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TECHNICAL ASSISTANCE FOR DOWNSTREAM PETROCHEMICAL INDUSIRIES

SI/SAU/85/801

SAUDI ARABIA

Terminal report*

for the Government of the Kingdom of Saudi Arabia
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Arthur D. Clarke,
UNIDO consultant

United Nations Industrial Development Organization

Vienna

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261

TABLE OF CONTENTS

G. List of Annexes

A - Individual reports of companies visited (confidential information, restricted circulation)

B - Distribution of companies by the number of workers employed

C - Geographical location of factories

D - Summary and individual tables of total product quantity licenced by applications and also by operational factories

E - Imports of plastic products

F - Plastic processing, factories visited, products produced, raw material usage and number of employees

G - Manufacturing tyres and tubes of rubber - licenced factories, products and number of workers

H - Rubber processing factories licenced, products and number of employees

I - Imports of rubber and rubber goods

J - Imports of motor vehicles

K - Weaving factories licenced, products and number of employees

L - Factories licenced for manufacture of synthetic fibres

M - Imports of textile goods containing synthetic fibres

N - Synthetic fibres in developing countries / recent trends

Key to abbreviations

AIDO	Arab-Industrial Development Organization
ARAMCO	Arab-American Company
GCC	Gulf Co-operation Council
GOIC	Gulf Organisation for Industrial Consulting
ILO	International Labour Organization
LKT	Laboratorium für Kunstofftechnik
MFA	Multi Fibre Agreement
NIC	National Industrialisation Company
PTC	Plastics Technology Centre
R&D	Research and Development
SABIC	Saudi Arabian Basic Industries Corporation
SANCST	Saudi Arabian National Committee for Science and Technology
SASO	Saudi Arabian Standards Organization
SCH	Saudi Consulting House
SIDF	Saudi Industrial Development Fund
UNIDO	United Nations Industrial Development Organization
HD.PE	High density-polyethylene
LD.PE	Low density-polyethylene
LLD.PE	Linear low density-polyethylene
PA	Polyamide (nylon)
PET	Polyethylene teraphthalate
PP	Polypropylene
PTA	Pure teraphthalic acid
PU	Polyurethane
SBR	Styrene Butadiene Rubber

A. SUMMARY

A sample study of the Saudi plastics processing industry has been undertaken. It showed that the industry used modern machinery and manufactured good quality products for use in three major areas of application, for building and construction, for packaging and for general purpose. Nevertheless the industry was facing serious difficulties in overcoming problems associated with a reduced demand in a fast changing market situation. The size of the problem was indicated by some 25% of the installed capacity being idle, and aggrevated by continued imports of suspect quality products. Some minor exceptions were noted and appropriate actions have been indicated.

The industry has made major efforts to achieve product diversification but has encountered difficulties in exploiting the new markets concerned. The following four areas of governmental assistance were identified that were considered essential if the industry was to survive its current situation as well as to ensure its future growth and development: a widening of the total potential market area, through exports, initiated and supported by a Government integrated export policy; the development of a Plastics Technology Centre with the immediate establishment of an industrial information unit to provide technical and market information; provision of import restrictions on the entry of sub-standard quality products, and improvements in the quality of management. A number of suggestions have been made to achieve these objectives including further UNIDO assistance and are detailed in the specific recommendations which have been made. The implementation of the recommendations are expected to ensure the establishment of a thriving industry which in turn will provide the visible incentive to encourage the remaining two thirds of the licenced companies to become operational.

A review of the rubber processing sector has shown this to be at an early stage of development. Prospects for a tyre production factory have been outlined but would be more positive if viewed from a wider market area, and thus fits more naturally as a Gulf Co-operative Council project. Some aspects of synthetic rubber production have been considered which indicated that it would need to be export-sales oriented.

A review of carpet and textile manufacturing sector as potential users of synthetic fibres has shown this to be at the very earliest stage of development with several items that require detailed checking. Although there was insufficent detailed information available to determine the prospects for establishing a synthetic fibre plant in the Kingdom, the indications and deductions made suggested this needed to be reviewed from the aspects of a wider market area and should therefore be considered as a Gulf Co-operative Council project.

In examing the future potential growth of all these three down-stream petrochemical sub-sectors the limited Saudi market-size has been the dominant limiting factor.

Technical and supporting data has been detailed in 13 Annexes to the report.

Eleven recommendations have been made. Six concern the plastics processing sector, two each concerning the synthetic rubber and synthetic fibre sections respectively and a two-part recommendation for extended training of the counterparts.

B. RECOMMENDATIONS

The following recommendations are respectfully submitted to Government for their examination and implementation.

It is strongly recommended that the Ministry of Industry and Electricity should initiate appropriate Government action to ensure that:

2.1 Where National Saudi Standards exist, then plastic products entering the Kingdom must comply in all respects to the appropriate National Saudi Standard, and as evidence of compliance each incoming consignment must be accompanied by a certified Test Certificate. In particular this will apply to plastics pipes. (Page 12)

2.2 Plastic products entering the Kingdom (imports) must be permanently (indelibly) marked with the country of origin. (Page 12)

2.3 Initiates and follows up action with the Chambers of Commerce and Trade and other concerned institutions to organise a seminar and associated industrial clinics, to be held in various locations within the country on the subject of industrial management, particularly in plastics processing. The objective is to acquaint the trader entrepeneur with information on modern industrial management techniques and of the facilities available, in the Kingdom, that could assist him. (Page 20)
The Government may wish to request UNIDO assistance to organise the seminar and industrial clinics.

2.4 Advise the Chamber of Commerce and Trade that their assistance is required to help resolve a problem faced by the plastics bag manufacturers that currently restricts the development and introduction of lower unit cost plastic bags based on LLDPE polymer or combinations with LDPE polymer. The LLDPE polymer is produced in Saudi Arabia and has been successfully tested by many plastic bag manufacturers. Resolution of the problem will therefore make a contribution to the National Economy. (Page 17)

2.5 It not only continues its present support for the establishment of a Plastics Technology Centre but should press for the immediate initiation of a plastics industry information service which could be temporary treated in office premises with small staff and equipment facilities.
Additionally,that the plastics industry is represented on the governing body of the PTC; that the PTC is initially wholly Government funded but with a clearly defined longer term view that it should become fully industrially funded by the plastics industry. In the intervening period Government funding should be progressively decreased while industry contribution funding shouldbe progressiveley increased. This method would meet the needs of the plastics industry during its development phase. (Page 16)
The Government may consider to request UNIDO assistance to establish this Information Service Facility.

2.6 Should encourage existing manufacturers of blown plastics film (LDPE, LLDPE and MDPE) to increase production capacity to meet the increasing market demand. (Page 16)

2.7 Encouragement ist given for a market survey on flexible rubber hose-pipes to be undertaken with a view to introducing their production in the Kingdom. (Page 24)

2.8 Request the GCC to undertake a current market study for the GCC area to determine present and future tyre requirements, and to assess whether one large factory or a few smaller factories for tyre production would be economic. In the meantime the Ministry should delay any joint venture action on establishing a tyre production factory in the Kingdom. (Page 26)

2.9 Refuses any further licences for the manufacture of carpets, rugs and prayer-mats until the Ministry has positive evidence from the operational factories that they are in fact producing carpets and selling them effectively. Additional import protection would be achieved by ensuring that all imported carpets are marked with country of origin. (Page 30)

3.0 Consideration is given to making a request of the GCC to examine the market potential for synthetic fibres in carpet and textile production with a view to determining whether a production of synthetic fibres can be justified economically within the GCC. (Page 32)

3.1a Mr. Mohamed Ahmedseed, and a representative of SANCST, should undertake a one month study tour to European Plastics Research Institutes and Technology Centres, and to visit, on the return journey, the Plastics Technology Centre in Alexandria, Egypt. (Page 33)

3.1b Mr. Mohamed Ahmedseed and Mr. Hassan Munif should attend the UNIDO organised plastics training course at LKT Vienna normally for a period of six weeks starting October/November period each year. As the work load prevents these gentlemen attending together one should be scheduled for 1986 and one for 1987 training courses.
Organisation for the study tour (3.1a) and the plastics training programm can be made through UNIDO on Government request. (Page 33)

C. INTRODUCTION

This mission was the last of a four-month split mission assignment for the Ministry of Industry and Electricity undertaken for technical assistance for downstream petrochemical industries under UNIDO reference SI/SAU/85/801. The consultant arrived in Riyadh on 17 April and left on 1 May. The consultant was attached to the Industrial Licencing Department of the Ministry of Industry and Electricity and was provided with Mr. Mohamed Ahmedseed as counterpart, and Mr. Hassan Munif as alternative counterpart.

The first mission was concerned with data collection by desk research and undertaking visits to selected plastics processing factories in both Riyadh and Jeddah. The second mission included visits to plastics processing factories in Damman area. The remaining period and the final mission were concentrated on aspects of synthetic rubber and synthetic fibres.

D. PREFACE

A sample study was undertaken to examine the current state of the Saudi plastics processing industry. Peripherical companies producing end-user products, in which plastics forms one of several different types of component parts, for example electric-cables, footwear etc., were excluded from the study. A representative selection of factories to be visited was made having regard to:

size - by number of employees (Annex B)
location - by major concentrations (Annex C)
types of processes operated

In total 21 factories (19 %) were visited.

Detailed reports of the factories visited,including comments,have been set out in Annex A.

Since much of the information disclosed during the discussions was of a confidential nature,Annex A has been issued on a restricted circulation basis.

Percentage and tonnage figures in this report have all been rounded to the nearest number as it is only the comparative size of data that is under consideration.

To assist the reader the report has been set out in three parts each dealing with a specific subject area:

I Plastics Processing Industry
II Synthetic Rubber
III Synthetic Fibres

Readers attention is drawn to a study undertaken by the Saudi Consulting House for the Ministry of Industry on Electricity entitled "Opportunities for investment in the plastics industry", dated December 1983. This deals with forward marketing and investment aspects for the industry.

E. I -PLASTICS PROCESSING INDUSTRY

1 /GENERAL

The Saudi plastics industry is suffering from the effects of the present economic recession to the extent that, on average, 25 % of installed capacity is idle. There are one or two product areas where production has markedly increased but they represent only 5 % of the industry's capacity. The industry consists of some 3 operational companies (Annex B) with a licenced capacity of 194,020 tons, plus some 35 products for which weight is not specified. These factories represent only 35 % of the total companies licenced by the Ministry of Industry and Electricity.

Of the nine application areas into which the licenced products can be divided (Annex D) 92 % fall within three application areas: Building and Construction 57%, Packaging 19% and General Purpose 16%. The manufacturers have voiced their complaints of the poor quality pipe entering the country, and the devious ways that are used to import it to avoid or reduce customs duty. The Government's Fourth Development Plan 1986-1990 indicates a planned decrease in building and construction activities over the next five years, and this will undoubtedly result in a further decrease in the market size for plastics pipes.

