | 3573.93 | 5194.73 | 5647.55 |
| administrative overheads | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| of these labour | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total before depreciation and interests | 5674.03 | 5847.27 | 6054.66 | 6315.91 | 6614.76 | 5858.93 | 7479.73 | 7932.55 |
| depreciation | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total before interests | 5674.03 | 5847.27 | 6054.66 | 6315.91 | 6614.36 | 5958.93 | 7479.73 | 7932.55 |
| interests, payable on deb'tures | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs | 5674.03 | 5847.27 | 6054.66 | 6315.91 | 6614.76 | 5879.93 | 7479.73 | 7932.55 |
| of it variable | 3389.03 | 3562.27 | 3769.66 | 4030.91 | 4329.76 | 3573.93 | 5194.73 | 5847.55 |
| of it labour ( total, direct and indirect ) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| | YEAR: 9 | YEAR:10 | YEAR:11 | YEAR:12 | YEAR:13 | YEAR:14 | YEAR:15 |
|---|---|---|---|---|---|---|---|
| raw material | 6153.67 | 6702.82 | 6689.77 | 5077.02 | 6689.77 | 6689.77 | 6689.77 |
| other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| energy | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| labour | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| maintenance | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| factory overheads | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| sub-total ( factory costs ) | 8398.67 | 8947.82 | 8934.77 | 7322.02 | 8934.77 | 8934.77 | 8934.77 |
| of these variable | 6153.67 | 6702.82 | 6689.77 | 5077.02 | 6689.77 | 6689.77 | 6689.77 |
| administrative overheads | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| of these labour | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total before depreciation and interests | 8438.67 | 8987.82 | 8974.77 | 7362.02 | 8974.77 | 8974.77 | 8974.77 |
| depreciation | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total before interests | 8438.67 | 8987.82 | 8974.77 | 7362.02 | 8974.77 | 8974.77 | 8974.77 |
| interests, payable on deb'tures | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs | 8438.67 | 8987.82 | 8974.77 | 7362.02 | 8974.77 | 8974.77 | 8974.77 |
| of it variable | 6153.67 | 6702.82 | 6689.77 | 5077.02 | 6689.77 | 6689.77 | 6689.77 |
| of it labour ( total, direct and indirect ) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

"FUJA/4"

"Raw material imported at Dlls 277.63/ton of glass"

[illegible]

| | YEAR: 1 | YEAR: 2 | YEAR: 3 | YEAR: 4 | YEAR: 5 | YEAR: 6 | YEAR: 7 | YEAR: 8 |
|---|---|---|---|---|---|---|---|---|
| raw material ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| other raw materials ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| energy ........ | 5274.67 | 5274.57 | 5274.47 | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| labour ........ | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| maintenance ........ | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| spares ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| factory overheads ........ | 264.60 | 264.60 | 264.60 | 264.60 | 264.60 | -1053.90 | 1296.60 | 1842.60 |
| sub-total ( factory costs ) ........ | 8157.87 | 8157.87 | 8157.87 | 8157.87 | 8157.87 | 6839.37 | 9189.87 | 9735.87 |
| of these variable ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| administrative overheads ........ | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 |
| of these labour ........ | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 |
| total before depreciation and interests ........ | 9449.87 | 9449.87 | 9449.87 | 9449.87 | 9449.87 | 8131.37 | 10481.87 | 11027.87 |
| depreciation ........ | 5740.98 | 5740.98 | 5740.98 | 5740.98 | 5703.48 | 2498.98 | 3964.98 | 3968.98 |
| total before interests ........ | 15190.85 | 15190.85 | 15190.85 | 15190.85 | 15153.35 | 10630.35 | 14446.85 | 14996.85 |
| interests, payable on debentures ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs ........ | 15 | 15190.85 | 15190.85 | 15190.85 | 15153.35 | 10630.35 | 14446.85 | 14996.85 |
| of it variable ........ | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| of it labour ( total, direct and indirect ) .... | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 |

| | YEAR: 9 | YEAR:10 | YEAR:11 | YEAR:12 | YEAR:13 | YEAR:14 | YEAR:15 |
|---|---|---|---|---|---|---|---|
| raw material ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| other raw materials ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| energy ........ | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| labour ........ | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| maintenance ........ | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| spares ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| factory overheads ........ | 2439.60 | 3082.50 | 3083.60 | 1064.60 | 3088.60 | 3088.60 | 3088.60 |
| sub-total ( factory costs ) ........ | 10332.87 | 10981.57 | 10981.87 | 8957.87 | 10981.87 | 10981.57 | 10981.87 |
| of these variable ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| administrative overheads ........ | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 |
| of these labour ........ | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 |
| total before depreciation and interests ........ | 11624.87 | 12272.87 | 12273.97 | 10249.87 | 12273.87 | 12273.97 | 12273.87 |
| depreciation ........ | 3968.98 | 3932.48 | 1866.75 | 396.75 | 1796.75 | 1796.75 | 1759.25 |
| total before interests ........ | 15593.85 | 16205.35 | 14140.62 | 10646.62 | 14070.62 | 14070.62 | 14033.12 |
| interests, payable on debentures ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs ........ | 15593.85 | 16205.35 | 14140.62 | 10646.62 | 14070.62 | 14070.62 | 14033.12 |
| of it variable ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| of it labour ( total, direct and indirect ) .... | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 |

## Total initial investment costs in 1000 DHS

| | | |
|---|---|---|
| Year | 1985 | 1986 |
| **Fixed investment costs** | | |
| Land site preparation and development | 600.00 | 75.00 |
| Buildings and civil works | 5300.00 | 1210.00 |
| Auxiliary and service facilities | 0.0 | 0.0 |
| Incorporated fixed assets | 75.00 | 175.00 |
| Plant machinery and equipment | 8774.00 | 20048.25 |
| Total fixed investment costs | 14277.00 | 21508.25 |
| Pre-production capital expendit | 6480.00 | 3714.14 |
| Working capital | 0.0 | 2301.75 |
| Total initial investment costs | 20757.00 | 27524.14 |
| Of it foreign, in % | 44.19 | 82.64 |

243.

---------------------------------------- COMFAR 1.0 - UNIDO Vienna ---

## Total current investment costs in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 0.0 | 0.0 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 0.0 | 0.0 | 0.0 |
| Total fixed investment costs | 0.0 | 0.0 | 0.0 | 0.0 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 4420.53 | -446.73 | 180.72 | 226.87 |
| Total current investment costs | 4420.53 | -446.73 | 180.72 | 226.87 |
| Of it foreign, % | 52.99 | 101.03 | 94.12 | 96.73 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

---------------------------------------- COMFAR 1.0 - UNIDO Vienna ---

## Total current investment costs in 1000 DHS

| Year | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 150.00 | 0.0 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 7350.00 | 0.0 | 0.0 |
| Total fixed investment costs | 150.00 | 7350.00 | 0.0 | 0.0 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 257.58 | -822.16 | 1702.35 | 462.94 |
| Total current investment costs | 407.58 | 6527.84 | 1702.35 | 462.94 |
| Of it foreign, % | 96.92 | 103.17 | 78.19 | 80.38 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

## Total current investment costs in 1000 DHS

| Year | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 0.0 | 150.00 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 0.0 | 0.0 | 7000.00 |
| Total fixed investment costs | 0.0 | 150.00 | 0.0 | 7000.00 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 515.00 | 559.25 | -10.66 | -1644.18 |
| Total current investment costs | 515.00 | 709.25 | -10.66 | 5355.82 |
| Of it foreign, % | 80.75 | 84.78 | 100.00 | 105.99 |





## Total current investment costs in 1000 DHS

| Year | 1999 |
|---|---|
| Fixed investment costs: | |
| Land, site preparation and development | 0.0 |
| Buildings and civil works | 0.0 |
| Auxiliary and service facilities | 0.0 |
| Incorporated fixed assets | 0.0 |
| Plant, machinery and equipment | 0.0 |
| Total fixed investment costs | 0.0 |
| Preproduction capitals expend's | 0.0 |
| Working capital | 1644.18 |
| Total current investment costs | 1644.18 |
| Of it foreign, % | 80.50 |

## Cashflow tables, construction in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| Total CF-inflow | 20759.00 | 26110.00 |
| . Financial resources | 20759.00 | 26110.00 |
| . Sales | 0.0 | 0.0 |
| Total CF-outflow | 20759.00 | 27524.14 |
| . Total assets | 20759.00 | 26110.00 |
| . Operating costs | 0.0 | 0.0 |
| . Debt service and interest | 0.0 | 1414.14 |
| . Repayment | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 |
| Surplus ( deficit ) | 0.0 | -1414.14 |
| Cumulated cash balance | 0.0 | -1414.14 |
| Inflow local currency | 10379.50 | 26110.00 |
| Outflow local currency | 11585.00 | 4724.14 |
| Surplus ( deficit ) local currency | -1205.50 | 21385.86 |
| Inflow foreign currency | 10379.50 | 0.0 |
| Outflow foreign currency | 9174.00 | 22800.00 |
| Surplus ( deficit ) foreign currency | 1205.50 | -22800.00 |

## Cashflow tables, production in 1000DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|
| Total CF-inflow | 16604.35 | 14289.74 | 15631.83 | 17278.90 | 19030.06 |
| . Financial resources | 3828.58 | 153.27 | 0.0 | 0.0 | 0.0 |
| . Sales | 12775.77 | 14136.46 | 15631.83 | 17278.90 | 19030.06 |
| Total CF-outflow | 24431.51 | 23896.71 | 24547.59 | 24425.26 | 24367.50 |
| . Total assets | 5196.55 | -437.10 | 192.24 | 241.34 | 424.16 |
| . Operating costs | 16345.57 | 16660.31 | 17003.95 | 17426.83 | 17281.49 |
| . Debt service and interest | 2889.40 | 2359.71 | 2403.25 | 1809.47 | 1215.69 |
| . Repayment | 0.0 | 4713.80 | 4948.17 | 4948.17 | 4948.17 |
| . Corporate tax | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Surplus ( deficit ) | -7827.16 | -9606.97 | -8915.76 | -7146.36 | -5337.44 |
| Cumulated cash balance | -9241.39 | -18849.27 | -27764.04 | -34910.95 | -40390.43 |
| Inflow local currency | 24522.72 | 24654.79 | 24366.10 | 23681.95 | 23379.04 |
| Outflow local currency | 16101.00 | 19110.88 | 18998.14 | 19015.33 | 18712.37 |
| Surplus ( deficit ) local currency | 8421.72 | 5543.91 | 5367.96 | 4666.62 | 4666.67 |
| Inflow foreign currency | 1405.00 | 706.20 | 792.06 | 1295.38 | 1431.60 |
| Outflow foreign currency | 8330.51 | 4785.83 | 5559.45 | 5410.53 | 5767.12 |
| Surplus ( deficit ) foreign currency | -6925.51 | -4079.63 | -4767.39 | -4115.15 | -4335.52 |





## Cashflow tables, production in 1000DHS

| Year | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| Total CF-inflow | 15811.37 | 23272.76 | 25683.00 | 28334.72 | 31249.60 |
| . Financial resources | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Sales | 15811.37 | 23272.76 | 25683.00 | 28334.72 | 31249.60 |
| Total CF-outflow | 27491.10 | 22371.47 | 21929.13 | 23333.94 | 25000.87 |
| . Total assets | 6412.62 | 1522.66 | 518.54 | 576.29 | 775.81 |
| . Operating costs | 15508.40 | 20186.11 | 21409.59 | 22757.66 | 24225.06 |
| . Debt service and interest | 621.91 | 28.12 | 0.00 | 0.00 | 0.00 |
| . Repayment | 4948.17 | 634.37 | 0.0 | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Surplus ( deficit ) | -11679.73 | 901.29 | 3754.86 | 5000.78 | 6248.73 |
| Cumulated cash balance | -51920.16 | -51078.87 | -47324.01 | -42323.22 | -36074.50 |
| Inflow local currency | 17120.70 | 21725.46 | 23114.23 | 25501.25 | 28125.11 |
| Outflow local currency | 16331.29 | 15519.23 | 15860.44 | 16947.51 | 18134.88 |
| Surplus ( deficit ) local currency | 789.49 | 6706.24 | 7253.79 | 8553.74 | 9990.23 |
| Inflow foreign currency | 1531.76 | 2327.28 | 2563.76 | 2833.47 | 3124.50 |
| Outflow foreign currency | 11159.81 | 6852.24 | 6062.69 | 6386.43 | 6866.00 |
| Surplus ( deficit ) foreign currency | -9578.06 | -4524.97 | -3498.93 | -3552.96 | -3741.50 |

## Cashflow tables, production in 1000DHS

| Year | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Total CF-inflow | 31249.60 | 23036.82 | 31249.60 | 31249.60 | 31249.59 |
| . Financial resources | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Sales | 31249.60 | 23036.82 | 31249.60 | 31249.60 | 31249.60 |
| Total CF-outflow | 24200.63 | 25107.71 | 26058.24 | 24212.02 | 24212.02 |
| . Total assets | -11.38 | 5153.78 | 1346.27 | 0.0 | 0.0 |
| . Operating costs | 24212.02 | 19955.93 | 24712.02 | 24212.02 | 24212.02 |
| . Debt service and interest | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| . Repayment | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Surplus ( deficit ) | 7048.97 | -1672.89 | 5191.37 | 7037.58 | 7037.58 |
| Cumulated cash balance | -29025.53 | -30698.42 | -25507.06 | -18469.47 | -11431.89 |
| Inflow local currency | 28125.11 | 20582.61 | 28125.11 | 28125.11 | 28125.11 |
| Outflow local currency | 17990.85 | 14421.66 | 18423.94 | 17990.86 | 17990.86 |
| Surplus ( deficit ) local currency | 10134.25 | 6160.94 | 9701.17 | 10134.25 | 10134.25 |
| Inflow foreign currency | 3124.50 | 2454.21 | 3124.50 | 3124.50 | 3124.50 |
| Outflow foreign currency | 6209.78 | 10788.05 | 7634.30 | 6221.16 | 6221.16 |
| Surplus ( deficit ) foreign currency | -3085.28 | -8333.84 | -4509.80 | -3096.66 | -3096.66 |



247.

