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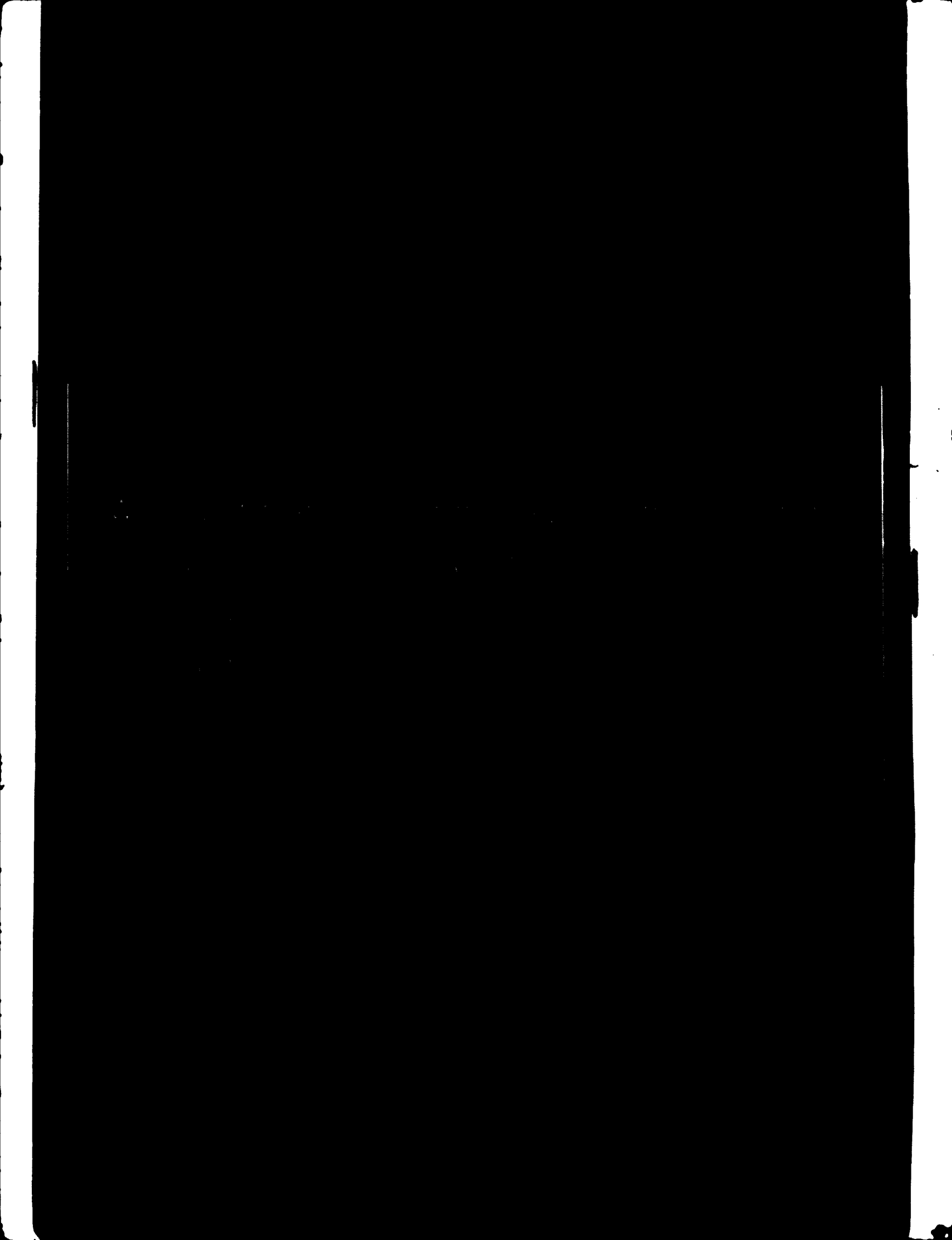
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UNITED NATIONS INDUSTRIAL
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DESIGN AND MANUFACTURE OF CONTAINERS
AND CONTAINER HANDLING AND TRANSPORTING
EQUIPMENT
TS/CYP/75/002
CYPRUS

Prepared for the Government of Cyprus
by the United Nations Industrial Development Organization

Based on the work of Ulrich Greiner, engineering consultant

14.76-4610

Explanatory notes

A full stop (.) is used to indicate decimals.