2 /BUILDING AND CONSTRUCTION

Of the plastics factories visited manufacturing building products half showed output drops for 1984 in the range of 33 - 68 % while the other half showed increased outputs in the range of 50 - 100 %. One exception was Al Babtain Polyurethan Co which increased its on-site sprayed PU thermal insulation foam from a licenced figure of 100 tons to 2,500 tons and was increasing. For 1985 most factories reported a continuing drop in demand, and the visits indicated idle capacity of the order of 25 % for all plastics products in the buildung and construction applications.

One Building & Construction product area which needs to be highlighted is that of PVC pipes. Excluding PVC pipe for electrical conduit, the PVC pipe manufacturers estimated the current (1985) market size as 50,000 tons while the total operational PVC pipe licenced capacity was nearly double at 92,000 tons.
This deficency undoubtedly explains why some 35% or more of plastic pipe manufacturing capacity was idle in the factories visited. This situation has been aggravated by the volume of imported PVC pipe entering the Kingdom amounting to 22,515 tons in 1984 (Annex E) which amounted to 45 % of the current demand.

The quality of plastic pipe produced in Saudi is generally of a very high order and meets the Saudi Specification established by SASO. Quality control testing laboratories, some much better equipped than others, were seen in all the plastics pipe factories visited with qualified and experienced expatriate staff in charge of the testing. Modern quality control systems were in operation. There appears to be no real technical reason why Saudi manufactured plastic pipe can not be used to fulfil civil engineering and other contracts within the Kingdom.

Despite this fact the information available indicates that many building and construction contracts continue to import the plastic pipe requirement from overseas, of which it is reported some is of doubtful quality.

Some of the pipe manufacturers have exported plastic pipe within the GCC area as a means of widening their market area which indicates that their prices can be competitive. However, before this can be achieved on a large volume scale there is a need for the Government to develop an integrated and comprehensive export policy together with a package of necessary promotional and supportive services that are an essential feature for sucessful export achievement. It is understood that during the period of this mission positive steps have already been initiated by the Ministry of Industry & Electricity in this direction. This is to be very highly applauded, since the activities of this mission have high-lighted the relative small population of Saudi Arabia (9 million) as being the limiting factor in the expansion of the plastics processing industry.

Exports are a menas of reaching a larger market area. The GCC area is obviously the immediate market area to be targeted followed by the Arabic speaking countries, and finally the world market.

The plastic pipe manufacturers, actively aware of the Saudi decreasing market demand, have all taken positive action to seek out alternative products which might be manufactured. Unfortunately there are not many items that have the potential market tonnage of plastics pipes. PVC window profile extrusion was one area which has been studied by one manufacturer, and turned down because it would not be economically feasible against aluminum frames in Saudi conditions. Extrusion of framed PVC as a wood-substitute for skirting board etc. is another possibility but would probably only occupy the capacity of one extruder.

In essence there is little possibility of finding appropriate alternative plastics products that can be processed by this extrusion equipment. An alternative approach to be considered is to sell or joint venture the idle plant and the technology that has been developed to a developing country which wishes to move into plastics pipe processing. However, as most of the personnel are expatriates it is unlikely that they would want to move with the plant. Additionally, the Saudi entrepeneur may not wish to become burdened with an overseas operation of this type on the basis that he is fully committed trying to keep his existing business running. Nevertheless, despite these negative view points, it is still a proposal that the Ministry of Industry and Electricity may wish to explore in more detail with specific plastics pipe manufacturers, or with the involved financial institutions. If a serious interest is expressed this could be an area where UNIDO may be of some assistance in establishing appropriate contacts in developing countries.

It is clearly evident that this large section of the industry requires some active Government support if a further increase of idle capacity is to be avoided.

The most immediate area which would produce a large benefit should be to restrict the flow of imports. This could be most readily and conveniently effected if the Government were to ensure that where Saudi Standards exist then plastic products entering the Kingdom must comply in all respects to the appropriate Saudi Standards, and that each incoming consignment must be accompanied by a certified Test Certificate. In addition, it would assist the plastics processing industry generally if appropriate action was also taken to ensure that all imported plastics goods are permanently (indelibly) marked with the country of origin.

It is therefore strongly recommended (2.1 and 2.2) that the Ministry of Industry and Electricity should initiate appropriate Government action to ensure that:

a/ Where Saudi Standards exist, then plastic products entering the Kingdom must comply in all respects to the appropriate Saudi Standard, and as evidence of compliance each incoming consignment must be accompanied by a certified Test Certificate. In particular this will apply to plastics pipes.

b/ Plastics products entering the Kingdom (imports) must be permanently (indelibly) marked with the country of origin.

3/ GENERAL PURPOSE

In the General Purpose Application area analysis of the production of products within the sample of factories visited shows a licenced capacity 8,254 tons (Annex F) while the actual production during the last twelve months (1984/5) was 6,226 tonnes representing a deficency against installed capacity of 25 %. This reflects the drop in business reported by this section of the industry and the noted idle capacity.

Much of this decrease has been in the houshold and domestic wares market. It reflects the changes taking place since the boom years of 1981/83. It has been reported by some of the companies that a large part of the drop in market demand has been caused by the decrease in the size of the expatriate worker population. Since the Government's fourth Development Plan 1986/90 indicates a further and substantial decrease of the expatriate labour force over the next five years this will cause a further shrinkage of this market. The companies concerned have undertaken much effort already to diversify their range of products within this market area, and some have expanded their efforts into packaging applications with a very wide variety of both shapes and sizes of packaging containers. This market involves a different range or customers as far as industrial packaging is concerned.

It is already evident that the industry will require technology support in this latter area to ensure that the products produced are satisfactory for use in the environment of the Kingdom of Saudi Arabia, with development of manufacturing specifications, and assistance to introduce quality assurance within the factories.

For producers of products in the General Purpose area polyurethane sponge (foam) appears to have very limited alternatives, carpet backing being one that is presently under examination by one company. The planned decrease in expatriate labour will further depress this market whose main outlets are in mattresses, pillows, and chairs. It seems inevitable that some companies will go out of business.

4/ PLASTICS TECHNOLOGY CENTRE

Very few of the plastics factories producing general purpose and packaging goods possess any testing facilities, and most appear to be totally unaware for the need of testing either the raw materials used or the finished products produced. However, in the development of parkets where product performance is the main criteria,for example foodstaffs and industrial packaging. The lack of such facilities will present a severe restriction to the development of these market areas.

In three separate factories blown PP film production equipment had been purchased and installed. In each case the equipment has been run once, and some film had been produced. PP film is characterised by exceptional clarity, high-gloss and non-stretch ability (like photographic film). Each entepreneur had tried to sell the film and was unable to find a market. Each one believed he was the only manufacturer in the Kingdom able to produce PP film.

This observation indicates that a licence should not have been granted by the Ministry of Industry & Electricity for the process without a detailed market study, and it further indicates a screening weakness in the financial institutions if a loan was involved for the purchase of the production equipment. If a PTC had been functioning in the country it would have been possible to provide some technical assistance to find a suitable market area.

Another manufacturer had invested in a modern co-extrusion blown film laminate (2-ply) production equipment. It is believed that he will require technical support with the potential customers to prove the technological advantages of the laminated films that can be produced. Without a PTC in the Kingdom to provide such industry-oriented support this advanced product is unlikely to be successfully developed.

The above examples are just two areas which high-light the need of a PTC to provide the technology and market support for assisting the plastics processing industry expand its market base with new technical products.

There is clearly a need to collect, store and disseminate both market and technical information for the plastics industry since the majority of entrepeneurs lack this ability. A PTC differs from a R& D Centre in that it is structured to serve the comprehensive requirements of the industry and it is not in general restricted to R& D activities alone. A PTC can therefore be developed not only to collect, store and disseminate market and technical information but it could also undertake specialised servicing requirements of the industry, since it will have specially trained staff to handle the servicing of the wide range process equipment with which it will be equipped to undertake its developmental activities. Additionally, it can be structured to provide specialised or general training, an essential activity if more Saudi nationals are to enter the industry.

Although a fully developed PTC will take some years to establish it should be pointed out that the industrial information operation, indicated above, could be started from an office with a small staff and this is an activity which is urgently required to assist both, the industry and the concerned authorities.

The technical/technology facilities at UPM Research Institute, and the embryonic facilities at SABIC Marketing Co due for completion in 1987, were examined while some of the equipment available could be used to assist the industry in developing industrial and agricultural applications of plastics products; nevertheless it must be very dearly realised that, at best, this would only produce a severely limited piece-meal approach. A organization such as a PTC designed, structured, and organised to serve the needs of the plastics industry is required to assist and support the development of the plastics industry to ensure it continuity and future viability. The subject was discussed with SANCST in some detail. Unfortunately the lack of staff personnel with industrial experience means that an academic view-point is also to the fore. The discussions indicated that it was proposed to establish a Petrochemical R&D Centre at the Science City. This could be an appropriate umbrella under which a PTC could be developed. Unfortunately this looks some years away from realisation. The need to start an industrial information service is of immediate need and Ministry of Industry support is now required to ensure this is implemented immediately. UNIDO has much experience in the design, planning and establishment of PTC's and this experience may be useful to both the Ministry and the SANCST.

Within the Saudi industrial environment, at its early stage of development, it is suggested that the funding of the PTC for the first few years should be Governmental but with a clearly defined longer term view that it should become fully industrially funded by the plastics industry. In the intervening period there should be a sliding scale of contributions with Government decreasing and industry increasers. If developments move in rubber processing and in synthetic rubber, the Centre could be developed to handle this sector as they are very closely inter-related. However, this is not the case with synthetic fibres and this would need to be fitted into a Synthetic Fibres & Textile R&D Centre.

Because the objective of the PTC is to serve the plastics industry,it is essential that industry should be represented on the governing body of the PTC right from the start of its inception so that it can have a voice in determining the work objectives. By this means the orientation of the PTC will be seen

to be serving the needs of the industry, and in consequence industry should be more easily persuaded to make not only its financial contribution to the PTC, but also to make use of the services it can offer.

It is therefore strongly recommended (2.5) that the Ministry of Industry and Electricity should not only continue its present support for the establishment of a Plastics Technology Centre (PTC) but should press for the immediate initiation of a plastics industry information service which could be temporarily located in office premises with small staff and equipment facilities. Additionally, it should ensure that the plastics industry is represented on the governing body of the PTC; that the PTC is initially wholly Government funded but with a clearly defined longer term view that it should become fully industrialially funded by the plastics industry. In the intervening period Government funding should be progressively decreased while industry contribution funding should be progressively increased. This method would meet the needs of the plastics industry during its development phase. The Government may consider to request assistance of UNIDO to establish this information service facility.

5/ PACKAGING APPLICATION

It is evident that various types of products for packaging are being introduced and developed by the plastics processing industry to meet the needs of the Saudi market. Of particular interest is the production of plastics films and bags where it was noted in the factories visited (Annex F) that the licenced capacity of 2,525 tons had significantly increased by 312 % to 7,900 tons during the last twelve month in 1984/85. During the period of 1984 imports of film and bags (Annex D) amounted to 4,719 tons . (1984 was the last available import statistic.)