## Cashflow Discounting:

a) interest payable on loan = cash-outflow:

| | | |
|---|---|---|
| Net present value at | 12.00 % = | -52573.32 |
| Internal Rate of Return | 0.0 % | |

b) interest payable on loan added back to net-cashflow:

| | | |
|---|---|---|
| Net present value at | 12.00 % = | -49735.91 |
| Internal Rate of Return | 0.0 % | |

Note: NPV is computed for the year before production starts, using
the Future Value of cashflows during pre-production.

c) Future Value of cashflow during pre-production:

| | | |
|---|---|---|
| Total cash-outflow at | 12.00 % , FVAL = | 50774.22 |
| Total cash-outflow, Nominal value | NVAL = | 48283.14 |

## Total production costs in 1000 DHS

| Year | 1987 | 1988 | 1989 |
|---|---|---|---|
| % of nom. capacity (single product only). | 78.28 | 82.28 | 87.07 |
| Raw material I | 3253.03 | 3552.27 | 3759.66 |
| Other raw materials | 0.0 | 0.0 | 0.0 |
| Energy | 5274.67 | 5274.67 | 5274.67 |
| Utilities | 545.00 | 545.00 | 545.00 |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 |
| Repair | 850.00 | 850.00 | 850.00 |
| Spares | 1700.00 | 1700.00 | 1700.00 |
| Factory overheads | 264.60 | 264.60 | 264.60 |
| Factory costs | 13791.90 | 13965.14 | 14172.53 |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 |
| Direct costs, sales and distribution | 1221.67 | 1362.17 | 1499.41 |
| Depreciation | 5740.98 | 5740.98 | 5740.98 |
| Financial costs | 2889.40 | 2959.71 | 2403.25 |
| Total manufacturing costs | 24975.94 | 25360.99 | 25148.15 |
| Costs per unit ( single product ) | 2.05 | 1.98 | 1.85 |
| Of it foreign, % | 22.72 | 23.40 | 24.45 |
| Of it variable,% | 18.46 | 19.42 | 20.95 |
| Of it direct, % | 60.11 | 60.44 | 62.32 |
| Total labour | 2865.60 | 2865.60 | 2865.60 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.

## Total production costs in 1000 DHS

| Year | 1992 | 1993 | 1994 |
|---|---|---|---|
| % of nom. capacity (single product only). | 82.55 | 119.99 | 130.45 |
| Raw material I | 3573.93 | 5194.73 | 5647.55 |
| Other raw materials | 0.0 | 0.0 | 0.0 |
| Energy | 5274.67 | 5274.67 | 5274.67 |
| Utilities | 545.00 | 545.00 | 545.00 |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 |
| Repair | 850.00 | 850.00 | 850.00 |
| Spares | 1700.00 | 1700.00 | 1700.00 |
| Factory overheads | -1053.90 | 1294.60 | 1842.60 |
| Factory costs | 12658.30 | 16627.60 | 17528.42 |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 |
| Direct costs, sales and distribution | 1519.10 | 2226.51 | 2449.17 |
| Depreciation | 2498.98 | 3968.99 | 3958.98 |
| Financial costs | 621.91 | 29.12 | 0.00 |
| Total manufacturing costs | 18629.29 | 24183.21 | 25378.56 |
| Costs per unit ( single product ) | 1.45 | 1.29 | 1.25 |
| Of it foreign, % | 32.47 | 32.08 | 32.47 |
| Of it variable,% | 27.33 | 30.69 | 31.90 |
| Of it direct, % | 76 | 77.96 | 79.11 |
| Total labour | 2865.[illegible] | 2865.60 | 2865.60 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.

--- COMFAR 1.0 - UNIDO Vienna ---

| | |
|---|---|
| 1990 | 1991 |
| 93.11 | 100.00 |
| 4070.51 | 4329.36 |
| 0.0 | 0.0 |
| 5274.67 | 5274.67 |
| 545.00 | 545.00 |
| 1768.60 | 1768.60 |
| 850.00 | 850.00 |
| 1700.00 | 1700.00 |
| 764.60 | 764.60 |
| 14451.78 | 14732.23 |
| 1332.00 | 1332.00 |
| 0.0 | 0.0 |
| 1651.10 | 1827.25 |
| 5745.98 | 5703.43 |
| 1009.47 | 1215.69 |
| 24177.32 | 24810.64 |
| 1.72 | 1.59 |
| 25.92 | 27.35 |
| 22.79 | 24.81 |
| 64.44 | 66.74 |
| 2865.60 | 2865.60 |

E. - DP/UAE/79/003 --- 1984-06-27

--- COMFAR 1.0 - UNIDO Vienna ---

| | |
|---|---|
| 1995 | 1996 |
| 142.14 | 151.82 |
| 6153.67 | 6702.82 |
| 0.0 | 0.0 |
| 5274.67 | 5274.67 |
| 545.00 | 545.00 |
| 1768.60 | 1768.60 |
| 850.00 | 850.00 |
| 1700.00 | 1700.00 |
| 2439.60 | 3088.69 |
| 19731.54 | 19729.69 |
| 1332.00 | 1332.00 |
| 0.0 | 0.0 |
| 2694.12 | 2953.78 |
| 3768.98 | 3931.48 |
| 0.00 | 0.00 |
| 26726.63 | 28156.54 |
| 1.21 | 1.17 |
| 32.84 | 33.24 |
| 33.10 | 34.33 |
| 80.17 | 81.31 |
| 2865.60 | 2865.60 |

E. - DP/UAE/79/003 --- 1984-06-27

## Total production costs in 1000 DH

| Year | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| % of nom. capacity (single product only). | 154.52 | 117.27 | 154.52 | 154.52 | 154.52 |
| Raw material 1 | 6689.77 | 5057.02 | 6689.77 | 6689.77 | 6689.77 |
| Other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| Utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| Repair | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| Spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| Factory overheads | 3088.60 | 1084.60 | 3088.60 | 3088.60 | 3088.60 |
| Factory costs | 19916.64 | 16279.89 | 19916.64 | 19916.64 | 19916.64 |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 | 1332.00 | 1332.00 |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Direct costs, sales and distribution | 2963.38 | 2244.05 | 2963.38 | 2963.38 | 2963.38 |
| Depreciation | 1866.75 | 396.75 | 1796.75 | 1796.75 | 1759.25 |
| Financial costs | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total manufacturing costs | 26078.77 | 20352.68 | 26008.77 | 26008.77 | 25971.27 |
| Costs per unit ( single product ) | 1.08 | 1.11 | 1.08 | 1.08 | 1.08 |
| Of it foreign, % | 35.84 | 37.61 | 35.93 | 35.93 | 35.99 |
| Of it variable,% | 37.02 | 36.46 | 37.11 | 37.11 | 37.17 |
| Of it direct, % | 87.73 | 91.51 | 87.97 | 87.97 | 88.10 |
| Total labour | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 |

## Projected balance sheets, construction in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| Total assets | 20759.00 | 48283.14 |
| Fixed assets, net of depreciation | 0.0 | 20759.00 |
| Construction in progress | 20759.00 | 25222.39 |
| Current assets | 0.0 | 2301.75 |
| Cash, bank | 0.0 | 0.0 |
| Cash surplus, finance available | -0.0 | 0.0 |
| Total liabilities | 20759.00 | 48283.14 |
| Equity capital | 20759.00 | 23390.00 |
| Reserves, retained profit | 0.0 | 0.0 |
| Profit,(loss) | 0.0 | 0.0 |
| Long and medium term debt | 0.0 | 23569.00 |
| Current liabilities | 0.0 | 0.0 |
| Bank overdraft, finance required | 0.0 | 1414.14 |
| Total debt | 0.0 | 24983.14 |
| Equity, % of liabilities | 100.00 | 49.71 |

## Projected balance sheet, production in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|
| Total assets | 47738.71 | 41560.63 | 36011.90 | 30512.27 | 25732.96 |
| Fixed assets, net of depreciation | 40240.41 | 34497.44 | 28758.46 | 23017.49 | 17315.01 |
| Construction in progress | 0.0 | 0.0 | 0.0 | 0.0 | 150.00 |
| Current assets | 7251.83 | 6814.73 | 7006.97 | 7248.31 | 7522.48 |
| Cash, bank | 246.47 | 246.47 | 246.47 | 246.47 | 246.47 |
| Cash surplus, finance available | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total liabilities | 47739.71 | 41560.63 | 36011.90 | 30512.27 | 25732.96 |
| Equity capital | 24705.00 | 24705.00 | 24705.00 | 24705.00 | 24705.00 |
| Reserves, retained profit | 0.0 | -12200.17 | -23424.70 | -32941.02 | -40577.44 |
| Profit,(loss) | -12200.17 | -11224.53 | -9516.32 | -7636.42 | -5720.58 |
| Long and medium term debt | 24587.58 | 20027.05 | 15078.88 | 10130.71 | 5182.54 |
| Current liabilities | 766.22 | 775.84 | 787.36 | 801.88 | 819.46 |
| Bank overdraft, finance required | 9880.08 | 19477.43 | 28381.67 | 35514.12 | 40286.96 |
| Total debt | 35233.88 | 40280.33 | 44247.92 | 46446.71 | 46887.98 |
| Equity, % of liabilities | 65.26 | 111.07 | 323.78 | -493.92 | -157.32 |





## Projected balance sheet, production in 1000 DHS

| Year | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| Total assets | 29146.60 | 27100.49 | 23650.06 | 20257.37 | 17101.71 |
| Fixed assets, net of depreciation | 14965.04 | 18346.06 | 14377.09 | 10409.12 | 6476.64 |
| Construction in progress | 7350.00 | 0.0 | 0.0 | 0.0 | 150.00 |
| Current assets | 6840.04 | 8465.94 | 8750.75 | 9512.17 | 10110.94 |
| Cash, bank | 191.53 | 289.38 | 312.22 | 337.09 | 364.13 |
| Cash surplus, finance available | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total liabilities | 29146.60 | 27100.49 | 23650.06 | 20257.37 | 17101.71 |
| Equity capital | 24705.00 | 24705.00 | 24705.00 | 24705.00 | 24705.00 |
| Reserves, retained profit | -46360.02 | -49177.93 | -50088.38 | -49783.95 | -48175.86 |
| Profit,(loss) | -2817.92 | -910.45 | 304.43 | 1608.09 | 3093.06 |
| Long and medium term debt | 234.37 | 0.00 | 0.00 | 0.00 | 0.00 |
| Current liabilities | 703.24 | 923.76 | 979.36 | 1040.64 | 1107.20 |
| Bank overdraft, finance required | 52681.92 | 51560.12 | 47749.66 | 42687.59 | 36372.30 |
| Total debt | 53619.53 | 52483.87 | 48729.01 | 43728.23 | 37479.51 |
| Equity, % of liabilities | -104.97 | -101.06 | -102.51 | -110.14 | -178.20 |

## Projected balance sheet, production in 1000 DHS

| Year | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Total assets | 15223.58 | 19980.61 | 20030.08 | 19233.33 | 16474.08 |
| Fixed assets, net of depreciation | 4759.89 | 4363.14 | 9566.39 | 7769.64 | 6010.39 |
| Construction in progress | 0.0 | 7000.00 | 0.0 | 0.0 | 0.0 |
| Current assets | 10099.55 | 8337.67 | 10099.55 | 10099.55 | 10099.55 |
| Cash, bank | 364.13 | 279.80 | 364.13 | 364.13 | 364.13 |
| Cash surplus, finance available | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total liabilities | 15223.58 | 19980.61 | 20030.08 | 19233.33 | 16474.08 |
| Equity capital | 24705.00 | 24705.00 | 24705.00 | 24705.00 | 24705.00 |
| Reserves, retained profit | -45092.80 | -39911.97 | -36827.84 | -31587.06 | -26345.16 |
| Profit (loss) | 5170.84 | 3084.13 | 5240.84 | 5240.84 | 5279.34 |
| Long and medium term debt | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Current liabilities | 1106.40 | 904.44 | 1106.48 | 1106.48 | 1106.48 |
| Bank overdraft, finance required | 29324.06 | 31199.00 | 25805.59 | 18769.01 | 11730.42 |
| Total debt | 30430.54 | 32103.44 | 26912.07 | 19874.49 | 12836.90 |
| Equity, % of liabilities | -175.21 | -220.22 | -427.75 | -4670.52 | 520.80 |

## Net income statement in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|
| Total sales, including sales tax | 12775.77 | 14176.46 | 15631.83 | 17278.90 |
| Less: variable costs, including sales tax | 4610.70 | 4975.44 | 5269.06 | 5692.01 |
| Variable margin | 8165.07 | 9211.02 | 10362.77 | 11586.89 |
| As % of total sales | 63.91 | 65.16 | 66.29 | 67.06 |
| Non-variable costs, including depreciation | 17475.85 | 17475.84 | 17475.85 | 17475.85 |
| Operational margin | -9310.77 | -8264.82 | -7113.08 | -5890.95 |
| As % of total sales | -72.88 | -58.46 | -45.50 | -34.08 |
| Cost of finance | 2889.40 | 2959.71 | 2403.25 | 1809.47 |
| Gross profit | -12200.17 | -11224.53 | -9516.32 | -7698.42 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | -12200.17 | -11224.53 | -9516.32 | -7698.42 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | -12200.17 | -11224.53 | -9516.32 | -7698.42 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | -12200.17 | -11224.53 | -9516.32 | -7698.42 |
| Accumulated undistributed profit | -12200.17 | -23424.70 | -32941.02 | -40639.44 |
| Gross profit, % of total sales | -95.49 | -79.40 | -60.88 | -44.55 |
| Net profit, % of total sales | -95.49 | -79.40 | -60.88 | -44.55 |
| Net profit, % of equity | -46.73 | -42.97 | -36.45 | -29.48 |
| Net profit + interest, % of investment | -17.87 | -15.81 | -13.56 | -11.18 |

## Net income statement in 1000 DHS

| Year | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|
| Total sales, including sales tax | [illegible] | 15811.37 | [illegible] | [illegible] |
| Less: variable costs, including sales tax | 6155.61 | 5092.03 | 7421.24 | 8096.72 |
| Variable margin | 12935.45 | 10719.34 | 15551.52 | 17536.28 |
| As % of total sales | 67.75 | 67.80 | 68.11 | 68.47 |
| Non-variable costs, including depreciation | [illegible] | 12915.35 | [illegible] | 17231.84 |
| Operational margin | -4504.89 | -2196.01 | -882.33 | 304.43 |
| As % of total sales | -23.60 | -13.89 | -3.79 | 1.19 |
| Cost of finance | 1215.69 | 621.91 | 28.12 | 0.00 |
| Gross profit | -5720.58 | -2817.92 | -910.45 | 304.43 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | -5720.58 | -2817.92 | -910.45 | 304.43 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | -5720.58 | -2817.92 | -910.45 | 304.43 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | -5720.58 | -2817.92 | -910.45 | 304.43 |
| Accumulated undistributed profit | -46360.02 | -49177.93 | -50088.38 | -49783.95 |
| Gross profit, % of total sales | -29.97 | -17.82 | -3.91 | 1.19 |
| Net profit, % of total sales | -29.97 | -17.82 | -3.91 | 1.19 |
| Net profit, % of equity | -21.91 | -10.79 | -3.49 | 1.17 |
| Net profit + interest, % of investment | -8.49 | -3.68 | -1.44 | 0.49 |