A comma (,) is used to distinguish thousands and millions.

References to "dollars" (\$) are to United States dollars, unless otherwise stated.

The monetary unit in Cyprus is the pound (£C). During the period covered by the report, the value of the Cyprus pound in relation to the United States dollar was \$US 1 = £C 1.

References to "pounds" (£C) are to Cyprus pounds, unless otherwise stated.

The following abbreviations are used in this report:

- AM American shipping
- CSC Convention on Safe Containers
- GFR Glass-reinforced plastic
- IICL International Institution of Container Lessors
- IMCO Inter-Governmental Maritime Consultative Organization
- KMC Cyprus commercial vehicle manufacturer and container maintenance service
- TIR Transport international de marchandises par la route
- Ro-Ro Roll on - Roll off

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ABSTRACT

The project "Design and manufacture of containers and container handling and transporting equipment" (TS/CYP/75/002) originated in a request submitted by the Government of Cyprus to the United Nations Development Programme (UNDP) in January 1975 and approved in May 1975, with the United Nations Industrial Development Organization (UNIDO) acting as the executing agency and the appropriate Cyprus authorities as the government counterparts. The purpose of the project was to study local needs and possibilities for the manufacture of containers and container handling equipment using existing design capabilities and locally available materials.

The expert began his one-month mission in mid-July 1976 and carried it to a successful conclusion. The following findings should be noted:

1. Its production facilities, repair and maintenance services, skilled manpower, low labour costs and good distribution possibilities make Cyprus competitive in the manufacture of equipment in accordance with American shipping standards.
2. The world-wide container production surplus, the lack of substantial new demand for containers, and the imbalance in container traffic to and from Cyprus push up distribution costs and discourage the mass production of standard dry cargo containers in Cyprus. However, owing to the importance of containerization and the encouraging market outlook, there is a need to manufacture, in small quantities, more specialized types, such as insulated, refrigerated, open-side and flat-rack containers.
3. There is a need for assistance in setting up additional repair facilities in Cyprus and for the training of skilled labour in modern repair techniques.

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INTRODUCTION

TEXT

The transport industry has undergone a great change in the past two decades as a result of technological innovations and the replacement of traditional by modern methods of cargo handling. The introduction of containerization, in particular, has been of considerable importance to the transport industry, as is borne out by the high level of investment by the developed countries in containers, container handling equipment and related installations. Such developments could not fail to have consequences for the developing countries, many of which have the necessary know-how and potential for the design and manufacture of transport equipment and container system components. Realizing the importance of these developments, and in view of its key geographical position in the increasingly container-based trade of the Mediterranean area and Western Asia, the Government of Cyprus decided to assess the needs and possibilities of Cyprus in the field of containerization. This led to the project entitled "Design and manufacture of containers and container handling and transporting equipment" (TS/CYP/75/002), for which the original request was submitted by the Government of Cyprus to the United Nations Development Programme (UNDP) in January 1975, and which was approved in May 1975, with the United Nations Industrial Development Organization (UNIDO) acting as the executing agency and the appropriate Cyprus authorities as the government counterparts. The project budget called for a contribution by UNDP of \$3,000.

The expert began his one-month mission in mid-July 1976 with the following tasks to perform:

1. To study and analyse container traffic through the port of Limassol and the possibilities and needs of containerization in Cyprus.
2. To visit local enterprises, assess their capabilities for the design and manufacture of containers and container handling and transport equipment, and evaluate locally available resources, including qualified personnel and raw materials.
3. To present findings and make recommendations regarding the design and manufacture of containers and container transport and handling equipment, on the one hand, and the production layout, capacity, investment and labour of container manufacturing plants, on the other.

His main conclusions include the following:

TEXT

1. Its production facilities, repair and maintenance services, skilled manpower, low labour costs and good distribution possibilities make Cyprus competitive in the manufacture of equipment in accordance with American shipping standards.

2. The world-wide container production surplus, the lack of substantial new demand for containers, and the imbalance in container traffic to and from Cyprus push up distribution costs and discourage the mass production of standard dry cargo containers in Cyprus. However, owing to the importance of containerization and the encouraging market outlook, there is a need to manufacture, in small quantities, more specialized types, such as insulated, refrigerated, open-side and flat-rack containers.