These figures indicate that the market for plastics film and bags is strong and expanding rapidly. Existing companies should be encouraged therefore to expand in order to develop a stronger industrial base. This is an area requiring promotional action by the Ministry of Industry and Electricity.

It is therefore recommended that (2.6) the Ministry of Industry & Electricity should take steps to encourage existing manufacturers of blown plastics film (LDPE, LLDPE, HDPE) to increase their production capacity to meet the increasing market demand.

In the area of plastics bags there is a commercial problem to which attention must be drawn since if allows to continue unchallenged will limit the potential for using LLDPE, of SABIC manufacture, in the production of plastics bags. Present practice is to sell bags by weight, whether plain or printed. Normally plastics bags are produced from LDPE polymer. If LLD.PE is partially or wholly substituted for LDPE the resulting material is physically stronger than that produced for LDPE. Consequently a bag made from LLD.PE film can be 25 % thinner than a bag from LDPE but will possess equivalent performance characteristics in use. This process is known as 'down-gauging' i.e. to reduce thickness to give equivalent performance. One commercial advantage is lower unit cost, but despite this factor the market refuses to move from a weight basis. This problem has to be resolved. One approach could be to establish appropriate National Standard specifications setting out permitted limits on the variation of physical dimensions specified for a bag and the minimum physical performance characteristics. It would then be possible to sell a specified number of bags, of specific dimensions, per kg. This would still enable the customers to weigh his bags, but he would be getting a specific number of bags per kg. However, for this to become a practical operation requires close co-operation and co-ordination of the plastics bags manufacturers. This is an area in which the relevant Chamber of Commerce and Trade could take an initiative since a successful outcome would be a contribution to the Kingdom's national economy.

It is <u>therefore strongly recommended</u> (2.4) that the Ministry of Industry and Electricity should advise the Chambers of Commerce & Trade that their assistance is required to help resolve a problem faced by plastics bag manufacturers that currently restrict the development and introduction of lower unit cost plastic bags based on LLD.PE or in combinations with LDPE polymer. The LLD.PE polymer is produced in Saudi Arabia and has been successfully tested by many plastic bag manufacturers. Resolution of the problem will therefore make a contribution to the National Economy.

6/ PRODUCTION EQUIPMENT

In generell the industry is very well equipped with modern machinery, and covering a very wide range of different types of plastics processing. Rotational casting was the only process absent, but some products, licensed by companies not yet operational, would require rotational moulding for their production.

Some factories had equipment from a wide range of manufacturers located in USA, Japan, Germany, Tawain etc. and with such mixed suppliers the spare-parts inventory was unduly complex as well as expensive. Attempting to purchase bargain machines from a wide range of manufacturers does not in the end lead to any real financial savings. These are areas where the Ministry of Industry could usefully provide some active guidance in the future to new entrepeneurs, as well as the financial institutions that may be involved.

To be critical there were three specific areas where up to date state-of-the-art technology was lacking. In view of the extensive travelling undertaken by some fo the entrepeneurs and their staff to international plastics exhibitions, raw material and machinery suppliers in various parts of the world a few at least should be aware of the latest developments available.

In injection moulding the use of robots to handle products ejected from the moulds have become widespread in use in Europe during the past few years as part of a labour cost saving operation. Other robotic uses have also been developed for the plastics moulding factory.

No robotics were observed in any of the factories visited. Their installation would result in a labour reduction and should therefore be attractive. However, their installation would require specialised training of both production and maintenance staff to ensure their effective operation since this is a very new technology. It is perhaps this aspect that stops their introduction since the majority of entrepeneurs have expressed their view very strongly, that they are opposed to training expatriate personnel on the basis that they are supposed to be trained and skilled personnel. If this view continues to predominate it will block the introduction of state-of-the-art technology in plastics processing and the associated cost and labour savings. With the recession continuing, and the existing market shrinking for the main line products, competition will progressively become keener, and to maintain profit margins productivity will need to be improved. This changing situation may provide the necessary leverage on the entrepeneurs to examine ways of reducing labour costs, and the introduction of robotics will be one aspect of improving productivity.

In the production of blown plastics film output is increased by some 30% with the use of internal bubble cooling. Such systems are generally coupled with automatic thickness control devises to achieve high productivity. Internal bubble cooling with automatic thickness control was installed on new equipment working in the PP sack factory but completely lacking in other film and bag factories. This technology can not be easily introduced on existing equipment and it ought to be considered in any new equipment plans for blown film production. However it involves a high capital cost, but results in very much improved productivity. Manufacturers did not seem to be aware of this technology.

The trend to reduce or eliminate labour requirements, and to improve quality of product has engaged the attention of plastics machinery manufacturers in many countries. In the area of injection and blow moulding the use of computerised control of the processing operation has moved a long way forward. This current state-of-the-art technique was not observed in the factories visited. One possible reason is that due to the small population fo the country and consequent limited demand for products production cycles for any one product are relatively short. This was a point mentioned by several moulders. With the expansion of the market area through export promotion, and by economic pressures arising from the recession it can be expected that plastics manufacturers will turn eventually to improved, automated and computer controlled process equipment to remain competitive. Most manufacturers seemed to be aware of this development but did not feel any necessity to move in this direction at the present time.

7/ MANAGEMENT

In general terms the industry can be divided into two groups. Group one consists of entrepeneurs who have had some experience of industrial operations, in several cases through earlier work within ARAMCO. In group two the entrepeneurs are traders whose previous experience has been in the commercial world of buying and selling.

The factories operated by group one entrepeneurs vary from excellent to good, with good quality and technically capable management personnel who have been carefully selected, and presumably are well paid. Several of these persons would qualify as consultants for UNIDO such is the range and level of their skills and knowledge. These managements plan ahead and use modern management control techniques and several are comparable to some of the best in Europe.

The factories operated by Group two vary from good to very poor, with variable quality of management personnel who have not been very well screened and personally are not well paid. These factories are run like a trading business with little forward planning beyond four or six weeks, the production planning is lacking as was observed during the visits, but perhaps the worst aspect is the lack of really good technical know-how and real management skills.

In between these two groups there are a few small companies where one person is able to run the entire operation with a very limited product range, and the skill of the owner is either technical or managerial. Because they are small, compact, and restrict themselves to known product market areas appear to be very successfull.

The real problem for the future of the industry lies in the Group two entrepeneurs. Their pride will generally prevent them requesting assistance, even if they are able to recognise their need. They are probably unaware that NIC is a company able to provide such assistance. A means of reaching such entrepeneurs is required otherwise it must be anticipated that several such companies will fail only through lack of experienced managerial skills. This is an area that requires a more detailed examination by the Ministry of Industry as part of its promotional efforts, and a liaison with the SIDF would find common interests. One method that may be considered is to organise through the various Chamber's of Commerce and Trade a seminar in various locations on industrial management.

The speakers ought to be Arabic speaking or alternatively English speaking, international personnel who have operated factories with much practical experience in industrialised countries. Opportunities for the entrepeneurs to have private discussions with the lecturers should be provided on the basis of - an industrial clinic - with pre-timed appointments. Local Saudi experts should also be invited to participate with the international experts in the open meetings, but not at the private clinic sessions. To assist the lecturers to obtain a relevant Saudi background several days should be allocated to factory visits in various locations, so they may have first-hand information. Provided the entrepeneurs can be persuaded to attend such meetings the system provides the necessary cloak of privacy that is required to overcome the pride-factor, and experience has shown that provided it is well organised, in detail, the industrial clinic system works exceptionally well.

It is <u>therefore strongly recommended that</u> (2.3) the Ministry of Industry and Electricity initiates and follows up action with the Chambers of Trade andCommerce and other concerned Institutions to organise a seminar and associated industrial clinics, to be held in various locations

within the country on the subject of industrial management, particularly in plastics processing. The objective is to acquaint the trader entrepreneurs with information on modern industrial management techniques and of the facilities available in the Kingdom that could assist him. The Government may wish to request UNIDO assistance to organise this seminar and industrial clinics.

8/ REVIEW OF EXISTING (NON-OPERATIONAL) LICENCES

Annex D lists all the total products licenced which have been divided into nine application areas. None of the products listed in Table IX of the Annex D under the heading of "Safety and Security" have yet been produced, and in Table VI Medical applications, only one of 12 products is being produced. These are two specific areas in which markets exist within the Kingdom and companies should be encouraged to start their licenced operations.Other companies visited had expressed interest in the medical application products and it was stressed that these are highly technical products and a joint venture operation was to be recommended.

Within the other application areas there appeared to be opportunities for licenced products in agricultural applications, Table II, as well as in electrical, electronics and telecommunications Table IV. However again it needs to be stressed that these all involve special and specific technical performance products which would only gain a satisfactory market operation if the factories which are to produce them operate a high level of quality control and quality assurance. Even with joint venture operation there would still be the need of an organisation to assist in the technology area such as the recommended PTC, and also local Saudi specifications and supervision by SABO.

Other opportunities in packaging applications (Table VII) are still open but an updated market survey ought to be undertaken by the licenced companies before they make any other financial commitment. Additonally, it should be stressed that several of the products might have export potential within the GCC. This needs to be examined in a market study. For the remainder of the products listed in Tables I, III, V and VIII dealing with General Purpose, Building and Construction, Furniture and accessories, and Transport and associated items the existing licenced companies should be advised to reconsider their licence unless they have supporting market studies which would be sufficiently detailed to support the grant of any necessary funding.

The diversity of products licenced is very large, and many are highly technical which would require support services to be available within the Kingdom until the operational companies are seen to be successfully overcoming their serious difficulties it must be expected that the remaining licence holders will postpone, perhaps indefinitely, their plans for becoming operational. It is therefore extremely important that the recommendations, relating to assisting the industry to overcome their current problems, are implemented as soon as possible so that a thriving plastics industry can become the visible incentive to encourage the further growth and development of this industry.

It is interesting to note that if the population of the Kingdom is taken as nine million, and that 85% of the licenced capacity is realistic then on this basis the per capita consumption would be 41 kg. For comparison the current West European figure is about 45 kg.

On the other hand the per capita figure for operation factories, based on 85% of licenced capacity, is 18kg and in reality is probably less than 14 kg, due to idle capacity.

It will be seen therefore that the total licenced capacity is very high for the Kingdom, but there is much room for licenced factories to become operational as well as increased output from existing units. In this situation the current policy of the Ministry of not issuing any further licences for plastics products without valid marketing studies is to be highly commended. Serious attention to assist the industry overcome its current difficulties must be of the highest priority.

9/ HEALTH AND SAFETY IN FACTORIES

In general terms the fire precautions in factories can be considered as satisfactory, and compared to many countries are of a high standard. However, there appear to be no inspections governing the health environment in factories. Attention needs to be drawn to the health risks that exist in factories which print PE film and factories which manufacture PU foam (synthetic sponge). The printing ink used for PE film printing contains flamable solvents which are also hazardous to health. Effective ventilations over the printing machine with an exhaust system to the outside of the building will generally be an adequate safeguard.