## Net income statement in 1000 DHS

| Year | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|
| Total sales, including sales tax | 28334.72 | 31249.60 | 31249.60 | 23436.82 |
| Less: variable costs, including sales tax | 8847.79 | 9666.20 | 9653.15 | 7421.06 |
| Variable margin | 19486.94 | 21583.41 | 21[illegible].46 | 16015.75 |
| As % of total sales | 68.77 | 69.07 | [illegible] 11 | 68.34 |
| Non-variable costs, including depreciation | 17878.85 | 18490.35 | 16425.62 | 12931.62 |
| Operational margin | 1608.09 | 3093.06 | 5170.84 | 3084.13 |
| As % of total sales | 5.68 | 9.90 | 16.55 | 13.16 |
| Cost of finance | 0.00 | 0.00 | 0.00 | 0.00 |
| Gross profit | 1608.09 | 3093.06 | 5170.84 | 3084.13 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | 1608.09 | 3093.06 | 5170.84 | 3084.13 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | 1608.09 | 3093.06 | 5170.84 | 3084.13 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | 1608.09 | 3093.06 | 5170.84 | 3084.13 |
| Accumulated undistributed profit | -48175.86 | -45082.80 | -39911.97 | -36827.84 |
| Gross profit, % of total sales | 5.68 | 9.90 | 16.55 | 13.16 |
| Net profit, % of total sales | 5.68 | 9.90 | 16.55 | 13.16 |
| Net profit, % of equity | 6.16 | 11.85 | 19.80 | 11.81 |
| Net profit + interest, % of investment | 2.58 | 4.91 | 8.21 | 4.51 |

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## Net income statement in 1000 DHS

| Year | 1999 | 2000 | 2001 |
|---|---|---|---|
| Total sales, including sales tax | 31249.60 | 31249.60 | 31249.60 |
| Less: variable costs, including sales tax | 9653.15 | 9653.15 | 9653.15 |
| Variable margin | 21596.46 | 21596.46 | 21596.46 |
| As % of total sales | 69.11 | 69.11 | 69.11 |
| Non-variable costs, including depreciation | 16355.62 | 16355.62 | 16318.12 |
| Operational margin | 5240.84 | 5240.84 | 5278.34 |
| As % of total sales | 16.77 | 16.77 | 16.89 |
| Cost of finance | 0.00 | 0.00 | 0.00 |
| Gross profit | 5240.84 | 5240.84 | 5278.34 |
| Allowances | 0.0 | 0.0 | 0.0 |
| Taxable profit | 5240.84 | 5240.84 | 5278.34 |
| Tax | 0.0 | 0.0 | 0.0 |
| Net profit | 5240.84 | 5240.84 | 5278.34 |
| Dividends paid | 0.0 | 0.0 | 0.0 |
| Undistributed profit | 5240.84 | 5240.84 | 5278.34 |
| Accumulated undistributed profit | -31587.00 | -26346.16 | -21067.82 |
| Gross profit, % of total sales | 16.77 | 16.77 | 16.89 |
| Net profit, % of total sales | 16.77 | 16.77 | 16.89 |
| Net profit, % of equity | 20.07 | 20.07 | 20.22 |
| Net profit + interest, % of investment | 7.49 | 7.49 | 7.54 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

## Source of finance, construction in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| Equity, ordinary | 20759.00 | 2541.00 |
| Equity, preference | 0.0 | 0.0 |
| Subsidies, grants | 0.0 | 0.0 |
| Loan AF | 0.0 | 0.0 |
| Loan [illegible] | 0.0 | 0.0 |
| Loan [illegible] | 0.0 | 0.0 |
| Loan [illegible] | 0.0 | 23569.00 |
| Loan RL | 0.0 | 0.0 |
| Loan CL | 0.0 | 0.0 |
| Total loan | 0.0 | 23569.00 |
| Current liabilities | 0.0 | 0.0 |
| Bank overdraft | 0.0 | 1414.14 |
| Total funds available | 20759.00 | 27524.14 |

---------------------------------------------------------------------------------- COMFAR 1.0 - UNIDO Vienna ---

## Source of finance, production in 1000 DHS

| Year .................... | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|
| Equity, ordinary ........ | 2810.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Equity, preference ...... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Subsidies, grants ....... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AL ............... | 0.0 | -4713.80 | -4713.80 | -4713.80 | -4713.80 | -4713.80 |
| Loan BL ............... | 1018.58 | 153.27 | -234.37 | -234.37 | -234.37 | -234.37 |
| Loan CL ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total loan ............. | 1018.58 | -4560.53 | -4948.17 | -4949.17 | -4948.17 | -4948.17 |
| Current liabilities ..... | 766.22 | 9.62 | 11.52 | 14.51 | 15.58 | -115.72 |
| Bank overdraft .......... | 9880.03 | 9597.35 | 6904.24 | 7132.45 | 5372.86 | 11794.95 |
| Total funds available ... | 14474.88 | 5046.45 | 3967.59 | 2198.79 | 441.27 | 6731.56 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

---------------------------------------------------------------------------------- COMFAR 1.0 - UNIDO Vienna ---

## Source of finance, production in 1000 DHS

| Year .................... | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Equity, ordinary ........ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Equity, preference ...... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Subsidies, grants ....... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CF ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AL ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BL ............... | -234.37 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CL ............... | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total loan ............. | -234.37 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities ..... | 220.52 | 55.60 | 61.28 | 66.56 | -0.72 | -202.04 |
| Bank overdraft .......... | -1121.80 | -3810.46 | -5062.06 | -6315.29 | -7048.24 | 1874.94 |
| Total funds available ... | -1135.66 | -3754.86 | -5000.78 | -6246.73 | -7048.97 | 1672.90 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

260.



## Source of finance, production in 1000 DHS

| Year | 1999 | 2000 | 2001 |
|---|---|---|---|
| Equity, ordinary | 0.0 | 0.0 | 0.0 |
| Equity, preference | 0.0 | 0.0 | 0.0 |
| Subsidies, grants | 0.0 | 0.0 | 0.0 |
| Loan AF | 0.0 | 0.0 | 0.0 |
| Loan BF | 0.0 | 0.0 | 0.0 |
| Loan CF | 0.0 | 0.0 | 0.0 |
| Loan AL | 0.0 | 0.0 | 0.0 |
| Loan BL | 0.0 | 0.0 | 0.0 |
| Loan CL | 0.0 | 0.0 | 0.0 |
| Total loan | 0.0 | 0.0 | 0.0 |
| Current liabilities | 202.04 | 0.0 | 0.0 |
| Bank overdraft | -5393.41 | -7037.59 | -7037.59 |
| Total funds available | -5191.37 | -7037.59 | -7037.59 |

## Net working capital in 1000 DHS

| Year | | | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable | 30 | 12.0 | 1362.13 | 1388.36 | 1416.99 | 1452.24 |
| Inventory and materials | 236 | 1.5 | 2583.88 | 2709.00 | 2858.78 | 3047.46 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | 850.00 | 850.00 | 850.00 | 850.00 |
| Work in progress | 9 | 40.0 | 344.80 | 349.13 | 354.31 | 360.84 |
| Finished products | 15 | 24.0 | 630.16 | 637.38 | 646.02 | 656.91 |
| Cash in hand | 15 | 24.0 | 246.47 | 246.47 | 246.47 | 246.47 |
| Total current assets | | | 6896.55 | 7059.45 | 7251.69 | 7493.03 |
| Current liabilities and | | | | | | |
| Accounts payable | 20 | 18.0 | 766.22 | 775.84 | 787.36 | 801.88 |
| Net working capital | | | 6130.33 | 6283.61 | 6464.33 | 6691.15 |
| Increase in working capital | | | 3020.50 | 153.27 | 180.72 | 226.83 |
| Net working capital, local currency | | | 2086.85 | 2091.44 | 2102.06 | 2110.39 |
| Net working capital, foreign currency | | | 4043.48 | 4192.17 | 4362.27 | 4580.77 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .





## Net working capital in 1000 DHS

| Year | | | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable | 30 | 12.0 | 1490.96 | 1292.37 | 1682.18 | 1784.13 |
| Inventory and materials | 236 | 1.5 | 3263.01 | 2717.42 | 3888.00 | 4215.03 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | 850.00 | 850.00 | 850.00 | 850.00 |
| Work in progress | 9 | 40.0 | 368.31 | 316.46 | 415.69 | 440.71 |
| Finished products | 15 | 24.0 | 669.34 | 582.93 | 748.32 | 790.02 |
| Cash in hand | 15 | 24.0 | 246.47 | 191.53 | 289.38 | 312.22 |
| Total current assets | | | 7767.19 | 6829.82 | 8752.68 | 9271.22 |
| Current liabilities and | | | | | | |
| Accounts payable | 20 | 18.0 | 818.46 | 703.24 | 923.76 | 979.36 |
| Net working capital | | | 6948.74 | 6126.58 | 7828.92 | 8291.87 |
| Increase in working capital | | | 257.58 | -822.16 | 1702.35 | 462.94 |
| Net working capital, local currency | | | 2122.92 | 1916.25 | 2287.56 | 2378.37 |
| Net working capital, foreign currency | | | 4825.82 | 4210.33 | 5541.37 | 5913.49 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

## Net working capital in 1000 DHS

| Year | mdc | coto | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable | 30 | 12.0 | 1896.47 | 2018.76 | 2017.67 | 1662.99 |
| Inventory and materials | 236 | 1.5 | 4590.56 | 4977.17 | 4967.75 | 3502.58 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | 850.00 | 850.00 | 850.00 | 850.00 |
| Work in progress | 9 | 40.0 | 458.29 | 498.24 | 497.92 | 407.00 |
| Finished products | 15 | 24.0 | 835.98 | 885.90 | 885.36 | 723.83 |
| Cash in hand | 15 | 24.0 | 337.09 | 364.13 | 364.13 | 279.80 |
| Total current assets | | | 9847.51 | 10473.32 | 10461.94 | 8615.72 |
| Current liabilities and | | | | | | |
| Accounts payable | 20 | 18.0 | 1040.64 | 1107.20 | 1106.48 | 904.44 |
| Net working capital | | | 8806.87 | 9366.12 | 9355.46 | 7711.28 |
| Increase in working capital | | | 515.00 | 559.25 | -10.66 | -1644.18 |
| Net working capital, local currency | | | 2477.49 | 2585.46 | 2585.46 | 2264.82 |
| Net working capital, foreign currency | | | 6329.37 | 6780.65 | 6770.00 | 5446.46 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .





## Net working capital in 1000 DHS

| Year | mdc | coto | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | |
| Current assets & | | | | | |
| Accounts receivable | 30 | 12.0 | 2017.67 | 2017.67 | 2017.67 |
| Inventory and materials | 236 | 1.5 | 4967.75 | 4967.75 | 4967.75 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | 850.00 | 850.00 | 850.00 |
| Work in progress | 9 | 40.0 | 497.92 | 497.92 | 497.92 |
| Finished products | 15 | 24.0 | 885.36 | 885.36 | 835.36 |
| Cash in hand | 15 | 24.0 | 364.13 | 364.13 | 364.13 |
| Total current assets | | | 10461.94 | 10461.94 | 10461.94 |
| Current liabilities and | | | | | |
| Accounts payable | 20 | 18.0 | 1106.48 | 1106.48 | 1106.48 |
| Net working capital | | | 9355.46 | 9355.46 | 9355.46 |
| Increase in working capital | | | 1644.18 | 0.0 | 0.0 |
| Net working capital, local currency | | | 2585.46 | 2585.46 | 2585.46 |
| Net working capital, foreign currency | | | 6770.00 | 6770.00 | 6770.00 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

# APPENDIX XI.7

TABLE FOR ... [illegible] ... CLASS

| | YEAR: 1 | YEAR: 2 | YEAR: 3 | YEAR: 4 | YEAR: 5 |
|---|---|---|---|---|---|
| raw material | 1156.24 | 1215.35 | 1286.10 | 1375.24 | 1477.06 |
| other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| energy | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| labour | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| maintenance | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| factory overheads | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| subtotal ( factory costs ) | 3401.24 | 3460.35 | 3531.10 | 3620.24 | 3722.06 |
| of these variable | 1156.24 | 1215.35 | 1286.10 | 1375.24 | 1477.06 |
| administrative overheads | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| of these labour | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total before depreciation and interests | 3441.24 | 3500.35 | 3571.10 | 3660.24 | 3762.06 |
| depreciation | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total before interests | 3441.24 | 3500.35 | 3571.10 | 3660.24 | 3762.06 |
| interests, payable on debentures | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs | 3441.24 | 3500.35 | 3571.10 | 3660.24 | 3762.06 |
| of it variable | 1156.24 | 1215.35 | 1286.10 | 1375.24 | 1477.06 |
| of it labour ( total, direct and indirect ) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

| | YEAR: 9 | YEAR:10 | YEAR:11 | YEAR:12 | YEAR:13 |
|---|---|---|---|---|---|
| raw material | 2099.46 | 2286.82 | 2282.37 | 1732.14 | 2282.37 |
| other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| energy | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| labour | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| maintenance | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| factory overheads | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| subtotal ( factory costs ) | 4344.46 | 4531.82 | 4527.37 | 3977.14 | 4527.37 |
| of these variable | 2099.46 | 2286.82 | 2282.37 | 1732.14 | 2282.37 |
| administrative overheads | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| of these labour | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total before depreciation and interests | 4384.46 | 4571.82 | 4567.37 | 4017.14 | 4567.37 |
| depreciation | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total before interests | 4384.46 | 4571.82 | 4567.37 | 4017.14 | 4567.37 |
| interests, payable on debentures | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs | 4384.46 | 4571.82 | 4567.37 | 4017.14 | 4567.37 |
| of it variable | 2099.46 | 2286.82 | 2282.37 | 1732.14 | 2282.37 |
| of it labour ( total, direct and indirect ) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

FUJA15

"100 % equity"

| | | |
|---|---|---|
| YEAR: 6 | YEAR: 7 | YEAR: 8 |
| 1219.33 | 1772.30 | 1926.79 |
| 0.0 | 0.0 | 0.0 |
| 545.00 | 545.00 | 545.00 |
| 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 |
| 0.0 | 0.0 | 0.0 |
| 1700.00 | 1700.00 | 1700.00 |
| 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= |
| 3464.33 | 4017.30 | 4171.79 |
| 1219.33 | 1772.30 | 1928.79 |
| 40.00 | 40.00 | 40.00 |
| 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= |
| 3504.33 | 4057.30 | 4211.79 |
| 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= |
| 3504.33 | 4057.30 | 4211.79 |
| 0.0 | 0.0 | 0.0 |
| ========= | ========= | ========= |
| 3504.33 | 4057.30 | 4211.79 |
| 1219.33 | 1772.30 | 1926.79 |
| 0.0 | 0.0 | 0.0 |

| | |
|---|---|
| YEAR:14 | YEAR:15 |
| 2282.37 | 2282.37 |
| 0.0 | 0.0 |
| 545.00 | 545.00 |
| 0.0 | 0.0 |
| 0.0 | 0.0 |
| 0.0 | 0.0 |
| 1700.00 | 1700.00 |
| 0.0 | 0.0 |
| ========= | ========= |
| 4527.37 | 4527.37 |
| 2282.37 | 2282.37 |
| 40.00 | 40.00 |
| 0.0 | 0.0 |
| ========= | ========= |
| 4567.37 | 4567.37 |
| 0.0 | 0.0 |
| ========= | ========= |
| 4567.37 | 4567.37 |
| 0.0 | 0.0 |
| ========= | ========= |
| 4567.37 | 4567.37 |
| 2282.37 | 2282.37 |
| 0.0 | 0.0 |

COST FOR PRODUCT [illegible] local [illegible] YEARS

| | YEAR: 1 | YEAR: 2 | YEAR: 3 | YEAR: 4 | YEAR: 5 | YEAR: 6 | YEAR: 7 | YEAR: 8 |
|---|---|---|---|---|---|---|---|---|
| raw material | 512.70 | 530.90 | 579.25 | 649.80 | 654.95 | 540.67 | 765.06 | 854.37 |
| other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| labour | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| maintenance | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| spares | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| factory overheads | 264.60 | 264.60 | 264.60 | 264.60 | 264.60 | -1053.90 | 1274.60 | 1032.60 |
| sub-total ( factory costs ) | 8670.55 | 8696.77 | [illegible] | 8767.67 | 8812.02 | [illegible] | 9573.73 | 10530.24 |
| of these variable | 512.70 | 538.90 | 571.28 | 649.80 | 654.95 | 540.67 | 765.06 | 854.37 |
| administrative overheads | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 |
| of these labour | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 |
| total before depreciation and interests | 9962.56 | 9988.77 | [illegible] | [illegible] | 10104.02 | 8722.04 | 11265.73 | 11822.24 |
| depreciation | 5740.98 | 5740.98 | [illegible] | 5740.98 | 5703.48 | [illegible] | [illegible] | 3968.98 |
| total before interests | 15703.54 | 15729.75 | 15761.12 | 15800.64 | 15808.29 | 11171.01 | 15224.71 | 15891.21 |
| interests, payable on deb tures | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs | 15703.54 | 15729.75 | 15761.12 | 15800.64 | 15808.29 | 11171.01 | 15224.71 | 15891.21 |
| of it variable | 512.70 | 522.90 | 571.28 | 649.80 | 654.95 | 540.67 | 765.06 | 854.37 |
| of it labour ( total, direct and indirect ) | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 |

| | YEAR: 9 | YEAR:10 | YEAR:11 | YEAR:12 | YEAR:13 | YEAR:14 | YEAR:15 |
|---|---|---|---|---|---|---|---|
| raw material | 930.93 | 1014.01 | 1012.04 | 763.06 | 1012.04 | 1012.04 | 1012.04 |
| other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| utilities | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| labour | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| maintenance | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| spares | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| factory overheads | 2839.40 | 3768.60 | 3052.59 | 1654.69 | 3090.60 | [illegible] | 3004.60 |
| sub-total ( factory costs ) | 11263.80 | 11935.78 | 11597.93 | 9723.93 | 11993.90 | 11577.90 | 11777.90 |
| of these variable | 930.93 | 1014.01 | 1012.04 | 742.06 | 1012.04 | 1012.04 | 1012.04 |
| administrative overheads | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 | 1292.00 |
| of these labour | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 | 1097.00 |
| total before depreciation and interests | 12555.60 | 13267.35 | [illegible] | 11017.93 | 13285.50 | [illegible] | 13235.90 |
| depreciation | 3969.72 | 3951.46 | 1666.75 | 396.75 | 1796.75 | 1796.75 | 1757.25 |
| total before interests | 16524.72 | 17219.36 | 15152.65 | 11414.68 | 15082.65 | 15082.65 | 15045.15 |
| interests, payable on deb tures | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| total manufacturing costs | 16524.78 | 17219.35 | 15152.65 | 11414.68 | 15052.45 | 15072.65 | 15065.15 |
| of it variable | 930.93 | 1014.01 | 1012.04 | 760.06 | 1012.04 | 1012.04 | 1012.04 |
| of it labour ( total, direct and indirect ) | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 |

**Total initial investment costs** in 1000 DHS

| | | |
|---|---|---|
| Year | 1985 | 1986 |
| Fixed investment costs | | |
| Land site preparation and development | 690.00 | 75.00 |
| Buildings and civil works | 5200.00 | 1210.00 |
| Auxiliary and service facilities | 0.0 | 0.0 |
| Incorporated fixed assets | 75.00 | 175.00 |
| Plant machinery and equipment | 8774.00 | [illegible]46.25 |
| Total fixed investment costs | 14739.00 | 21509.75 |
| Pre-production capital expendit | 6460.00 | 2300.00 |
| Working capital | 0.0 | [illegible]1.75 |
| Total initial investment costs | 20759.00 | 26110.00 |
| Of it foreign, in % | 44.19 | 87.32 |

266.



## Total current investment costs in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 |
| --- | --- | --- | --- | --- |
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 0.0 | 0.0 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 0.0 | 0.0 | 0.0 |
| Total fixed investment costs | 0.0 | 0.0 | 0.0 | 0.0 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 3395.29 | -459.64 | 117.38 | 147.04 |
| Total current investment costs | 3395.29 | -459.64 | 117.38 | 147.04 |
| Of it foreign, % | 7.75 | 111.61 | 36.45 | 39.55 |



COMFAR 1.0 - UNIDO Vienna

## Total current investment costs in 1000 DHS

| Year | 1991 | 1992 | 1993 | 1994 |
| --- | --- | --- | --- | --- |
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 150.00 | 0.0 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 7350.00 | 0.0 | 0.0 |
| Total fixed investment costs | 150.00 | 7350.00 | 0.0 | 0.0 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 166.43 | -591.44 | 1207.33 | 324.55 |
| Total current investment costs | 316.43 | 6758.56 | 1207.33 | 324.55 |
| Of it foreign, % | 65.95 | 105.51 | 27.84 | 29.00 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - UP/UAE/79/095 --- 1984-06-27

## Total current investment costs in 1000 DHS

| Year | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|
| Fixed investment costs: | | | | |
| Land, site preparation and development | 0.0 | 0.0 | 0.0 | 0.0 |
| Buildings and civil works | 0.0 | 0.0 | 0.0 | 0.0 |
| Auxiliary and service facilities | 0.0 | 0.0 | 0.0 | 0.0 |
| Incorporated fixed assets | 0.0 | 150.00 | 0.0 | 0.0 |
| Plant, machinery and equipment | 0.0 | 0.0 | 0.0 | 7000.00 |
| Total fixed investment costs | 0.0 | 150.00 | 0.0 | 7000.00 |
| Preproduction capitals expend's | 0.0 | 0.0 | 0.0 | 0.0 |
| Working capital | 360.43 | 391.53 | -6.67 | -1151.62 |
| Total current investment costs | 360.43 | 541.53 | -6.67 | 5848.38 |
| Of it foreign, % | 29.19 | 48.78 | 39.67 | 113.99 |





## Total current investment costs in 1000 DHS

| Year | 1999 |
|---|---|
| Fixed investment costs: | |
| Land, site preparation and development | 0.0 |
| Buildings and civil works | 0.0 |
| Auxiliary and service facilities | 0.0 |
| Incorporated fixed assets | 0.0 |
| Plant, machinery and equipment | 0.0 |
| Total fixed investment costs | 0.0 |
| Preproduction capitals expend's | 0.0 |
| Working capital | 1151.62 |
| Total current investment costs | 1151.62 |
| Of it foreign, % | 28.95 |

268.

Cashflow tables, construction in 1000 DHS

| Year | 1985 | 1986 |
| --- | --- | --- |
| Total cash inflow | 20759.00 | 26110.00 |
| . Financial resources | 20759.00 | 26110.00 |
| . Sales | 0.0 | 0.0 |
| Total cash outflow | 20759.00 | 26110.00 |
| . Total assets | 20759.00 | 26110.00 |
| . Operating costs | 0.0 | 0.0 |
| . Debt service and interest | 0.0 | 0.0 |
| . Repayment | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 |
| Surplus ( deficit ) | 0.0 | 0.0 |
| Cumulated cash balance | 0.0 | 0.0 |
| Inflow local currency | 20759.00 | 5241.00 |
| Outflow local currency | 11585.00 | 3310.00 |
| Surplus ( deficit ) local currency | 9174.00 | 1931.00 |
| Inflow foreign currency | 0.0 | 20869.00 |
| Outflow foreign currency | 9174.00 | 22800.00 |
| Surplus ( deficit ) foreign currency | -9174.00 | -1931.00 |

-------- COMFAR 1.0 - UNIDO Vienna ---

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, U.A.E. - DP/UAE/79/003 --- 1984-06-27

COMFAR 1.0 - UNIDO Vienna ---

## Cashflow tables, production in 1000DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|
| Total CF-inflow | 15569.30 | 14236.03 | 15747.21 | 17425.94 | 19906.50 |
| . Financial resources | 2793.53 | 100.76 | 115.78 | 147.04 | 316.43 |
| . Sales | 12775.77 | 14136.46 | 15631.93 | 17278.90 | 17690.66 |
| Total CF-outflow | 18691.41 | 14357.10 | 15212.71 | 15535.20 | 16018.73 |
| . Total assets | 4065.94 | -494.90 | 123.05 | 154.19 | 324.69 |
| . Operating costs | 14625.40 | 14852.27 | 15090.65 | 15381.01 | 15694.13 |
| . Debt service and interest | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Repayment | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Surplus ( deficit ) | -3122.11 | -120.57 | 535.50 | 1890.75 | 3387.77 |
| Cumulated cash balance | -3122.11 | -3242.69 | -2707.18 | -816.44 | 2571.33 |
| Inflow local currency | 19894.75 | 19825.61 | 20087.84 | 19024.41 | 19763.50 |
| Outflow local currency | 14740.11 | 12271.17 | 12322.71 | 12950.27 | 13298.04 |
| Surplus ( deficit ) local currency | 5036.64 | 7554.44 | 7765.12 | 6074.14 | 6465.46 |
| Inflow foreign currency | 793.53 | 806.57 | 839.44 | 1442.42 | 1746.03 |
| Outflow foreign currency | 3893.30 | 2326.23 | 2871.00 | 2584.93 | 2720.69 |
| Surplus ( deficit ) foreign currency | -3099.77 | -1519.76 | -2031.56 | -1142.51 | -972.65 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

COMFAR 1.0 - UNIDO Vienna ---

## Cashflow tables, production in 1000DHS

| Year | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| Total CF-inflow | 21457.62 | 23272.76 | 25683.00 | 28334.72 | 31249.60 |
| . Financial resources | 5655.26 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Sales | 15811.37 | 23272.76 | 25683.00 | 28734.72 | 31249.60 |
| Total CF-outflow | 20359.11 | 16931.69 | 18910.69 | 20041.92 | 21415.69 |
| . Total assets | 6654.64 | 1262.15 | 357.43 | 407.44 | 592.61 |
| . Operating costs | 13694.47 | 17549.55 | 18547.20 | 19634.38 | 20823.08 |
| . Debt service and interest | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Repayment | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Surplus ( deficit ) | 1108.52 | 4341.07 | 6772.31 | 8292.80 | 9833.92 |
| Cumulated cash balance | 3679.85 | 8020.91 | 14793.22 | 23085.12 | 32920.04 |
| Inflow local currency | 14591.29 | 20935.40 | 23134.23 | 25501.25 | 28125.11 |
| Outflow local currency | 11052.52 | 15565.15 | 16855.79 | 18032.80 | 19322.89 |
| Surplus ( deficit ) local currency | 3628.77 | 4369.24 | 6255.95 | 7452.44 | 8802.21 |
| Inflow foreign currency | 7258.01 | 2327.28 | 2548.76 | 2833.47 | 3124.59 |
| Outflow foreign currency | 9296.57 | 2375.55 | 2032.40 | 2003.02 | 2092.90 |
| Surplus ( deficit ) foreign currency | -2038.56 | -48.27 | 516.37 | 830.46 | 1031.70 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

## Cashflow tables, production in 1000 UDS

| Year | 1997 | 1995 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Total CF-inflow | 31249.60 | 23436.82 | 31249.60 | 31249.60 | 31249.60 |
| . Financial resources | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Sales | 31249.60 | 23435.97 | 31249.60 | 31249.60 | 31249.60 |
| Total CF-outflow | 20809.62 | 23070.92 | 22124.84 | 20816.65 | 20816.65 |
| . Total assets | -7.03 | 5691.81 | 1308.19 | 0.0 | 0.0 |
| . Operating costs | 20816.65 | 17379.11 | 20816.65 | 20816.65 | 20816.65 |
| . Debt service and interest | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Repayment | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Corporate tax | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| . Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Surplus ( deficit ) | 10439.98 | 365.09 | 9124.76 | 10432.96 | 10432.96 |
| Cumulated cash balance | 43360.02 | 43725.92 | 52850.68 | 63283.63 | 73716.59 |
| Inflow local currency | 28125.11 | 20982.60 | 28125.11 | 28125.11 | 28125.11 |
| Outflow local currency | 18998.76 | 14578.72 | 19946.97 | 19002.89 | 19002.89 |
| Surplus ( deficit ) local currency | 9126.35 | 6403.88 | 8178.13 | 9122.22 | 9122.22 |
| Inflow foreign currency | 3124.50 | 2454.21 | 3124.50 | 3124.50 | 3124.50 |
| Outflow foreign currency | 1810.87 | 8492.20 | 2177.87 | 1813.76 | 1813.76 |
| Surplus ( deficit ) foreign currency | 1313.63 | -6037.99 | 946.63 | 1310.74 | 1310.74 |

## Cashflow Discounting:

a) interest payable on loan = cash-outflow:

| | | |
|---|---|---|
| Net present value at | 12.00 % = | -31195.61 |
| Internal Rate of Return | 3.67 % | |

b) interest payable on loan added back to net-cashflow:

| | | |
|---|---|---|
| Net present value at | 12.00 % = | -31195.61 |
| Internal Rate of Return | 3.[illegible] % | |

Note: NPV is computed for the year before production starts, using
the Future Value of cashflows during pre-production.

c) Future Value of cashflow during pre-production:

| | | |
|---|---|---|
| Total cash-outflow at | 12.00 % , FVAL = | 4[illegible]60.08 |
| Total cash-outflow, Nominal value | NVAL = | 46859.00 |

272.