The chemicals used in the production of PU foam are hazardous due to their high toxicity. The main risk is within the mixing operations where both adequate ventilation and protective clothing are necessary, as well as reserve clothing and mask facilities in case of accidents which necessitate other persons entering the mixing room. It is also a useful precaution to advise the nearest hospital of the nature of the chemicals being used so that they are pre-warned in case of accidents.

Attention is also drawn to a further hazard which relates to speed of escape from a factory in case of accident, and specifically in case of fire. All hanged doors in a factory that lead to the outside of the building should open outwards. They should also be unlocked during working hours. In the factories visited the majority had doors which opened inwards instead of outwards.

It was interesting to note during this mission that a project had been proposed by ILO for the training of factory inspectors. When this is completed it is hoped that the above hazards will be subject to more positive control.

E. II - SYNTHETIC RUBBER

1/ RUBBER PROCESSING INDUSTRY

The Saudi rubber processing industry is small and at a very early stage of development. In the area of rubber tyres five companies have been licenced for re-treading of tyres (Annex G) and of these three are operational, one in Damman, one in Jeddah while it is understood the third factory in Riyadh has stopped production.

The total retreading capacity licenced is 63,600 tyres covering automobile, truck, heavy equipment vehicles and aircraft tyres. If certain basic assumptions are made regarding tyre weight in this mix the total rubber content is of the order of 1,746 tons.

Other rubber products have been licenced (Annex H) to eleven companies of these four are stated to be operational. Two producing rubber footwear, one producing O-rings and one producing rubber section for window glass sealing. Excluding one factory where the product is proposed to be based on scrap rubber the remainder involve 4,570 tons of rubber compound plus eight products for which it is not possible to calculate a weight.

2/ IMPORTS OF RUBBER AND RUBBER GOODS

Examination of the import statistics for 1985 (AnnexI) showed that tyres accounted for 115,652 tons and inner tubes 9,600 tons representing 97% and 7% respectively of the total imports. Unvulcanised rubber items and latex used for rubber pressing amounted to 5,036 tons (3%) while some 35 listed items of rubber manufactured goods accounted for the remaining 16,822 tons (11%). Examination of this latter list indicated that most items amounted to only a few hundred tons, but 5,762 tons was imported under the heading of "other pipes of non-rigid rubber". This probably means rubber hose-pipe. Observation in the Riyadh and Jeddah areas indicated that reinforced rubber hose pipe is used for garden watering, for irrigation and by the fire-service. A detailed investigation would appear to be justified since even half this quantity would be sufficient for a production operation of rubber hose-pipe in the Kingdom. Unfortunately this product is not among the list of licenced rubber goods, but might be an item worth promoting. It is therefore recommended that (2.7) the Ministry of Industry and Electricity should encourage a market survey on flexible rubber hose-pipes to be undertkaen with a view to introducing their production in the Kingdom.

Of the other imports the quantities are all too low to justify production within the Kingdom at the present time.

3/ TYRES

Tyres for automobiles (including light pick-up trucks) and heavy trucks represent the major international market for rubber, both natural and synthetic; and the current level of imports into the Kingdom suggest this should be examined as a potential production operation.

The current vehicle population in the Kingdom has been indicated as 2.5 million in 1984 and was forecast to decline to 2.0 to 1.9 million (Vehicles includes cars, pick-ups and trucks). For heavy trucks there are some variation in the figures. An offical figure of 400,000 is a contrast with a figure of 200,000 from another source.

Imports of vehicles in 1985 amounted to 234,489 units (Annex J) of which 4,590 were heavy trucks. On the basis that the active life of the vehicles is eight years this gives a vehicle population of 1,839,192 excluding heavy vehicles. This would suggest a vehicle population figure of 1.9 to 2.0 million at the present time (1985) is of the correct order.

It has been indicated that there are both radial and crossply tyres, tubed and tubeless tyres as well as a large number of different tyre sizes in current use in the Kingdom. It is understood from discussions in the trade that about 85% of the tyres fall within 6 sizes, and that car and light-truck tyres require replacement once per year. On this basis there is an annual tyre demand of 8 million tyres taking the vehicle population as 2.0 million. This would suggest that a factory for the production of one million tyres would be worth persuing. It is understood that a joint-venture operation for a tyre factory has been under discussion within the Ministry of Industry and Electricity but details were not made available.

Discussions with the Secretariat of the GCC indicated that a one million per year tyre production factory was licenced in Kuwait but the project had not moved. It would therefore appear on the above information that this is a subject which ought to be transferred to the GCC to undertake a fully detailed market study covering all GCC countries to determine the current and future tyre requirements of the area and to assess whether one large factory or a few smaller factories 1 million tyres/annum for tyre production whould be economically justifiable. In the meantime, the Ministry of Industry and Electricity ought to delay any joint venture action on establishing a trye production factory in the Kingdom until a GCC study is completed since this could lead to the prospect of a large tyre factory,

It is therefore strongly recommended that (2.8) the Ministry of Industry and Electricity should request the GCC to undertake a current market study for the GCC area to determine present and future tyre requirements and to assess whether one large factory or a few smaller factories for tyre production would be economically justifiable. In the meantime, the Ministry should delay any joint venture action on establishing a tyre production factory in the Kingdom.

Apart from establishing a tyre production operation within the GCC area to supply locally manufactured tyres, a longer term view ought to be oriented to the possibility of utilisation of locally manufactured synthetic rubber in the production of the tyres. A one million per year car tyre plant would consume about 2,500 tons of rubber (natural plus synthetic).

4/ SYNTHETIC RUBBER PROSPECTS

A "product marketing-final report Volume III World Market" study undertaken for GOIC in 1980 by the Bureau d'Etudes Industrielles et de Co-operation de l'Institute Française du Petrol covers the subject of synthetic rubbers and clearly identifies four synthetic rubbers which represent 86% of the world products.

as	Styrene-Butadiene SBR	57%
	Polybutadiene	13%
	Butyl rubber	8%
	Polyisoprene	8%

To this can be added up-dated market information that world wide consumption of synthetic rubber increased 3% in 1985 and will rise 15% by 1990 according to the long range forecast of International Institute of Synthetic Rubber Producers based in USA. Synthetic rubber production forecast was 5.443 million tons in 1986 to 5.977 million tons in 1990 while natural rubber forecast was 3-610 million tons in 1986 to 3.972 million tons in 1990.

Synthetic rubber production is projected to represent consistently about two thirds of total rubber demand, and tyre products will continue to consume about 55% of all synthetic rubber .

A synthetic rubber plant of about 50,000 tons per annum is considered the smallest economic size. Against this figure should be compared the rubber requirement of a tyre factory for one million tyres. Taking the synthetic rubber content at 55% this would be 1,375 tons per annum. Even assuming that this might be a possible justification for even a 3 million/year tyre plant this would increase

the figure to only 4,125 tons. Add to this tyre-re-treading of 1,746 tons giving a total of 5,871 tons which is less than 12% of any projected local synthetic rubber production. In addition, there could be no guarantee that the synthetic rubber produced would necessarily be utilised by the joint-venture tyre manufacturer since he would wish to keep to his own formulations. The production of synthetic rubber must therefore be regarded as an export-oriented market operation and any local sales within GCC area ought to be regarded as a bonus.

NIC has indicated that it proposes to arrange for a detailed feasibility study to be undertaken for the production of 50,000 tons each of both polybutadiene and polyisoprene. Both these rubbers depend on a butane/butene precursor. With the Saudi petrochemical industry presently based on waste gas as its raw material this will probably be the limiting economic factor to any down-stream chemical products which need to have butane/butene as precursor material. It cannot be too strongly emphasised that in the synthetic and natural rubber world price is the dominant factor. If synthetic price is high the trend will be to use more natural rubber and visa-versa.

Although the general direction of thinking in Saudi and GCC appeared to be oriented towards polybutadiene and polyisoprene it is necessary to point out that SBR is still the largest tonnage synthetic rubber. Its production in Saudi could only be achieved by importation of burene and conversion of styrene to co-polymerise with the butadiene. The importation costs are bound to adversely affect the economics of the operation to some degree. This problem will only be fundamentally resolved when an aromatics plant is operational in the GCC area.

E. III -SYNTHETIC FIBRES

1 /CARPETS/RUGS

The Saudi carpet industry comprises the manufacture of carpets, rugs and prayer mats. It is an extremely small industry as well as being new.Of eight licenced factories (Annex K) five were stated to be operational, although other sources of information suggested only two carpet factories were in fact currently producing carpets.

The total licenced capacity for carpets and rugs was 19,429,200 square metres, while the operational licenced capacity amounted to 15,145,200 square metres representing 78% of the total licenced capacity. For comparison purposes it was necessary to convert these figures to a weight basis. In the absence of any positive data these figures for carpets have therefore been converted on the basis of 1.7 kg per square metre.

The operational licenced capacity for carpets and rugs was equivalent to 25,747 tons while the total licenced capacity amounts to 33,030 tons.

In the production of carpets it has been disclosed that apart from wood and jute the following synthetic fibres were used, acrylic, nylon (polyamide), polyester and polypropylene. PP appeared to be used as both carpet-backing and also as part of the carpet tufting.

From the 1985 import statistics (Annex M) some indication of the size of the Saudi market for carpets and textiles containing synthetic fibres can be obtained but it is only in general terms.

Imported carpets (Annex M) containing synthetic fibres amount to 8,998 tons, on the other hand imports of moquette carpets, which are not sub-divided in the import statistics to show whether or not they contain synthetic fibres, amounted to 67,625 tons. There is a very high degree of probability that these moquette carpets all contained some element of synthetic fibres. Taken all together the import of carpets amounted to 76,623 tons.

While it is extremely doubtful if the operational carpet factories have reached their licenced capacity levels, but assuming they have, then the total current market for carpets/rugs amounts to 102,370 tons. This would indicate that the total licenced factories for carpet/rug manufacture represents 32% of the total Saudi market. This is a large sector of market in which to achieve sales for which products are so widely diversified in qualities, designs and types. It would therefore be prudent to refuse any further licences until positive evidence is obtained from the operational factories that they are in fact producing

carpets and selling them effectively. Additonal import protection could be achieved by ensuring that all imported carpets are marked with the country of origin.

It is therefore strongly recommended that (2.9) the Ministry refuses any further licences for the manufacture of carpets, rugs and prayer mats until it has positive evidence from the operational factories that they are in fact producing carpets and selling them effectively. Additonal import protection would be achieved by ensuring that all imported carpets are marked with country of origin.

2 /SYNTHETIC FIBRES FOR CARPETS

The use of synthetic fibres for carpets can either be in mixture with wool for carpet tufting, or as carpet backing. Over the past few years the industry has seen a number of changes taking place in the types of synthetic fibres used. High quality contract carpets generally consist of wool polyamide (nylon) tufting in ratio of 80:20. An alternative to nylon has been acrylic fibres. In lower quality carpets the ratio of synthetic increases and acrylic, polyester and polypropylene fibres have been used. There appears to be no set pattern.