## Total production costs in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|
| % of nom. capacity (single product only). | 78.28 | 82.29 | 87.07 | 93.11 | 100.00 |
| Raw material 1 | 1658.95 | 1754.75 | 1826.38 | 1985.04 | 2132.05 |
| Other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| Utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| Repair | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| Spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| Factory overheads | 264.60 | 264.60 | 264.60 | 264.60 | 264.60 |
| Factory costs | 12071.81 | 12157.42 | 12259.25 | 12337.91 | 12534.39 |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 | 1332.00 | 1332.00 |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Direct costs, sales and distribution | 1221.67 | 1363.17 | 1499.41 | 1661.10 | 1827.25 |
| Depreciation | 5740.98 | 5740.98 | 5740.93 | 5740.98 | 5703.49 |
| Financial costs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total manufacturing costs | 20366.45 | 20593.27 | 20931.53 | 21131.98 | [illegible] |
| Costs per unit ( single product ) | 1.57 | 1.60 | 1.53 | 1.45 | 1.37 |
| Of it foreign, % | 16.90 | 17.42 | 17.69 | 18.07 | 19.77 |
| Of it variable,% | 14.19 | 15.14 | 16.11 | 17.75 | 18.50 |
| Of it direct, % | 65.27 | 65.65 | 66.05 | 66.51 | 67.12 |
| Total labour | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 |



------------------------------------------------------------ COMFAR 1.0 - UNIDO Vienna ---

## Total production costs in 1000 DHS

| Year | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| % of nom. capacity (single product only). | 82.55 | 119.99 | 130.45 | 142.14 | 154.52 |
| Raw material 1 | 1760.00 | 2508.17 | 2721.16 | 3070.10 | 3309.73 |
| Other raw materials | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Energy | 5274.67 | 5274.67 | 5274.67 | 5274.67 | 5274.67 |
| Utilities | 545.00 | 545.00 | 545.00 | 545.00 | 545.00 |
| Labour, direct | 1768.60 | 1768.60 | 1768.60 | 1768.60 | 1768.60 |
| Repair | 850.00 | 850.00 | 850.00 | 850.00 | 850.00 |
| Spares | 1700.00 | 1700.00 | 1700.00 | 1700.00 | 1700.00 |
| Factory overheads | -1053.50 | 1234.60 | 1843.60 | 2473.60 | 3058.60 |
| Factory costs | 10844.27 | 13991.64 | 14763.03 | 15666.27 | 16577.39 |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 | 1332.00 | 1332.00 |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Direct costs, sales and distribution | 1518.10 | 2226.51 | 2459.17 | 2694.12 | 2963.75 |
| Depreciation | 2450.98 | 3963.98 | 3569.98 | 3952.98 | 3931.43 |
| Financial costs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total manufacturing costs | 16193.44 | 21518.52 | 22512.17 | 23003.76 | 24759.55 |
| Costs per unit ( single product ) | 1.26 | 1.15 | 1.11 | 1.06 | 1.03 |
| Of it foreign, % | 22.81 | 20.15 | 20.07 | 20.00 | 19.97 |
| Of it variable,% | 20.74 | 22.24 | 23.23 | 24.25 | 25.31 |
| Of it direct, % | 76.34 | 75.37 | 75.45 | 77.54 | 78.74 |
| Total labour | 2865.60 | 2865.60 | 2865.60 | 2865.60 | 2865.60 |

## Total production costs in 1000 US

| Year | 1997 | 1998 | 1999 |
|---|---|---|---|
| % of nom. capacity (single product only) | 151.52 | 117.27 | 151.52 |
| Raw material 1 | 3294.10 | 2590.20 | 3294.40 |
| Other raw materials | 0.0 | 0.0 | 0.0 |
| Energy | 5274.67 | 5274.67 | 5274.67 |
| Utilities | 545.00 | 545.00 | 545.00 |
| Labour, direct | 1763.60 | 1763.60 | 1758.60 |
| Repair | 650.00 | 650.00 | 650.00 |
| Spares | 1700.00 | 1700.00 | 1700.00 |
| Factory overheads | 3012.60 | [illegible] | [illegible] |
| Factory costs | 16521.27 | 17703.07 | 16521.27 |
| Administrative overheads | 1332.00 | 1332.00 | 1332.00 |
| Indir. costs, sales and distribution | 0.0 | 0.0 | 0.0 |
| Direct costs, sales and distribution | 2953.38 | 2314.05 | 2953.38 |
| Depreciation | 1656.75 | 396.75 | 1776.75 |
| Financial costs | 0.0 | 0.0 | 0.0 |
| Total manufacturing costs | 22682.40 | 17775.86 | 22613.40 |
| Costs per unit ( single product ) | 0.98 | 0.97 | 0.74 |
| Of it foreign, % | 21.77 | 24.25 | 21.84 |
| Of it variable,% | 27.59 | 27.25 | 27.67 |
| Of it direct, % | 85.90 | 90.27 | 85.16 |
| Total labour | 2865.60 | 2865.60 | 2865.60 |

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| | |
|---|---|
| 2000 | 2001 |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| 0.0 | 0.0 |
| [illegible] | 5274.67 |
| [illegible] | 595.00 |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | 16521.27 |
| [illegible] | [illegible] |
| 0.0 | 0.0 |
| [illegible] | 2763.39 |
| [illegible] | 1757.75 |
| 0.0 | 0.0 |
| [illegible] | 22575.90 |
| 0.94 | 0.94 |
| [illegible] | 21.87 |
| 27.67 | 27.72 |
| [illegible] | 96.31 |
| [illegible] | [illegible] |

. - EP/CRE/79/093 --- 1984-06-27

274.



## Projected balance sheets, construction in 1000 DHS

| | | |
|---|---|---|
| Year | 1985 | 1986 |
| Total assets | 20759.00 | 46969.00 |
| Fixed assets, net of depreciation | 0.0 | 20759.00 |
| Construction in progress | 20759.00 | 23908.25 |
| Current assets | 0.0 | 2301.75 |
| Cash, bank | 0.0 | 0.0 |
| Cash surplus, finance available | -0.0 | -0.0 |
| Total liabilities | 20759.00 | 46969.00 |
| Equity capital | 20759.00 | 46969.00 |
| Reserves, retained profit | 0.0 | 0.0 |
| Profit,(loss) | 0.0 | 0.0 |
| Long and medium term debt | 0.0 | 0.0 |
| Current liabilities | 0.0 | 0.0 |
| Bank overdraft, finance required | 0.0 | 0.0 |
| Total debt | 0.0 | 0.0 |
| Equity, % of liabilities | 100.00 | 100.00 |

## Projected balance sheet, production in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|
| Total assets | 45193.96 | [illegible] | 33349.16 | 27753.38 | 24167.47 |
| Fixed assets, net of depreciation | 38324.27 | 33065.39 | 27346.32 | 21603.35 | 15559.87 |
| Construction in progress | 0.0 | 0.0 | 0.0 | 0.0 | 150.00 |
| Current assets | 6121.22 | 5426.32 | 5742.39 | 5903.55 | 6972.16 |
| Cash, bank | 245.47 | 245.47 | 246.47 | 246.47 | 245.47 |
| Cash surplus, finance available | 0.0 | 0.0 | 0.0 | 0.0 | 1792.97 |
| Total liabilities | 45193.96 | [illegible] | 33349.16 | 27753.38 | 24167.47 |
| Equity capital | 40959.00 | 45263.00 | 45259.00 | 48852.00 | 45289.00 |
| Reserves, retained profit | 0.0 | -7530.60 | -14042.49 | -15247.29 | -23090.37 |
| Profit,(loss) | -7530.60 | -6456.91 | -5199.80 | -3847.08 | -2307.50 |
| Long and medium term debt | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities | 670.66 | 675.40 | 681.07 | 680.22 | 696.35 |
| Bank overdraft, finance required | 3244.98 | 3461.17 | 3027.38 | 1296.52 | 0.0 |
| Total debt | 3915.64 | 4136.57 | 3715.45 | 1974.74 | 696.38 |
| Equity, % of liabilities | 116.50 | 137.67 | 161.27 | 184.44 | 202.71 |





## Projected balance sheet, production in 1000 DHS

| Year | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| Total assets | 26540.16 | 25620.53 | 28934.19 | 37612.56 | 49150.69 |
| Fixed assets, net of depreciation | 12550.30 | 16531.92 | 12962.95 | 6993.97 | 5042.55 |
| Construction in progress | 7350.00 | 0.0 | 0.0 | 0.0 | 150.00 |
| Current assets | 5447.71 | 6772.02 | 7075.68 | 7453.24 | 7074.81 |
| Cash, bank | 191.53 | 289.78 | 312.72 | 332.09 | 284.13 |
| Cash surplus, finance available | 0.0 | 1557.20 | 8482.35 | 16322.25 | 24307.25 |
| Total liabilities | 26540.16 | 25620.53 | 28934.19 | 37612.56 | 49158.69 |
| Equity capital | 48567.00 | 48359.00 | 48567.00 | 48369.00 | 45369.00 |
| Reserves, retained profit | -25397.91 | -25779.33 | -24025.75 | -20854.53 | -16122.57 |
| Profit,(loss) | -382.09 | 1754.74 | 3170.87 | 4731.36 | 6855.05 |
| Long and medium term debt | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities | 602.46 | 777.20 | 820.11 | 867.13 | 918.21 |
| Bank overdraft, finance required | 2846.69 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total debt | 3451.15 | 777.20 | 820.11 | 867.13 | 918.21 |
| Equity, % of liabilities | 296.27 | 190.74 | 167.48 | 145.37 | 121.69 |

276.

## Projected balance sheet, production in 1000 DHS

| Year | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Total assets | 48724.54 | 54228.92 | 62921.69 | 71657.91 | 80321.41 |
| Fixed assets, net of depreciation | 3745.75 | 2969.99 | 8152.25 | 6355.50 | 4576.25 |
| Construction in progress | 0.0 | 7000.00 | 0.0 | 0.0 | 0.0 |
| Current assets | 7867.78 | 6663.92 | 7867.78 | 7867.78 | 7867.78 |
| Cash, bank | 364.13 | 279.55 | 364.13 | 364.13 | 364.13 |
| Cash surplus, finance available | 37146.58 | 37356.2[illegible] | 46537.53 | 57070.50 | 675[illegible].45 |
| Total liabilities | 48724.54 | 54228.92 | 63071.69 | 71657.91 | 80321.41 |
| Equity capital | 45859.00 | 48869.00 | 42869.00 | 48869.00 | 48869.00 |
| Reserves, retained profit | -9628.52 | -1062.31 | 4598.64 | 13234.85 | 21871.[illegible] |
| Profit (loss) | 8565.21 | 5650.55 | 8636.21 | 8636.21 | 6573.71 |
| Long and medium term debt | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities | 917.85 | 761.23 | 917.65 | 917.85 | 917.85 |
| Bank overdraft, finance required | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total debt | 917.85 | 761.20 | 917.85 | 917.65 | 917.85 |
| Equity, % of liabilities | 100.30 | 90.12 | 77.54 | 66.20 | 60.63 |

## Net income statement in 1000 UHS

| Year | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|
| Total sales, including sales tax | 12775.77 | 14136.46 | 1563[illegible] | 17278.90 |
| Less: variable costs, including sales tax | 2890.61 | 3117.42 | 3355.74 | 3646.14 |
| Variable margin | 9885.16 | 11019.04 | 12275.94 | 1[illegible]632.[illegible]7 |
| As % of total sales | 77.37 | 77.95 | 78.53 | 78.90 |
| Non-variable costs, including depreciation | 17475.84 | 17475.84 | 17475.84 | 17475.84 |
| Operational margin | -7590.68 | -6456.80 | -5199.80 | -3843.08 |
| As % of total sales | -59.41 | -45.67 | -33.26 | -22.24 |
| Cost of finance | 0.0 | 0.0 | 0.0 | 0.0 |
| Gross profit | -7590.68 | -6456.81 | -5199.80 | -3843.08 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | -7590.68 | -6456.81 | -5199.80 | -3843.08 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | -7590.68 | -6456.81 | -5199.80 | -3843.08 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | -7590.68 | -6456.81 | -5199.80 | -3843.08 |
| Accumulated undistributed profit | -7590.68 | -14047.49 | -19247.29 | -23090.37 |
| Gross profit, % of total sales | -59.41 | -45.67 | -33.26 | -22.24 |
| Net profit, % of total sales | -59.41 | -45.67 | -33.26 | -22.24 |
| Net profit, % of equity | -15.28 | -12.96 | -10.42 | -7.69 |
| Net profit + interest, % of investment | -15.28 | -12.98 | -10.42 | -7.68 |

## Net income statement in 1000 DHS

| Year | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|
| Total sales, including sales tax | 19090.06 | 15811.37 | 23272.76 | 25703.00 |
| Less: variable costs, including sales tax | 3959.26 | 3278.10 | 4784.68 | 5250.33 |
| Variable margin | 15130.80 | 12533.27 | 18428.08 | 20452.67 |
| As % of total sales | 79.26 | 79.27 | 79.44 | 79.64 |
| Non-variable costs, including depreciation | 17438.35 | 12915.34 | 16733.84 | 17281.64 |
| Operational margin | -2307.54 | -382.08 | 1754.24 | 3170.82 |
| As % of total sales | -12.09 | -2.42 | 7.54 | 12.35 |
| Cost of finance | 0.0 | 0.0 | 0.0 | 0.0 |
| Gross profit | -2307.54 | -382.08 | 1754.24 | 3170.82 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | -2307.54 | -382.08 | 1754.24 | 3170.82 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | -2307.54 | -382.08 | 1754.24 | 3170.82 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | -2307.54 | -382.08 | 1754.24 | 3170.82 |
| Accumulated undistributed profit | -25397.91 | -25779.99 | -24025.75 | -20854.93 |
| Gross profit, % of total sales | -12.09 | -2.42 | 7.54 | 12.35 |
| Net profit, % of total sales | -12.09 | -2.42 | 7.54 | 12.35 |
| Net profit, % of equity | -4.58 | -0.68 | 3.13 | 5.66 |
| Net profit + interest, % of investment | -4.58 | -0.67 | 3.01 | 5.41 |

--- COMFAR 1.0 - UNIDO Vienna ---

## Net income statement in 1000 DHS

| Year | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|
| Total sales, including sales tax | 28334.73 | 31249.60 | 31249.60 | 234[illegible] |
| Less: variable costs, including sales tax | 5724.52 | 6264.21 | 6257.78 | 4844.74 |
| Variable margin | 22610.21 | 24985.40 | 24991.82 | 18597.57 |
| As % of total sales | 79.80 | 79.95 | 79.97 | 79.33 |
| Non-variable costs, including depreciation | 17878.85 | 18490.35 | 16425.52 | 12931.62 |
| Operational margin | 4731.36 | 6495.05 | 8566.21 | 5660.95 |
| As % of total sales | 16.70 | 20.78 | 27.41 | 24.15 |
| Cost of finance | 0.0 | 0.0 | 0.0 | 0.0 |
| Gross profit | 4731.36 | 6495.05 | 8566.21 | 5660.95 |
| Allowances | 0.0 | 0.0 | 0.0 | 0.0 |
| Taxable profit | 4731.36 | 6495.05 | 8566.21 | 5660.95 |
| Tax | 0.0 | 0.0 | 0.0 | 0.0 |
| Net profit | 4731.36 | 6495.05 | 8566.21 | 5660.95 |
| Dividends paid | 0.0 | 0.0 | 0.0 | 0.0 |
| Undistributed profit | 4731.36 | 6495.05 | 8566.21 | 5660.95 |
| Accumulated undistributed profit | -16123.57 | -9628.52 | -1062.31 | 4598.64 |
| Gross profit, % of total sales | 16.70 | 20.78 | 27.41 | 24.15 |
| Net profit, % of total sales | 16.70 | 20.78 | 27.41 | 24.15 |
| Net profit, % of equity | 8.45 | 11.60 | 15.30 | 10.11 |
| Net profit + interest, % of investment | 8.02 | 10.91 | 14.39 | 8.66 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27

280.