In both cases PP carpet backing could be utilized and this represents another market area for synthetic fibre usage.

Examining the Saudi carpet situation with an operational licenced capacity of 25,747 tons this represents a total potential market for synthetic fibres within the range of 5,149 tons for top range carpets to about 12,000 tons of mixed fibres if the bottom market range is considered and where price is a dominent factor in the fibre selection. It would appear then that the potential market is perhaps about 2,500 tons nylon, 2,000 tons acrylic, 2,000 tons polyester and 2,000 tons PP. This latter fibre would be increased by the amounting carpet-backing based on PP which is used. This might be of the order of 2,000 tons as backing. None of these figures in themselves give any justification for a synthetic fibre production in Saudi Arabia. Additional potential capacity in textiles therefore will need to be examined.

It is interesting to note at this point that a licence has been issued (Annex L) for the production of 15,505 tons of "prepared PET thread" which is understood to mean PET fibres. This item ought to be clarified by the Ministry.

3 /TEXTILES, UPHOLSTRY CLOTHS, ETC.

The Saudi textile industry is very new and therefore of a very small size. Of seven licenced factories (Annex K) two are operational covering silk and cotton cloth, and meshlah cloth (wool). For comparative purposes a very rough conversion of the licenced items to a weight basis has been made. The total licenced capacity is 2,623 tons and the operational capacity equivalent to 105 tons. In additon one factory is licenced for the production of 1,183 tons of cotton yarn, but details were not available as to whether this was being used for weaving into cloth within the factory. This is suspected to be the case since the company is called Saudi Company for weaving. This needs to be clarified by the Ministry.

Imports of woven fabrics of man-made and/or synthetic fibres are listed in the import statistics (Annex M) as 17,068 tons. However, imports of fabric with mixed fibres such as cotton and polyester are not detailed. It should be assumed therefore that the imports of fabrics entaining synthetic fibres are at a higher level than those indicated above.

It is evident even from the limited import information that there is still plenty of potential for manufacture of textiles within the Kingdom. However, it is an internationally established fact that low cost labour and low cost machinery have produced a large volume of textiles which fill the bottom and middle section of the world textile market. Much of this comes from developing countries particularly East Asia. Many of the exports achieved additional added value through being exported in the form of ready-made clothes. In an attempt to prevent an uncontrolled flood of these goods to industrialised countries the MFA - Multi-Fibre Agreement - was negotiated and is currently scheduled for re-negotiation.

Even with modern high technology textile equipment it is difficult to compete with such imported fabrics. Within the Kingdom the higher cost of labour would be a negative factor. Production of textiles within the Kindgom would therefore be expected to concentrate on the higher quality level of the market. There appears to be no information available on the size of this part of the market.

It was interesting to note that AIDO have initiated, through SCH a detailed survey on textiles within the Arab world. Once this study becomes available it should provide appropriate data for improved forward planning of the Saudi textile industry.

4 /SYNTHETIC FIBRES FOR TEXTILES

There is currently a shortage of data on which projection could be made for the potential usage of synthetic fibres in textiles to be manufactured in the Kingdom. However, the textile survey initiated by AIDO will hopefully provide some useful information when completed. In the meantime some indication of possible size of market could be judged from a preliminary study on "manufacturing polyester/cotton fabrics in Saudi Arabia" undertaken in 1974 by the ISDC which is now superseeded by SCH. This sets out the various types of cloth required for thobes (the white traditional chess of the Saudis) on the basis of 20 million yards of cloth per year. By using data within the study it is possible to make a projection forward to 1985. This indicates this would require 1,442 tons of PET synthetic fibre.

A minimum-sized plant for synthetic fibre production of PET fibres is 8,000 tons, and 12,000 tons/year would have better economic prospects. Unfortunately the Saudi petrochemical industry produced only one of the two precursor chemicals required to make PET and that is ethylene-glycol which represents about one third of the finished polymer product. The main chemical is PTA which is derived from para-xylene, which in turn is an aromatic based chemical. Again, without an aromatic based source within the Kingdom, or within GCC this presents production restrictions. There are alternative import possibilities but these would require very careful economic consideration since PET usage depends on comparative costs of other synthetic fibres.

It would appear that if a PET synthetic fibre production were to be established within the Kingdom a large portion of the output would need to be export oriented.

A short note on recent trends in the portential use of synthetic fibres in developing countries, particularly in hot climate areas, has been prepared (Annex N). This indicates an increasing trend towards the use of PP fibres mixed with cotton and this is an area of increasing growth.

The small size of indicated potential demand for synthetic fibres within the Kingdom at the present time would suggest that this is perhaps a subject area which should be examined within the context of a larger market area, such as GCC. It is <u>therefore strongly recommended that</u> (3.0) the Ministry should consider to make a request of the GCC to examine the market potential for synthetic fibres in carpet and textile production with a view to determining whether a production of synthetic fibres can be justified economically within the GCC.

F. COUNTERPART TRAINING

The two counterparts, Mr. Mohammed Ahmedseed and Mr. Hassan Munif have both had an opportunity to learn about the plastics industry during the course of this mission. Both have shown a very keen interest in the subject and it is evident that they would substantially benefit from further training.

Since Mr. Ahmedseed has taken an interest in the idea of a Plastics Technology Centre and has asked many questions on what does it do and how does it work, as well as being involved in Ministry of Industry discussions at SANCST it would be appropriate for him to undertake a study tour for one month in Europe to visit selected Plastics Research Institutes and Organisations in Europe (Austria, France, Germany, Holland, Spain and the United Kingdom) and to visit the Plastics Development Centre in Alexandria, Egypt on the return journey. Such a tour could be organised through UNIDO which has established contacts with the institutions. It would also be appropriate for a member of SANCST to be nominated to undertake this study tour.

UNIDO organises a plastics training programme undertaken by LKT in Vienna, generally about October/November period each year for six/seven weeks. It is aimed primarily at graduate level (or equivalent) personnel form developing countries and limited to 10 persons. It is a broad-based syllabus and serves to cover a wide range of plastics. It is suggested that such a training programme would benefit both counterparts one in 1986 and one in 1987, since both can not be away at the same time.

It is therefore strongly recommended that (3.1a) Mr. Ahmedseed, together with a member of SANCST, should undertake a one month study tour to European Plastics Research Institutions and Technology Centres, and to visit the Plastics Development Centre in Alexandria, Egypt on the return journey.

Additonally, it is further strongly recommended that (3.1b) Mr. M. Ahmedseed and Mr. H. Munif should attend the plastics training course organised by UNIDO at LKT in Vienna normally for a period of six weeks starting October/November period. Mr. Ahmedseed in the first year and Mr. Munif in the second year.

Arrangements both for organisation of the study tour and for the training programme can be made through UNIDO upon Government request.

G. ACKNOWLEDGEMENTS

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Personal thanks are also expressed to my counterparts Mr. Mohammed Ahmedseed and Mr. Hassan Munif who have shown much enthusiasm and enquiring minds to the work of this project as well as undertaking the work load of arranging and accompanying me on the necessary visits. Thanks are also expressed to all those members of the licencing Department who have rendered assistance in various forms during the course of this mission.

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Finally, thanks are expressed to Mr. R. Withana and Mr. S. Guindy UNIDO experts, and to Mr. M. Gillibrand, Arthur D. Little,international consultants at the Ministry of Industry for all their kind and personal help.

ANNEX A

CONFIDENTIAL INFORMATION

Restricted circulation

Individual report of companies visited

in Dammam, Jeddah and Riyadh

Details only on restricted circulation list

ANNEX B

The distribution of companies by the number of workers employed
(including both licenced companies and operational companies)

Number of workers Range	Licenced companies Number	Percentage	Operating companies Number	Percentage
up to 25	129	41.1	47	42.3
26 to 50	130	41.4	34	30.6
51 to 75	28	8.9	10	9.0
76 to 100	15	4.8	12	10.8
101 to 150	7	2.2	7	6.3
151 to 200	3	0.9	1	0.9
more than 200	2	0.6	-	-
TOTAL	314	-	111	-

NOTE

Of the operating companies 82.9% have 75 workers or less
Of the operating companies 7.2% have more than 100 workers
Of the total licenced companies 91.4% will have 75 workers or less
Of the total licenced companies 3.7% will have more than 100 workers

ANNEX C

Location of factories (up to third quarter 1985)

	Number of factories			
	Licenced	%	operating	%
Riyadh	108	34.3	28	25.2
Jeddah	75	23.8	40	36.0
Damman	42	13.4	15	13.5
Jubail	10	3.3	2	1.8
Buraidah	7	2.3	3	2.7
Makka	9	2.9	5	4.5
Medinah	8	2.6	2	1.8
Al Masse-Hofuj	6	2.0	3	2.7
Abha	5	1.7	1	0.9
Arar	2	0.6	-	-
Tabouk	6	2.0	3	2.7
Biljuchi	2	0.6	1	0.9
Alkobar	4	1.3	3	2.7
Khamis	2	0.6	-	-
Ar Rass	1	0.3	-	-
Rabegh	2	0.6	1	0.9
Hail	5	1.7	-	-
Taij	5	1.7	2	1.8
Yambo	5	1.7	1	0.9
Hafr-Albatin	2	0.6	1	0.9
Al Jouf	1	0.3	-	-
Aba Arish	1	0.3	1	0.9
Bisha	1	0.3	-	-
Jazan	1	0.3	-	-
Najron	1	0.3	-	-
Rahimah	1	0.3	-	-
Sabya	1	0.3	-	-
Saihat	1	0.3	-	-
Torbat	1	0.3	-	-
Total number of companies	314	-	111	-

1. 35.3% of the licenced units have reached operational status

2. The licenced units cover 29 different locations in the Kingdom

3. The operational units cover 16 different locations in the Kingdom

4. 74.7% of the operational units are located within the three cities of Riyadh, Jeddah and Damman

ANNEX D

Summary of Product Quantity Licenced by Applications

Applications	Product Quantity Licenced			
	All Factories		Operational Factories	
	Units plus tonnes		Units plus Tonnes	
I General Purpose	8 products	119,267	4 Products	31,378
II Agriculture and Horticulture	5 products	7,581	2 products	3,300
III Building and Construction	32 products	177,291	21 products	109,834
IV Electrical, electronic and telecommunications	9 products	19,183	1 products	9,343
V Furniture	4 products	7,127	2 products	4,234
VI Medical	12 products	-	1 product	-
VII Packaging	3 products	91,811	2 products	35,931
VIII Transport	2 products	12,220	2 products	-
IX Safety and Security	7 products	-	-	-
GRAND TOTAL	82 products	434,480	35 products	194,020

KEY NOTES FOR ANNEX D

LD.PE	Low Density Polyethylene
HD.PE	High density polyethylene
PP	Polypropylene
PS	Polystyrene
EPS	Expanded polystyrene
PU	Polyurethane
PVC	Polyvinylchloride
GRP	Glass reinforced plastics
M	Million
sm	Square metre
ha	hectare
l	litre

The data analyzed include information up to the end of the third quarter 1985 (end of September 1985). The source of information is from the List of Licenced Factories and Industrial Licences issued under the National Industries Protection and Encouragement Law and Foreign Capital Investment Law during the years 1982, 1983, 1984 and 1985 (Years 1402, 1403, 1404 and 1405H) issued by the ministry of Industry and Electricity, Industrial Affairs Agency Statistics Section. The operational status of factories was obtained from the Licencing Department.