## Net income statement in 1000 DHS

| Year | 1999 | 2000 | 2001 |
|---|---|---|---|
| Total sales, including sales tax | 31249.60 | 31249.60 | 31249.60 |
| Less: variable costs, including sales tax | 6257.78 | 6257.78 | 6257.78 |
| Variable margin | 24991.82 | 24991.82 | 24991.82 |
| As % of total sales | 79.97 | 79.97 | 79.97 |
| Non-variable costs, including depreciation | 16355.62 | 16355.62 | 16318.12 |
| Operational margin | 8636.21 | 8636.21 | 8673.71 |
| As % of total sales | 27.64 | 27.64 | 27.76 |
| Cost of finance | 0.0 | 0.0 | 0.0 |
| Gross profit | 8636.21 | 8636.21 | 8673.71 |
| Allowances | 0.0 | 0.0 | 0.0 |
| Taxable profit | 8636.21 | 8636.21 | 8673.71 |
| Tax | 0.0 | 0.0 | 0.0 |
| Net profit | 8636.21 | 8636.21 | 8673.71 |
| Dividends paid | 0.0 | 0.0 | 0.0 |
| Undistributed profit | 8636.21 | 8636.21 | 8673.71 |
| Accumulated undistributed profit | 13234.85 | 21871.05 | 30544.76 |
| Gross profit, % of total sales | 27.64 | 27.64 | 27.76 |
| Net profit, % of total sales | 27.64 | 27.64 | 27.76 |
| Net profit, % of equity | 15.42 | 15.42 | 15.49 |
| Net profit + interest, % of investment | 12.58 | 12.98 | 13.64 |

## Source of finance, construction in 1000 DHS

| Year | 1985 | 1986 |
|---|---|---|
| Equity, ordinary | 20759.00 | 26110.00 |
| Equity, preference | 0.0 | 0.0 |
| Subsidies, grants | 0.0 | 0.0 |
| Loan AF | 0.0 | 0.0 |
| Loan BF | 0.0 | 0.0 |
| Loan CF | 0.0 | 0.0 |
| Loan AL | 0.0 | 0.0 |
| Loan BL | 0.0 | 0.0 |
| Loan CL | 0.0 | 0.0 |
| Total loan | 0.0 | 0.0 |
| Current liabilities | 0.0 | 0.0 |
| Bank overdraft | 0.0 | 0.0 |
| Total funds available | 20759.00 | 26110.00 |

282



## Source of finance, production in 1000 DHS

| Year | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|
| Equity, ordinary | 2793.53 | 100.35 | 117.39 | 147.04 | 316.43 | 5556.26 |
| Equity, preference | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Subsidies, grants | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total loan | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities | 670.66 | 4.74 | 5.67 | 7.15 | 8.17 | -93.92 |
| Bank overdraft | 3244.98 | 216.19 | -423.79 | -1750.86 | -1285.53 | 2848.69 |
| Total funds available | 6709.17 | 321.29 | -309.73 | -1596.67 | -961.93 | 8411.03 |

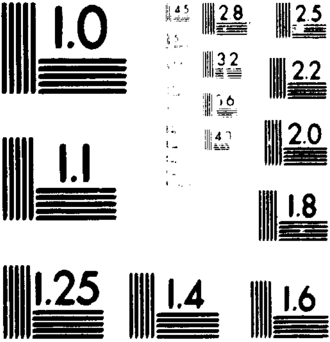


COMFAR 1.0 - UNIDO Vienna

## Source of finance, production in 1000 DHS

| Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Equity, ordinary | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Equity, preference | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Subsidies, grants | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan AL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan BL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Loan CL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total loan | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Current liabilities | 174.82 | 42.83 | 47.01 | 51.08 | -0.36 | -156.57 |
| Bank overdraft | -2848.69 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total funds available | -2673.87 | 42.83 | 47.01 | 51.08 | -0.36 | -156.57 |

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E. - DP/UAE/79/003 --- 1984-06-27




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

## Source of finance, production in 1000 DHS

| | |
|---|---|
| Year .................... | 1999 |
| Equity, ordinary ......... | 0.0 |
| Equity, preference ....... | 0.0 |
| Subsidies, grants ........ | 0.0 |
| Loan AF ................ | 0.0 |
| Loan BF ................ | 0.0 |
| Loan CF ................ | 0.0 |
| Loan AL ................ | 0.0 |
| Loan BL ................ | 0.0 |
| Loan CL ................ | 0.0 |
| Total loan ............... | 0.0 |
| Current liabilities ...... | 156.37 |
| Bank overdraft ........... | 0.0 |
| Total funds available .... | 156.37 |

## Net working capital in 1000 DHS

| Year | | | 1987 | 1988 | 1989 | 1990 |
| --- | --- | --- | --- | --- | --- | --- |
| Coverage .................................. | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable ..................... | 30 | 12.0 | 1215.79 | 1237.59 | 1257.55 | 1261.75 |
| Inventory and materials.................. | 278 | 1.3 | 1711.73 | 1791.79 | 1566.19 | [illegible] |
| Energy ..................... .......... | 60 | 6.0 | 879.11 | 879.11 | 879.11 | 879.11 |
| Spares .................................. | 180 | 2.0 | 850.00 | 850.00 | 850.00 | 850.00 |
| Work in progress ........................ | 9 | 40.0 | 301.85 | 303.53 | 306.48 | 305.70 |
| Finished products ....................... | 15 | 24.0 | 535.49 | 552.05 | 564.30 | 571.66 |
| Cash in hand ............................ | 15 | 24.0 | 246.47 | 246.47 | 246.47 | 246.47 |
| Total current assets .................... | | | 5765.94 | 5871.04 | 5954.09 | 6145.28 |
| Current liabilities and | | | | | | |
| Accounts payable ........................ | 20 | 18.0 | 670.66 | 675.40 | 631.07 | 699.22 |
| | | | ------------- | ------------- | ------------- | ------------- |
| Net working capital ..................... | | | 5095.28 | 5195.64 | 5313.02 | 5460.06 |
| Increase in working capital ............. | | | 2797.53 | 100.36 | 117.33 | 147.04 |
| Net working capital, local currency ... | | | 3132.18 | 3190.20 | 3264.79 | 3253.70 |
| Net working capital, foreign currency ... | | | 1963.10 | 2005.44 | 2048.23 | 2196.35 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .





## Net working capital in 1000 DHS

| Year | | | 1991 | 1992 | 1993 | 1994 |
| --- | --- | --- | --- | --- | --- | --- |
| Coverage .................................. | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable ..................... | 30 | 12.0 | 1307.04 | 1141.21 | 1462.46 | 1545.27 |
| Inventory and materials.................. | 278 | 1.3 | 2146.29 | 1797.21 | 2556.47 | 2760.91 |
| Energy ..................... .......... | 60 | 6.0 | 877.11 | 875.11 | 879.11 | [illegible] |
| Spares .................................. | 180 | 2.0 | 850.00 | 850.00 | 850.00 | 850.00 |
| Work in progress ........................ | 9 | 40.0 | 373.37 | 271.11 | 343.78 | 359.05 |
| Finished products ....................... | 15 | 24.0 | [illegible] | 507.35 | [illegible] | 670.58 |
| Cash in hand ............................ | 15 | 24.0 | 246.47 | 191.53 | [illegible] | 317.22 |
| Total current assets .................... | | | 6322.98 | 5637.52 | 7019.65 | 7387.14 |
| Current liabilities and | | | | | | |
| Accounts payable ........................ | 20 | 18.0 | 696.28 | 602.46 | 777.29 | 820.11 |
| | | | ------------- | ------------- | ------------- | ------------- |
| Net working capital ..................... | | | 5626.49 | 5035.05 | 6242.38 | 6567.93 |
| Increase in working capital ............. | | | 166.45 | -591.44 | 1207.33 | 324.65 |
| Net working capital, local currency ... | | | 3458.29 | 3019.61 | 3867.85 | 4120.33 |
| Net working capital, foreign currency ... | | | 2168.20 | 2016.44 | 2352.54 | 2446.70 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

## Net working capital in 1000 DHS

| Year | | | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | | |
| Current assets & | | | | | | |
| Accounts receivable | 30 | 12.0 | 1676.20 | 1735.26 | 1724.72 | 1440.26 |
| Inventory and materials | 278 | 1.3 | [illegible] | 3251.34 | 3245.28 | [illegible] |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | [illegible] | [illegible] | [illegible] | [illegible] |
| Work in progress | 9 | 40.0 | 350.21 | 413.19 | 413.03 | 347.58 |
| Finished products | 15 | 24.0 | 765.66 | 744.15 | 743.07 | 626.46 |
| Cash in hand | 15 | 24.0 | 327.09 | 364.13 | 364.13 | 275.80 |
| Total current assets | | | 7794.58 | 8237.19 | 8230.16 | 6721.97 |
| Current liabilities and | | | | | | |
| Accounts payable | 20 | 18.0 | 867.13 | 918.21 | 917.85 | 761.26 |
| Net working capital | | | 6927.46 | 7318.99 | 7312.32 | 6160.69 |
| Increase in working capital | | | 360.43 | 391.53 | -6.67 | -1151.62 |
| Net working capital, local currency | | | 4375.56 | 4652.91 | 4648.89 | 3830.80 |
| Net working capital, foreign currency | | | 2551.90 | 2665.07 | 2663.43 | 2329.89 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .





## Net working capital in 1000 DHS

| Year | | | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Coverage: | mdc | coto | | | |
| Current assets & | | | | | |
| Accounts receivable | 30 | 12.0 | 1724.72 | 1724.72 | 1724.72 |
| Inventory and materials | 278 | 1.3 | [illegible] | 3245.28 | 3245.28 |
| Energy | 60 | 6.0 | 879.11 | 879.11 | 879.11 |
| Spares | 180 | 2.0 | [illegible] | 650.00 | [illegible] |
| Work in progress | 9 | 40.0 | [illegible] | 413.03 | 413.03 |
| Finished products | 15 | 24.0 | 743.99 | 743.07 | 743.99 |
| Cash in hand | 15 | 24.0 | 364.13 | 364.13 | 364.13 |
| Total current assets | | | 8230.16 | 8230.16 | 8230.16 |
| Current liabilities and | | | | | |
| Accounts payable | 20 | 18.. | 917.55 | 917.85 | 917.65 |
| Net working capital | | | 7312.32 | 7312.32 | 7312.32 |
| Increase in working capital | | | 1151.62 | 0.0 | 0.0 |
| Net working capital, local currency | | | 4648.89 | 4648.89 | 4648.89 |
| Net working capital, foreign currency | | | 2663.43 | 2663.43 | 2663.43 |

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

GLASS BOTTLE PROJECT IN FUJAIRAH, U.A.E.

DP/VAE/79/oo3

ECONOMIC AND FINANCIAL CALCULATIONS

USING COMFAR

2nd series of runs

from 26. and 27. of June 1984

During the second series of runs the following versions has been calculated:

- BASIC VERSION ("FUJAI 2"): This version is based on the revised figures, prepared by H.R.PERSSON in May 1984
- Alternative 1 - NO EXPORT ("FUJAI 3"): The assumption was that the bottles produced for export can not be sold; the consequence would be an increase of cullet and a reduction of raw material input by 1o % but no decrease of energy costs.
- Alternative 2 - RAW MATERIAL imported at DHS 277.63 per ton of glass ("FUJAI 4"): according to the estimates by Mr.PERSSON for imports from Turkey.

  Note: The difference between these three runs can be seen at the row "Raw material" in "TABC for product A: GLASS" and in the table for "Total production costs in 1ooo DHS".
- Alternative 3 - 1oo % equity ("FUJAI 5"): This alternative has been calculated in order to see the effect on the cash flow for financial planning. Without paying interest and without repayment, the project is on principle financable if there is additional equity available during the first two years to finance the cash deficit (-3122.11 and -12o.57 in 1ooo DHS). In that case the replacement of the furnace in year 1992 (6$^{th}$ year of production) could be financed by using the "cumulated cash balance" (see: cashflow tables, production in 1ooo DHS).

  In this alternative the IIR on total investment is slightly higher than in the basic version. The explanation is that the total investment costs are different:

  Basic version: 48 283.14 nominal value, including 1414.14 interest which is capitalized (financing with 5o % loan)

  "1oo% equity": 46 869.o nominal value (no interest during pre-production capitalized because of 1oo% equity)

<u>List of footnotes, concerning all four versions:</u>

FN 1: Table "Total initial investment costs in 1ooo DHS", line "Working capital": 23o1.75 inventory of spare parts; corresponding correction for years 1 and 2 has been made because of the assumption, that these stocked spare parts will be used first.

FN 2: Table "Total current investment costs in 1ooo DHS", line "Working capital": negative figures in year 1988 (explanation see FN 1) and years 1992, 1998: replacement of the furnace is reducing production (to 3/4) and therefore less working capital is necessary.

FN 3: Cashflow Discounting: only b) interest payable on loan added back to net-cashflow shows the internal rate of return (IIR) on total investment at future value (FVAL) which should be used.

FN 4: "Total production costs in 1ooo DHS", line "Factory overheads": This line is containing three cost elements factory overheads: 264.6 per year, 1oo % fixed and cost adjustments for energy:

- <u>reductions</u> in years 1992 and 1998 of 25 % because of the replacement of the furnace which will decrease the production to 3/4 of possible production
- <u>increases</u> in years 1993 to 2oo1; the assumption is that for producing <u>more than</u> the reference tonnage of glass (15 594 tons or 1oo %) the energy input has to be increased <u>by about</u> the same percentage as production will be increased:

  e.g. year 1993 $\longrightarrow$ increase of production 2o % $\longrightarrow$ increase of energy (5274 x 2o % $\cong$ +1o54) $\longrightarrow$ 264.6 + 1o54 $\Rightarrow$ 1318; actually a little bit less (1294.6) is considered as total under "Factory overheads"

This is because there was due to a limited storage capacity no free line for "Cost adjustments" in COMFAR.

FN 5: Table "Total production costs in 1ooo DHS", line "Direct costs, sales and distribution":

This line is containing the direct distribution costs

a) shrink palletizing } per ton of glass x
b) freight } tons of distributed glass

Vienna, 8.July 1984

Ewald Brunner
Economic and financial
project evaluations

APPENDIX XI.9

## 2 RAW MATERIALS CHARACTERISTICS

### 2.1 Generalities

This paragraph gives the main chemical, mineralogical, and mechanical characteristics, required generally by SGE for the raw materials used in its glass factories.

Each of these characteristics is individually recommended by SGE ; nevertheless, only their global consideration will allow to take the final decision, if these raw materials are suitable or not. However, some impurities are unacceptable.

Only, the complete analysis of samples, representing the different raw materials, will show the compatibility of these materials and lead to the final composition formula.

### 2.2 Sand

#### 2.2.1 Chemical analysis

The following values can be given as example :

| | | |
|---|---|---|
| - $Si O_2$ | % | 97.00 mini. (1) |
| - $Ti O_2$ | % | 0.10 maxi. |
| - $Fe_2 O_3$ | % | 0.15 maxi. |
| - $Al_2 O_3$ | % | 2.00 maxi. (2) |
| - $Na_2O + K_2O$ | % | 0.50 maxi. |
| - $CaO + MgO$ | % | 0.15 maxi. |

(1) Below 98 % the silica content must be constant by $\pm$ 0.5 %.
(2) The alumina content must be constant by $\pm$ 0.1 %.

#### 2.2.2 Moisture

< 5 % at use, must be as constant as possible.

2.2.3 Mineralogical impurities

Any sand that contents the following oxides must be rejected :

- chromite,
- andalusite,
- dysthenite,
- sillimanite,
- cyanide.

Other minerals with density higher than 2.9 can be accepted if they comply with the following conditions :

| | | |
|---|---|---|
| - quantity | % | 0.02 maxi. |
| - granulometry | mm | 0.03 maxi. |

2.2.4 Granulometry

Granulometry must comply with the attached typical curve.

2.2.5 Regularity

Besides the above criteria, sand bed must be evenly distributed in the whole quarry and therefore during the quarrying operation.

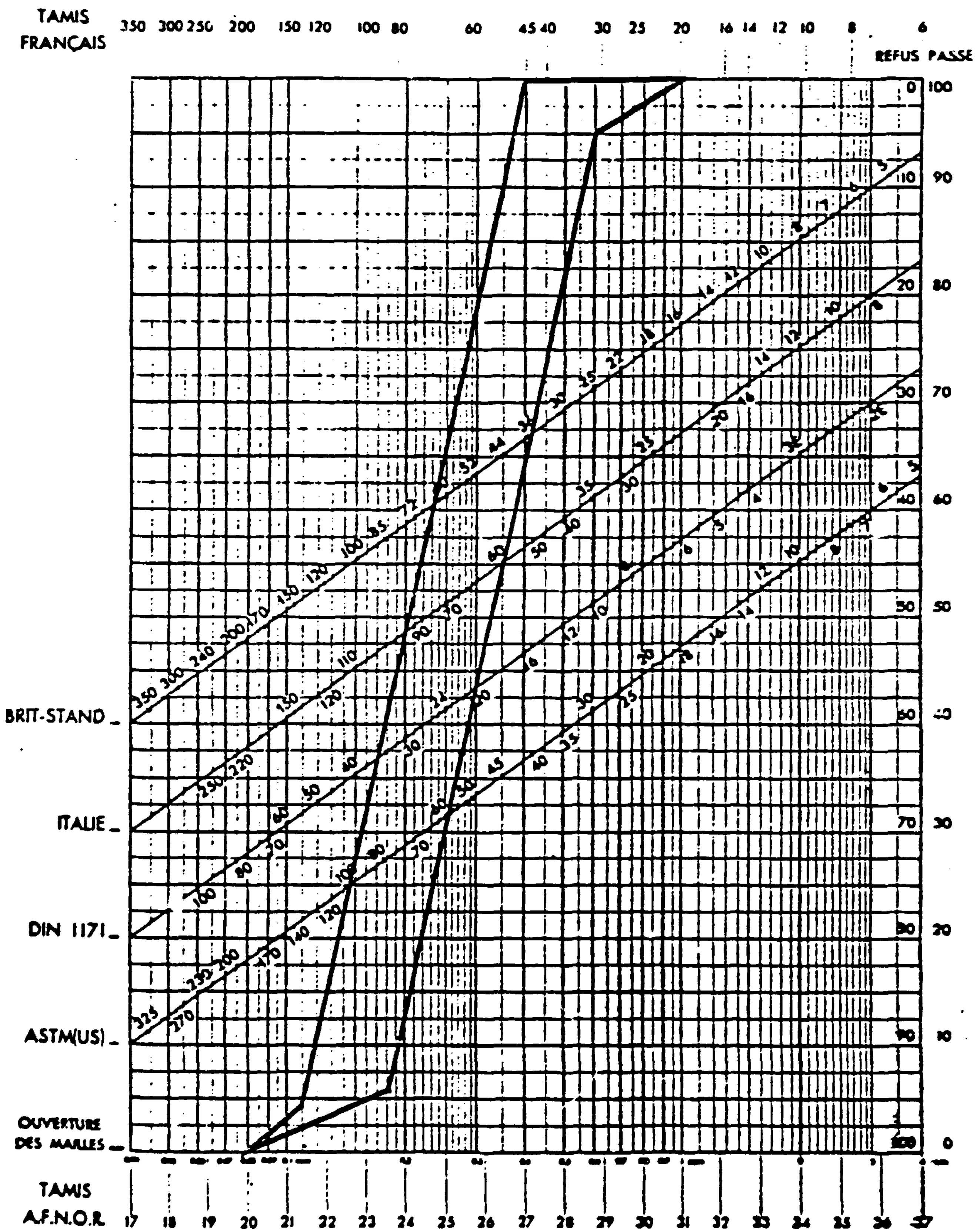
Chemical, mineralogical and mechanical properties (granulometry, porosity, etc.) must remain as constant as possible or at least have very slow variation.

VERRE CREUX
HOLLOW GLASS



SAND
SABLE

ANALYSE GRANULOMETRIQUE
GRAINS SIZE DISTRIBUTION



## 2.3 Soda ash

Soda ash (sodium carbonate) must be of the "dense" quality.

### 2.3.1 Granulometry

Granulometry must comply with the attached typical curve.

### 2.3.2 Chemical composition

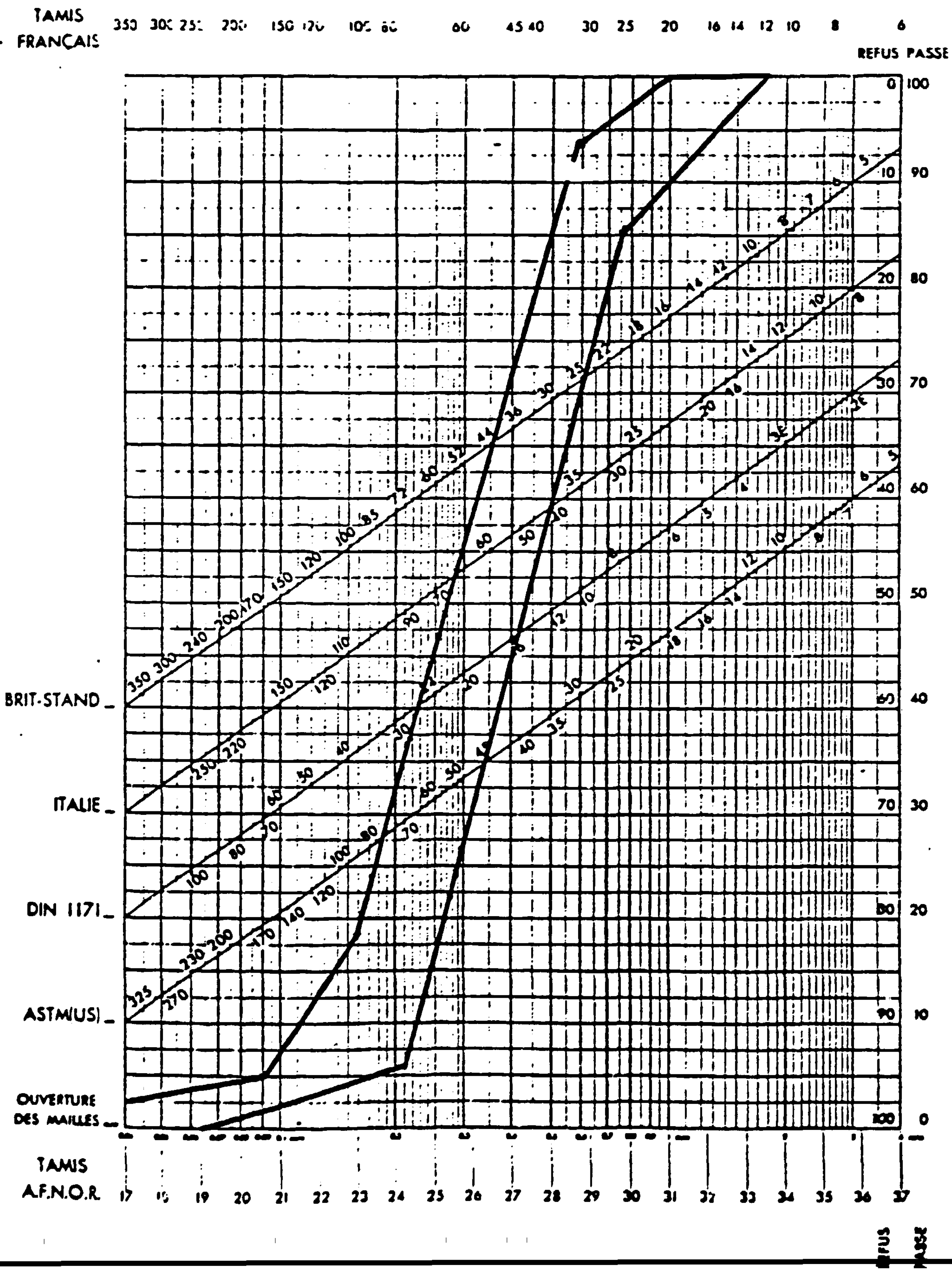
| | % |
|---|---|
| - $CO_3 Na_2$ | 98.000 mini. |
| - Cl Na | 0.400 maxi. |
| - $Na_2 SO_4$ | 0.070 maxi. |
| - $Fe_2O_3$ | 0.002 maxi. |
| - CaO | traces |
| - MgO | traces |
| - Insolubles in water | 0.020 maxi. |
| - Moisture | 0.300 maxi. |

SODA ASH

CARBONATE DE SOUDE

(DENSE)

# ANALYSE GRANULOMETRIQUE
# GRAINS SIZE DISTRIBUTION



2.4 Sulphate

Sulphate can be in the batch either under form of gypsum (hydrated calcium sulphate) or under form ᶜ sodium sulphate.

2.4.1 Gypsum

| | % |
|---|---|
| - $CaO + MgO$ | 33 mini. |
| - $SO_3$ | 35 mini. |

Granulometry must comply with typical attached curve.

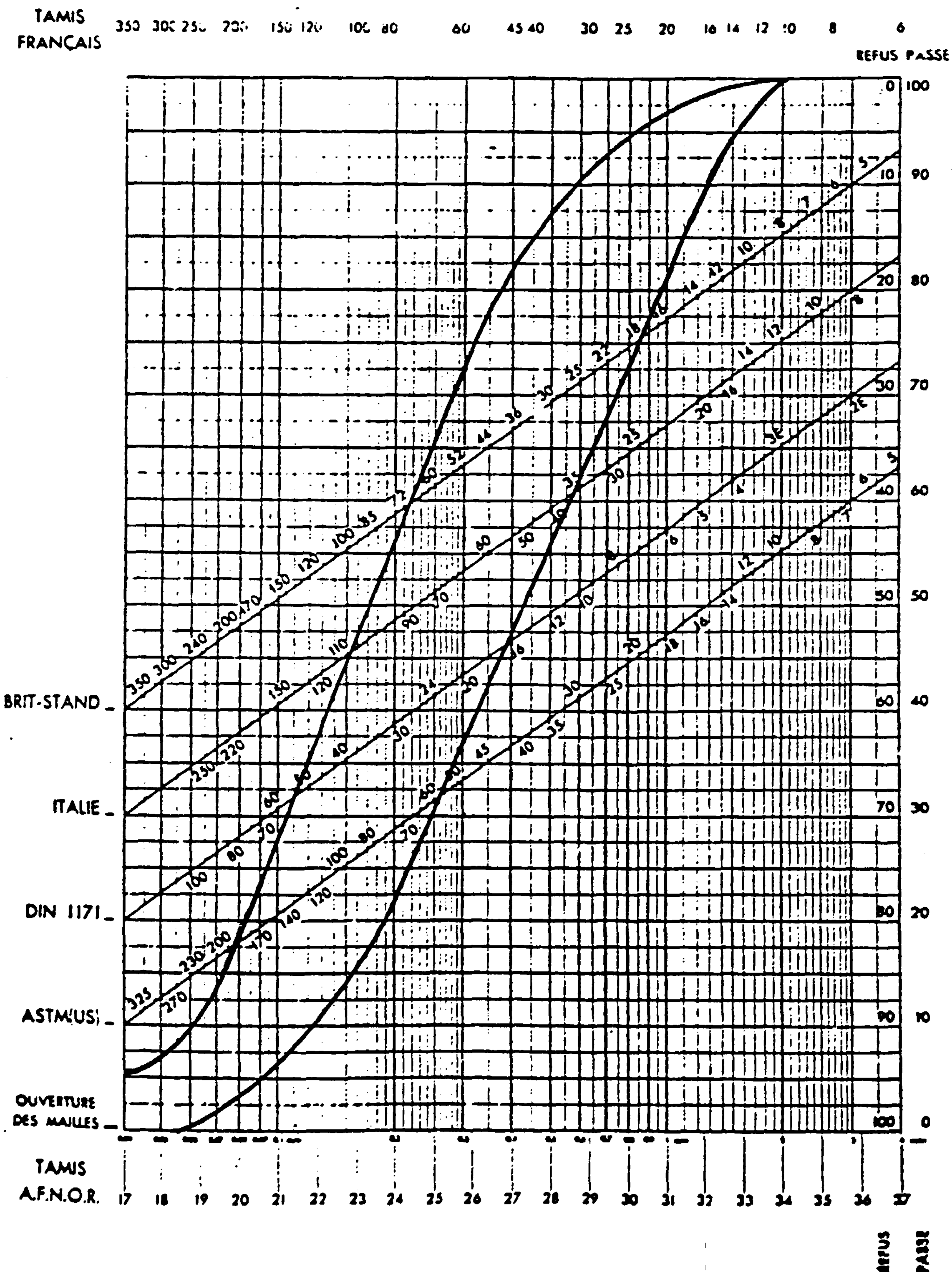
2.4.2 Sodium sulphate (anhydrous)

| | % |
|---|---|
| - $Na_2 SO_4$ | 97.0 mini. |
| - $Fe_2 O_3$ | traces |
| - Moisture | 0.1 maxi. |

Granulometry must comply with typical attached curve.