The quantity of some of the items licenced for production has been listed not by tonnage but by area or number of items. Where possible these have been calculated to an estimated weight, however, for many of the items this has not been possible. In calculating the amount of licenced capacity this has been set out by weight plus the number of products for which a weight has not been defined. The total weight quoted is therefore always under-estimated by the unknown weight of these products.

I. PRODUCT APPLICATION	PLASTIC QUANTITY LICENCED			
	All Factories		Operational Factories	
I. GENERAL PURPOSE	Units	Tonnes	Units	Tonnes
1. Household and domestic				
1.1 Household and domestic wares	-	80,736	-	5,007
1.2 Melamine tableware	-	3,337	-	944
1.3 Plastic mats	-	860	-	-
1.4 Disposable lighters	5 M	-	-	-
1.5 Luggage	271,125	-	178,000	-
1.6 Balloons and play-balls	-	250	-	250
1.7 Miscellaneous products	-	817	-	817
1.8 TOTAL	2 prod.	86,000	1 product	7,018
2. Synthetic Foam (sponge)				
2.1 PU sponge	-	7,920	-	7,370
2.2 TOTAL	-	7,920	-	7,370
3. Ropes and thread				
3.1 Rope (nylon)	-	882	-	482
3.2 TOTAL	-	882	-	482
4. Sheet and sheeting				
4.1 Leathercloth (PVC)	-	2,250	-	375
4.2 Plastics sheets	-	396	-	396
4.3 Sign-boards	3,000 sm	550	-	-
4.4 Synthetic grass	250,000 sm	-	-	-
4.5 TOTAL	2 prod.	3,196	-	771
5. Footwear				
5.1 Plastic shoes and slippers	2,192 M pair	100	150,000 pair	100
5.2 Soles and heels (PU)	-	300	-	-
5.3 TOTAL	1 prod.	400	1 prod.	100
6. Flexible hose				
6.1 Plastic hose (PVC)	-	1,077	-	297
6.2 Reinforced hose	-	2,168	-	1,208
6.3 Suction hose	-	514	-	514
6.4 TOTAL	-	3,759	-	2,019

I. PRODUCT APPLICATION	PLASTIC/QUANTITY LICENCED			
	All Factories		Operational Factories	
I. GENERAL PURPOSE (cont'd)	Units	Tonnes	Units	Tonnes
7. Office supplies				
7.1 Files	153,900	100	130,000	100
7.2 Office sets	8,640	-	-	-
7.3 Stationery items	1,95 M	-	1,95 M	-
7.4 TOTAL	3 prod.	100	2 prod.	100
8. Miscellaneous				
8.1 General purpose and industrial items not sub-divided	-	9,332	-	6,150
8.2 GRP items not sub-divided	-	1,978	-	1,668
8.3 Blow-moulded items not specified	-	5,700	-	5,700
8.4 TOTAL	-	17,010	-	13,518
9. TOTAL General Purpose Applications	8 prod.	119,267	4 prod.	31,378

I. PRODUCT APPLICATION	PLASTIC/QUANTITY LICENCED			
	All Factories		Operational Factories	
II.AGRICULTURE AND HORTICULTURE	Units	Tonnes	Units	Tonnes
1. Dairy utensils	-	700	-	700
2. Greenhouses with GRP or PE covers	108.5 ha	-	-	-
3. Irrigation pipe and acessories	-	5,216	-	2,000
4. Silos	600	-	600	-
5. Live-stock cages (chickens etc.)	-	160	-	-
6. Flowerbed -GRP	500	30	-	-
7. Flowerpots	-	475	-	-
8. Plant basins	100	-	-	-
9. Plant pots -GRP	4,100	-	4,100	-
10. Sheep mangers and water wheels	-	400		-
11. Decorative items for garden -GRP	-	600	-	600
12. TOTAL	5 prod.	7,581	2 prod.	3,300

I. PRODUCT APPLICATION	PLASTIC/QUANTITY LICENCED			
	All Factories		Operational Factories	
III.BUILDING AND CONSTRUCTION	Units	Tonnes	Units	Tonnes
1. Thermal insulation panels (and tiles)	3,18 Msm	2,936	2,126 M sm	167
2. GRP and EPS boards and panels	809,510 sm	2,710	10,000 sm	-
3. GRP panels and coated boards	10,000 sm	370	10,000 sm	-
4. PU boards for thermal insulation	4,375 Msm	470	4,21 Msm	470
5. Boards/panels of mixed components	1,579 Msm	5,750	-	-
6. Synthetic wood sheets -PS	-	3,000	-	-
7. Boards-acrylic	-	518	-	-
8. Temporary and mobile walls	-	500	-	-
9. Rigid sheets	40,000 sm	660	-	396
10. Doors -GRP	7,000 sm	562	7,000 sm	-
11. Doors	28,500 sm	500	-	500
12. Rolling doors	-	312	-	-
13. Plastics windows (and doors)	-	3,135	-	500
14. Flexible gaskets for windows	-	437	-	437
15. Decorative fittings	36,000 sm	3,000	-	3,000
16. Decorative tiles -GRP	8,250 sm	-	8,250 sm	-
17. Wall tiles	-	265	-	265
18. Ceiling tiles	25,000 sm	-	25,000 sm	-
19. Suspended ceilings	176,000 sm	375	90,000 sm	-
20. Wall covering rolls	10,000 sm	-	10,000 sm	-
21. Vinyl tiles	1,25 Msm	-	1,25 Msm	-
22. Roofing laminates (roof lining)	-	2,500	-	-
23. Laminates for floor tiles, wall covering etc.	6,5 Msm	-	-	-
24. PVC profiles	-	130	-	130
25. Pipes (polymer type not specif.)	-	75,047	-	74,651
26. Pipes - PVC	-	24,720	-	12,000
27. Pipes -HDPE	-	14,400	-	3,200
28. Pipes - GRP	-	12,650	-	4,155
29. Pipe lining	500 km	-	500 km	-
30. Pipe fittings (polymer type not specified)	330,000	9,797	330,000	3,320
31. Pipe fittings -GRP	20,000	460	20,000	460
32. Pipe fittings -PVC	-	450	-	450
33. Drain(sewer) fittings	170,000	-	-	-
34. Pipe holders	-	520	-	520
35. Sanitary wares -GRP	-	-	-	-
36. Sanitary wares -acrylic	4,720	1,180	4,720	150
37. Wash basins -GRP	3,100	-	3,000	,-
38. Baths -GRP	6,900	337	4,500	337
39. Bathroom units	800	-	800	-

I. PRODUCT APPLICATION	PLASTIC/QUANTITY LICENCED			
	All Factories		Operational Factories	
III.BUILDING AND CONSTRUCTION	Units	Tonnes	Units	Tonnes
40. Tanks -PE	-	270	-	-
41. Tanks -GRP 2,000 l	5,700	-	-	-
42. 3,000 l	2,000	-	2,000	-
43. 3,500 l	1,000	-	-	-
44. 5,000 l	3,200	-	-	-
45. 8,000 l	600	-	-	-
46. Tanks - unspecified size	53,000	-	20,000	-
48. Buildings insulation - PU -on site	-	1,560	-	726
48. Poles-GRP (for overhead wires)	-	2,420	-	1,000
49. Fences -GRP	-	3,000	-	3,000
50. Chalets, guard-huts and kiosks -GRP	1,420	-	1,420	-
51. Prefab. houses, caravans, cabins -GRP	1,120	-	1,120	-
52. Residential units -PS	400	-	-	-
53. Construction items - not sub-divided	-	2,350	-	-
54. TOTAL	32 prod.	177,291	21 prod.	109,834

I. PRODUCT APPLICATION	PLASTIC/QUANTITY LICENCED			
IV. ELECTRICAL, ELECTRONICS AND TELECOMMUNICATIONS	All Factories		Operational Factories	
	Units	Tonnes	Units	Tonnes
1. Conduit (pipe for wiring)	-	13,217	-	8,126
2. Conduit - PVC	-	3,239	-	-
3. Facier panels for air conditioners	-	320	-	320
4. Front frame for desert coolers	5,000	-	-	-
5. Air distributor for desert cooler	25,000	-	-	-
6. Electrical fuses	-	20	-	20
7. Electrical switches	-	38	-	38
8. Cable and telephone joints/ accessories	210,000	-	-	-
9. Covers for aluminum plugs	-	29	-	29
10. Electrical boards	7,500 sm	-	-	-
11. Distribution and connection boxes - electrical	2.5 M	-	-	-
12. Boxes for electrical equipment small	-	800	-	-
13. Boxes for electrical equipment large	-	300	-	-
14. Electrical phone parts for wiring	2.6 M	410	-	-
15. Electric meter boxes	-	800	-	800
16. Electrical covers -GRP	20,000	-	20,000	-
17. Sound recording tape casettes	20 M	-	-	-
18. Video recording tape-casettes	6 M	-	-	-
19. TOTAL	9 prod.	19,183	1 pro.	9,343

I. PRODUCT APPLICATION	PLASTIC/QUANTITY LICENCED			
	All Factories		Operational Factories	
V. FURNITURE AND ACCESSORIES	Units	Tonnes	Units	Tonnes
1. Flat tops-for tables	7,000 sm	-	7,000 sm	-
2. Chairs	12,500	-	-	-
3. Sofas	1,200	-	-	-
4. Cabinets, fittings, etc.	-	5,424	-	2,724
5. Chairs, sofas, kitchen units, seats tables - GRP	111,800	803	27,800	540
6. Mattresses -PU foam	-	930	-	930
7. Pillows -PU foam	-	40	-	40
8. TOTAL	4 prod.	7,127	2 prod.	4,234

I. PRODUCT APPLICATION	PLASTIC/QUANTITY LICENCED			
	All Factories		Operational Factories	
VI. MEDICAL	Units	Tonnes	Units	Tonnes
1. Disposal syringes	60 M	-	30 M	-
2. Plates	3 M	-	-	-
3. Special containers	1.16 M	-	-	-
4. Testing Tubes	0.05 M	-	-	-
5. Catheters	1.0 M	-	-	-
6. Injection regulators	0.5 M	-	-	-
7. Urine bags	0.2 M	-	-	-
8. Plastic gloves	2.5 M	-	-	-
9. Suckers	0.5 M	-	-	-
10. Stop-cocks	2.0 M	-	-	-
11. Cups (for blood)	0.5 M	-	-	-
12. Adhesive tape	1.0 sm	-	-	-
13. TOTAL	12 prod.	-	1 prod	-

I. PRODUCT APPLICATION	PLASTIC/QUANTITY LICENCED			
	All Factories		Operational Factories	
VII. PACKAGING	Units	Tonnes	Units	Tonnes
1. Plastic bottles	-	824	-	373
2. Plastic bottles -polyester	-	8,100	-	-
3. Plastic bottles (220M)	-	11,000	-	-
4. Plastic containers for drinks (55M)	-	2,000	-	-
5. Vegetable boxes (crates)	-	4,962	-	2,279
6. Containers -EPS	70,000	-	-	-
7. Plastic containers	-	5,880	-	3,739
8. Jerri-cans (20-25 litre)	-	451	-	156
9. Plastic bags -LDPE and HDPE	-	28,963	-	13,524
10. Plastic bags -HDPE	-	4,100	-	2,391
11. Plastic cups and covers for ice-cream	31,232 M	-	14,976 M	-
12. Netting bags -PP	-	500	-	-
13. Woven sacks -PP	-	8,523	-	8,523
14. Heavy duty bags (sacks) LDPE	-	6,400	-	-
15. Plastic film	-	1,300	-	1,300
16. Barrels (drums) -HDPE	-	6,487	-	3,137
17. Garbage bins (30 + 90 litre)	8,082	1,156	2,000	500
18. TOTAL	3 prod.	91,811	2 prod.	35,931

I. PRODUCT APPLICATION	PLASTIC/QUANTITY LICENCED			
VIII. TRANSPORT AND ASSOCIATED ITEMS	All Factories		Operational Factories	
	Units	Tonnes	Units	Tonnes
1. Pallets (plastic platforms)	-	8,860	-	-
2. Boats, yachts -GRP	300	1,760	300	-
3. Vehicle bodies and cabins -GRP	-	1,600	-	-
4. Vehicle seats	1,2 M	-	1,2 M	-
5. TOTAL	2 prod.	12,200	2 prod.	-

I. PRODUCT APPLICATION	PLASTIC/QUANTITY LICENCED			
	All Factories		Operational Factories	
IX. SAFETY AND SECURITY	Units	Tonnes	Units	Tonnes
1. Hard helmets	0,2 M	-	-	-
2. Welding helmets	0,26 M	-	-	-
3. Protective masks	27,000	-	-	-
4. Protective spectacles	40,000	-	-	-
5. Masks	27,000	-	-	-
6. Aprons	0,26 M	-	-	-
7. Protective glasses	1,04 M	-	-	-
8. TOTAL	7 products	-	-	-

ANNEX E

Imports of plastic products
(source: Import Statistics:Ministry of Finance and National Economy)

Chapter Code	Product	Tonnes 1982	1983	1984
3907-0100	Bags and sacks	8,823	9,273	11,941
0200	Home + kitchen appliances	11,374	10,635	10,295
0300	Baby bottles + ash trays	3,398	5,108	4,976
0401	beads	313	307	669
0402	necklaces, jewellery	249	139	166
0500	electrical accessoiries (switches etc.)	546	559	433
0600	medical products	3,450	4,585	5,152
0700	flooring, wall panels	2,205	2,287	1,620
0800	fixtures for walls	1,158	1,019	941
0900	clothing	108	85	48
1000	suitcase accessories	193	116	163
1100	rope/twine	310	197	428
1200	film for covering/ packaging	4,919	3,871	4,719
1300	files, stationary items	1,081	1,362	1,334
1400	decorating for the home	773	610	1,084
1500	conveyors	115	107	91
1600	-	-	-	-
1700	products for equipment transmission	141	101	86
1800	products for industrial and agricultural equipment	704	892	580
1900	medical, pharmaceutical products	576	704	925
2000	PVC pipe	31,225	35,817	22,515
2100	Manual fans	-	2,068	587
2200	Cores for reels of film	-	98	27
2300	Other products (not specified above).	19,247	16,960	13,945
	TOTALS:	90,908	96,899	82,698

ANNEX F

FACTORIES VISITED AND RELATED DATA

Licence No	Name of Company	Product type		Raw material (tons)		Workers	
		licenced	produced	licenced	actual	licenced	actual
300,123	Saudi Plastics Products SAPCO	PVC pipes	yes	38,000	12,000		292
257,200						600	
201,		PVC board	subsidary co.	470	these companies		
278/1401		EPS boards	subsidary co.	4,200	not visited		
123/96	Arabian Plastics Manufacturing	pipe fittings	yes	1,800	1,200	181	150
256/1403	APLACO	pipes	no	450	NIL	-	-
253,166	Ideal Melamine Factory for households	tablewares + toilet covers	yes	328	250	48	18
391		electric switches,fuses toilet covers plug covers	no cancelled	237	NIL	-	-
51,358,94	OM Saudi Plastics Factory	Containers + household items etc.	yes	2,259	1,106	92	98
204, 49, 28	National Plastics Factory	household appliances + containers not licenced	yes construction industry items	1,260	1,000	17	120

Licence No	Name of Company	Product type		Raw material (tons)		Workers	
		licenced	produced	licenced	actual	licenced	actual
46,221 26,154 173/1403	Riyadh Plastics Factory (Al-Hukair Industrial Co)	Jericans, buckets home utensils vegetable boxes not licenced not licenced	yes yes yes Plastic bags Agricultural film	1,500 -	2,000 1,500	12	80
399	Saudi Polystyrene Plant	EPS insulation boards	yes	200	100	24	6
40,51	Aba Nami Industrial Establishm. sponge factory	PV sponge	yes	1,950	390	28	42
139,426	Pipes and electrical fixtures factory	Plastics pipe for wiring + fixtures	yes	115	325	15	13
164	Al-Akhawian Plastics Materials Factory	"Nylon" bags printed + plain	yes	340	1,400	20	35
49,110 372	New Product Industries - NEPRO National Factory for Plastic Pipes	Pipes for water and sewage Plastics sheets	yes no	15,000 396	10,000 NIL	99	150

Licence No	Name of Company	Product type		Raw material (tons)		Workers	
		licenced	produced	licenced	actual	licenced	actual
41	Red Sea Plastic Factory	PE film + bags	yes	220	2,000	12	55
207,162	Al Amal for Plastics	Plastic bags	yes	525	2,000		
30		Ropes and thread	no	192		63	35
		artificial leather	no	-			
358,425	AREFCO Plastics Facotry	plastic pipes	yes	1,354	3,000		
85		pipe fittings	yes	620	160	41	90
		cups+containers	yes	300	370		
66	Saudi Fibreglass Factory	GRP water tanks	yes	not	not known		
		huts, yachts	as required	stated		46	27
		wash basins	as required				

Licence No.	Name of Company	Product Type		Raw material (tons)		Workers	
		Licenced	produced	licenced	actual	licenced	actual
9 65 70	Al Shefa Medical Syringe Mfg Co Ltd	Disposable syringes (2,2.5 and 5 ml sizes)	yes	not specified by weight 30 million units	120 28 million units	38	60
74	Saudi Polypropylene Sack Factory (Damman)	Woven plastics sacks Lined woven plastics sacks	yes yes	- 12 million sacks	3,400 tons 14 million sacks	100	140
146 188	Al-Babtain Polyurethane Company	1. sprayed foam (thermal insulation 2. PV chairs and setees 3. Soles and heels	yes separate company operation no-cancelled	100 1,500 300	2,500 - -	92 - -	140 - -
420	Al Wafa Plastic Bags	LDPE Bags HDPE Bags	yes yes	1,440	1,000	33	49

Licence No.	Name of Company	Product type		Raw material (tons)		Workers	
		Licenced	produced	licenced	actual	licenced	actual
28	Al Zam'l Plastics Factory	Domestic wares	Yes				
82		Dairy	Yes				
224		Profiles	Yes				
52		AC facin panels	Yes				
105		Bottles	Yes	2,415	1,500	84	127
381		Pipe holders	Yes				
404		EPS containers	Yes				
365		Thermoformed containers					
142	A. Fouad and A. Busbate	Electrical conduit pipe	yes	4,050	6,000	203	120
47	Co Ltd						
115	Plastics Factory	Water and sewerage pipe					
324		Pipe fittings					
416		Dippers for irrigation					
473		Rigid Sheets for greenhouses	No	2,000	-	-	-
		Solar systems heater	No	1,920	-	-	-
		Fittings for conduit	yes	900	-	-	-
		Plastic cartons	no	4,500	-	-	-
		Helmets	no	200	-	-	-
		Petri dishes	No	98 (4-8 m pipes)		-	-

Annex H

Rubber Processing Factories licenced

Ref. No.	Status	Company	Products	Licenced Capacity	No. of workers	Licence No.	Year
1	NOP	Saudi Belts Factory P.O. Box 2956 Riyadh Tel. 81882	Rubber conveyor belt for mechanical moving	1 million units	61	45 NOP	1402(1982)
2	NOP	Ibn Ayedh Factory for Foldable Rubber Tanks, P.O. Box 9732 Riyadh, Tel. 2312873	Rubber tanks	10,800 tanks	31	168 NOP	1402
3	NOP	Saudi Factory for Rubber Gloves for house and industrial purposes P.O. Box 984, Riyadh Tel. 402440	Rubber and industrial gloves	2 million pairs (household) 1 million pairs (industrial)	31	356/1401	1401
4	OP	Al Sahnty Est. for Manufacturing rubber sandals P.O. Box 2071, Medinah Road K7 Jeddah Tel. 54931	Rubber sandals (and plastic products)	0.5 million (750 tons)	39	194/1396 8 328/1403	100% Jordanian
5	OP	Industrial Establishment for Braiding Industry P.O. Box 422 Medinah	Rubber tapes shoes	58 tons	12	3/1386	
6	OP	Aminantit Rubber Manufacturing Co. Ltd P.O. Box 589 Damman Tel. 8571160	Rubber rings for pipes	450 tons	69	50 39 45 354/1402	20% Indian 1402

Annex G

Manufacturing tyres and tubes of Rubber

Ref. No.	Status	Company	Products	Licenced Capacity	No. of workers	Licence No.	Year
1.	NOP	Arab Factory for Tyres Renewing, P.O. Box 106 Riyadh, tel. 4789370	Tyre renewing and recapping for aircraft	10,200 tyres	47	95	1400 (1980)
2.	OP	Tyres recapping and renewing factory, P.O. Box 2726, Riyadh Tel. 39356	Tyres (re-capping) (production stopped)	28,800 units	25	263	1397 (1977)
3.	OP	Saudi Arabian Company Bandaj, P.O. Box 6478 Jeddah, Tel. 6445475	Recapping of rubber tyres (just managing)	13,200 tyres	21	176	1394 (1974) 20% USA 20% Pakistani
4.	OP	International Arabian Company for Tyres Re-capping, P.O. Box 441 Damman, Tel. 8337439	Renewing and recapping of tyres for heavy equipment	11,400 tyres	16	68 231	1396 (1976)

Code: OP = operational
NOP = non-operational

Note: For tyre re-moulds (recapping) 3 companies are operational out of 4 licenced.