GYPSUM (CALCIUM SULPHATE)
GYPSE
(SULFATE DE CALCIUM)

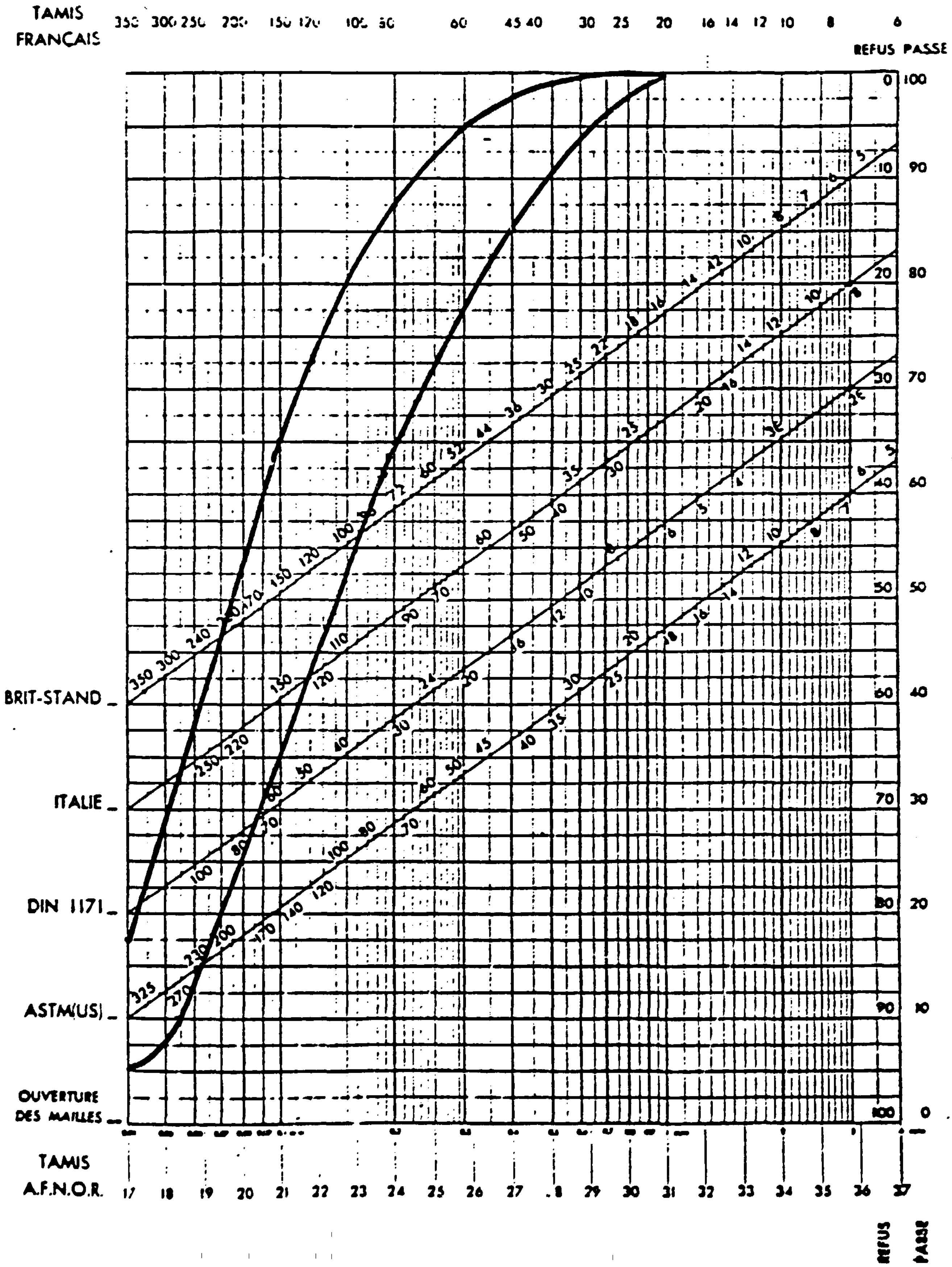
ANALYSE GRANULOMETRIQUE
GRAINS SIZE DISTRIBUTION



# SODIUM SULPHATE

# SULFATE DE SODIUM

## ANALYSE GRANULOMETRIQUE
## GRAINS SIZE DISTRIBUTION



2.5 Limestone

| | % |
|---|---|
| - $Fe_2O_3$ | 0.20 maxi. |
| - $CaO$ | 54.00 mini. |
| - $SiO_2$ | 1.20 maxi. |
| - $Al_2O_3$ | 0.30 maxi. |
| - $MgO$ | 1.00 maxi. |

Granulometry must comply with typical attached curve.

VERRE CREUX 

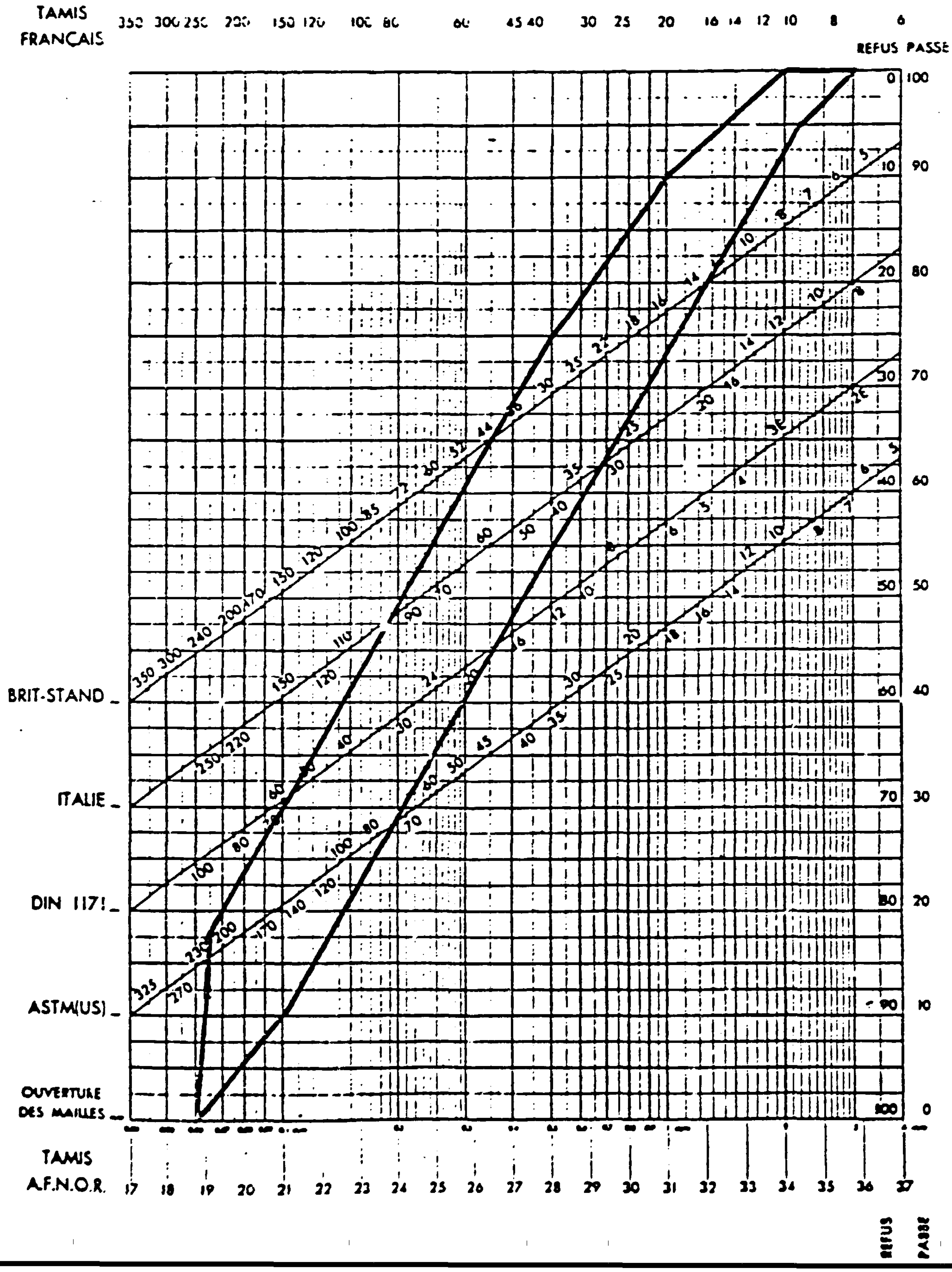
HOLLOW GLASS

LIMESTONE

CALCAIRE

ANALYSE GRANULOMETRIQUE

GRAINS SIZE DISTRIBUTION



2.6 Feldspar

| | % |
|---|---|
| - $Si\ O_2$ | 67.0 maxi. |
| - $Al_2\ O_3$ | 16.0 mini. |
| - $Na_2O + K_2O$ | 9.0 mini. |
| - $CaO + MgO$ | 2.0 maxi. |
| - $Ti\ O_2$ | 0.3 maxi. |
| - $Fe_2\ O_3$ | 0.3 maxi. |

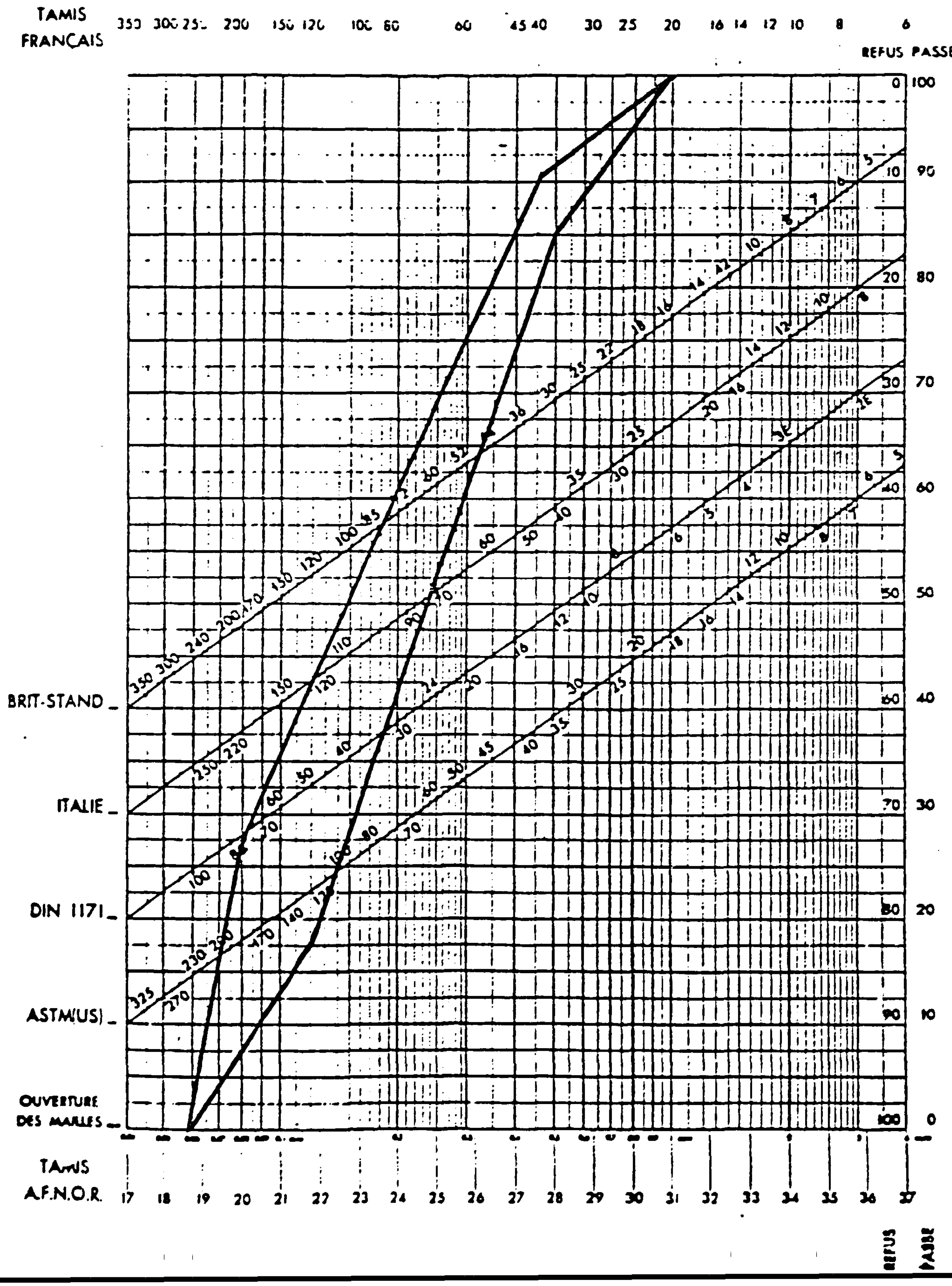
Granulometry must comply with typical attached curve.

VERRE CREUX
HOLLOW GLASS



FELDSPAR
FELDSPATH

ANALYSE GRANULOMETRIQUE
GRAINS SIZE DISTRIBUTION



7