Annex H

Rubber Processing Factories licenced

Ref. No.	Status	Company	Products	Licenced Capacity	No. of workers	Licence No.	Year
7	NOP	Fahd Al-Sudairy Industrial Establishm. P.O. box 2836 Damman Tel. 24663	Rubber laces for money (boxes) Nipples, Suckers (+other non-rubber items)	3 millllion boxes 1.8 million 42,000	47	72	1399
8	NOP	Al-Suhaimy Factory for Rubber moulding P.O. Box 161 Damman	rubber spare parts for vertical pumps	220 tons	26	142	1402
9	NOP	Saudi Company for Artificial Rubber Prod. P.O. box 3930 Riyadh	Rubber for covering playground floors	3,000 tons	20	15	1403 (1983) 49% Dutch
10	NOP	Zamel Schligel Co Ltd P.O. Box 19 Dammam/Khober	Anti-leakage of multi-adherence Peging-Rich anit-leakage "Mastic for window sealings"	7.376 million metres 0.384 million metres	13	32	1404 (1984) 50% Bermuda
11	NOP	Brothers Commercial Co. Rubber Squares Factory P.O. Box 5604 Jeddah Tel.:6606925	Rubber spares extracted from waste tyres	8,300 tons	52	138	1405 (1985)

Code: OP - operational
NOP - not - operational

NOTE: for rubber goods (rubber products) 4 companies are operational of the total 11 licenced.

ANNEX I

Imports of rubber and rubber goods

(Source: Import Statistics: Ministry of Finance and Natural Resources)

Chapter	Code	Product	Year 1985 (amount in tons)
4001	000	Natural rubber latex	312
4002	000	Rubber compound latex	243
4004	0000	Products and waste of soft rubber (non-rigid)	183
4005	0100	Panels and sheets, tapes of unvulcanized rubber	745
	0200	Other types of unvulcanised rubber compounds	2,208
4006	000	Solution and latex and pipes from unvulcanised rubber	185
4007	0100	thread and rope of unvulcanised rubber	81
	0201	as above cooked with cotton textile	20
	0202	as above with textile	35
	0300	Textile thread covered with vulcanised rubber	99
4008	0100	for sponge or cellulosic material	935
	0200	Plates, sheet and tapes for tyres	1,343
4009	0100	Pipes of non-rigid rubber for transport equipment	944
	0200	other pipes of non-rigid rubber	5,762
4010	0000	Belts and conveyors	1,662
4011	0100	Hollow and semi-hollow rings	442
	0200	External tyres	115,652
	0300	Inner tubes	9,600
	0400	Belts and tapes for tyres	649
4012	0100	Gloves, Bags for oxygen of rubber	83
	0200	Dummies (for babies)	230
	0300	other catagories of rubber for health and pharmaceutical uses	50
4013	0101	Divers and Fireman's dress made of rubber	77
	0102	Protective dress for surgeons and radiography technicians	45
	0103	Rubber belts	82
	0105	Other rubber belts	55
	0201	Gloves for firemen	15
	0202	Medical gloves for surgery	330
	0203	Gloves for other uses	271
	0300	Other rubber accessories for garments	101
4014	0100	Other rubber types for transport equipment	141
	0200	Accessories for tyres and pneumatic tube repair	476
	0300	Bathroom accessories	380
	0400	Rubber letters and numbers	128
	0500	Joint covers, rings, discs, in rubber	1,292
	0600	Rubber mattresses and pillows	194
	0700	Rubber containers	179
	0800	Other types of non-hard rubber	726
4015	0100	Powders, waste and disposables of non-hard rubber	44
	0200	Sheets and bars of hard rubber	345
4016	0200	Sanitary articles for bathrooms	224
	0300	Closure caps and rubber containers	38
	0400	Other types of hard rubber suitable for transport equipment	31
	0500	Other types of hard rubber	473
		TOTAL	147,110

ANNEX J

Import of motor vehicles

(Source: Input statistics : Ministry of Finance and National Economcy)

Chapter	Code	Products	1985
8702	0102	Private motor vehicles, taxis	105,199
	0103	Tourist motor vehicles with less than nine seats	23,000
	0201	Large Trucks	4,590
	0203	Small trucks (pick-up) one or two cabins	101,700
			234,489

Empirial dates re rubber in tyres

Type of Tyre	Rubber content	Total weight of tyre
Passenger car (textile radial)	2.5 kg	7.0 kg
(steel radial)	2.5 kg	6.25 kg
cross-ply	2.5 kg	6.5 kg
Heavy truck tyres	20.0 kg	40.0 kg

Ratio of natural rubber is higher in truck tyres.

Annex K

Weaving factories licenced for manufacture of carpets/rugs and textile cloth/fabrics

Licence No.	Status	Name of Company	Product type	Quantity	No of workers
68 33/1404 146 28/4/98	OP	National Carpet Factory P.O. Box 5444 Jeddah	Carpets	530,800 4,911,200	182
25 26/1/96	OP	Saudi Arabian Carpet Factory P.O. box 2371 Jeddah	Rayer mats	660,200	249
44 401	OP	Madina Factory for Prayer Mats and Textiles, P.O. Box 159 Medinah	Arabian carpets	85,000	44
38/1401	OP	National Saudi Factory for Carpets P.O. Box 159 Medinah	Prayer mats	1,428,000	75
330/1404	OP	Saudi Carpet Factory P.O. Box 859 Riydah	Carpets: Rayer mats: Rugs	6,250,000 640,000 640,000	96
343 217/1398	OP	Nakali + Sawass Co for Textile Manufactures (National Textile Factory) Mansour St. Makhah	Silk and cotton cloth	30,000 linear metres	8
85/1398	OP	Saudi company for weaving, P.O. Box 8384, Jeddah	cotton yarn	1,183 tonnes	291
805/1383	OP	National Textile Company, P.O. Box 1748 Al-Hasa, Hafouf	Meshlah cloth (wool) and made-up garments	33,000 garments	18
124 27/3	NOP	Saudi Blankets Factory, P.O. 142, Riyadh	Blankets (various)	1,000,000 blankets	86
196 26/5	NOP	Modern Carpet Factory, P.O. Box 1198 Damman	Floor carpets (fitted)	200,000	41

Licence No.	Status	Name of Company	Product type	Quantity	No of workers
222 8/6	NOP	Al-Mira Carpet Factory P.O. Box 2120 Damman	fitted carpets	1,200,000	36
509 30/12	NOP	Al Bahes Carpet Factory P.O. Box 2308 Riyadh	Moquette Carpets	2,500,000 384,000	61
133 10/4	NOP	Al Fahaid Fabric Factory P.O. Box 179 Hassa	White fabrics Coloured fabrics Coloured printed fabrics	approx. 250 t approx. 125 t approx. 125 t	73
296 29/6/1401	NOP	Saudi Textile Factory P.O. Box 3468 Jeddah	Fabrics and upholstery cloth	990,000	33
233 22/6/1401	NOP	Al-Ettafak Co for Manufacturing silk and cotton cloth P.O. Box 159 Medinah	Calico textiles	200,000	28

Code: OP = operational
NOP = not operational

Note: For carpet and rugs: five companies are operational of the total 8 licenced
For textile cloth/fabrics: three companies are operational of the total 7 licenced.

ANNEX L

Factories licenced for manufacture of synthetic fibres

Licence No.	Status	Name of Company	Product Type	Quantity	No of workers
395 14/9/1400	NOP	Arabian Company for Manufacturing Fibres and Polyester threads P.O. Box 10569 Riyadh Tel. 477 5890	Prepared PET threads	15,505 tons	
93 11/3/1401	NOP		PET Bottles	4,400 tons	159
			PET Films	2,000 tons	
			PET Thin plates	2,000 tons	

Code: NOP - Not operational

ANNEX M

Imports of textile goods containing synthetic fibres

(including carpets, blankets and woven synthetic fabrics)

(Source: Import statistics: Ministry of Finance and Natural Resources)

Chapter	Code	Product	Year 1985 (in tons)
6201	0300	Blankets and belts from synthetic and mixed fibres	7,786
5801	0200	Carpets with synthetic fibres -hand woven	637
5802	0221	Moquette carpet	67,625
	0223	Carpets of synthetic fibres	8,361
5104	0102	Woven fabrics of man-made fibres, of of synthetic fibres printed or artistically worked.	17,068

ANNEX N

Synthetic Fibres in developing countries - Recent trends

In the world situation of synthetic polymers both Japan and Europe have been re-structuring their industry during the 1980-85 period. However, the United States of America has not yet taken such action, and is suffering economically from an excess capacity position. During the above period, in Europe, the reduction in capacity amounts to some 900,000 tons.

During the same period, 1980-85, developing countries have increased their share of the world market for synthetic fibres from 17% in 1980 to 45% in 1985. From information obtained from trainees attending the UNIDO Synthetic Fibres In-Plant-Group Training Programme at LKT (Laboratorium für Kunststofftechnik) in Vienna the real requirements of many developing countries has been clarified. It should be stated that these countries have 'hot' climates compared with 'cold' climate countries and from a textile point of view their interests are therefore in cotton and not in wool.

The objective of these countries is to export their natural resources and to make added-value where possible. Most grow cotton which is used for production of cotton textiles for direct export, or as finished goods in the form of clothing. It has been indicated that as they can not significantly extend their acreage of cotton-growing they therefore look at synthetic fibres as a menas of fitting this widening gap between increasing home demand and expansion of their export markets. The choice of synthtic fibres for blending with cotton has been indicated as either viscose, polyamide (nylon), polyester or polypropylene. It has been interesting to note their reactions to selections from this range.

Viscose is regarded as requiring a complex chemical process operation for its production as well as requiring a special quality of viscose for fibre production. This is not a preferred method of developing the industrialisation process. This is the view of those who see this from their textile industry operations.

Polyamide and polyester on the other hand are regarded as more acceptable chemical processes for the production of synthetic fibres. However, the dye-ing (colouring) of the fibres has to be considered. Conventional cotton dyeing is undertaken at 100 o C, but these two synthetic fibres require special dyes and coupling agents and the process requires temperatures in excess of 100 o C (temperatures of 120 o C are general). This means that the existing equipment for dyeing, and the technology, would need to be updated and would involve additional financial resources.

Polypropylene is presently the preferred alternative. The processing of the fibre is a relatively more simple process but more significantly due to the transparency of the fibre there is no need to specially dye it. It can be used in blends of cotton with up to 15% polypropylene. This can then be dyed by the traditional cotton dyeing process which leaves the polypropylene fibre uncoloured, but it assumes the colour of the cotton since it is transparent. Like all apparent simple ideas there is of course a difficulty. To ensure uniformity of the overall colour it is essential that the blending process is very efficient and the distribution of the synthtic fibre is reasonably uniform. This may require some new equipment more attention to detail, and supervision, during the blending process. Nevertheless, overall, these requirements are likely to cause the least amount of additonal investment and very little change in exisiting working practices.