3. With the present container flow requiring three or four mobile container repair vans, there is a need for assistance in setting up additional repair facilities in Cyprus and for the training of skilled labour in modern repair techniques.

I. CONTAINER TRANSPORT AND HANDLING IN CYPRUS:
PROBLEMS AND OUTLOOK

Today the only port in Cyprus that handles containers is the port of Limassol. Statistics on container movements in 1975 and the first five months of 1976 are given in annex I.

It should be noted that the transit service started only in April 1976, and that the final destinations for transit containers are Iraq, Kuwait, Saudi Arabia, the Syrian Arab Republic and the United Arab Emirates.

It is expected that the growing imports and exports to and from Cyprus and the rapidly increasing transit traffic will double monthly container movements by the end of 1976. The current imbalance between full container import movements and empty container exports should also be noted.

A. Equipment and facilities for container transport and handling

The port of Limassol has one pier with one 35-ton crane for container handling. For container storage 145,000 sq ft are available where containers can be stacked three high. An additional 97,000 sq ft container storage area is rented to Teutonia Lines. The handling capacity of the port of Limassol depends on the present crane capacity of 12 to 15 containers per hour. The container transport and handling equipment in the port of Limassol belongs to the Cyprus Port Authority, the Cyprus Porters Association and shipping agents. These include a 20' "conjack" with "ship-changes" and a 30-ton 20' to 40' Clark van carrier capable of stacking containers three high.

Transport of containers within Cyprus is done by lorries and by flatbed semitrailers. No container chassis or container flatbed semitrailers are in service.

The transit containers arriving at Limassol "lift on-lift off" stations proceed to the Middle East "roll on - roll off" stations. Only foreign registered 40' container chassis with trucks are used for transit containers. Loading and unloading is done by Teutonia Line at its rented container storage area.

No specialized container repair, maintenance and refurbishing facilities exist. Container repair, maintenance and refurbishing services have to comply with international standards, the UN/IMCO Convention on Safe Containers (CSC), the UN/IMCO Convention on Customs Approval, and the repair and maintenance manuals of the container operators and the International Institution of Container Lessors (IICL).

Assistance is needed to equip a mobile van and to lay out and equip a repair, maintenance and refurbishing station with tools, machinery and repair material for aluminium, steel and glass-reinforced-plastic (GRP) plywood container repairs. A training programme is also needed to introduce American shipping standards (AM) with certain new techniques, such as corner post sectional and GRP-plywood repairs.

The majority of the containers passing through the port of Limassol are leased. Current leasing rates vary from \$US 2.75 per 20' container per day to \$1.75 per container per day for term leases. In addition, most of the containers are insured against damages and total loss, which costs an additional \$0.15 to \$0.25 per container per day. A company with approximately 1,500 20' containers in service and 5,000 containers passing annually through Limassol paid close to \$144,000 per year in repair costs abroad. Rising repair costs abroad and increased insurance rates are expected. The current rate for container repairs abroad is about \$10.00 per hour, and the material costs average nearly 10% of the total repair cost. Handling charges for empty, damaged containers and transport costs to the nearest continental port for repairs are not included in AM repair costs. Handling empty containers at the port of Limassol costs an estimated £C 9.90 per container. Transport costs to Trieste (Italy) amount to approximately \$300.00 per 20' container, plus \$25.00 per container for handling in Trieste.

The present small roll on - roll off (Ro-Ro) operation is handled by using imported container trucks. Increasing Ro-Ro traffic requires the use of specialised Ro-Ro terminal tractors.

Today's container traffic can be handled with existing facilities. However, in order to improve present services and to cope with the growing import, export and transit of containers through the port of Limassol, the following equipment is needed: 23' container chassis for import and export containers, 40' container chassis for transit containers, and mobile container repair facilities. Further, with increasing Ro-Ro traffic, there will be a need for shipboard low-bed trailers with detachable goose-neck and Ro-Ro terminal tractors. It is customary that container chassis are owned by the container operators or container trucking companies. Containers and shipboard trailers always belong to the ship operators. Ro-Ro terminal tractors belong to either the port authority, the porters association, or the container/Ro-Ro ship operators. Mobile container repair facilities are in most cases owned by local engineering companies or joint enterprises with the container operators and/or port associations.

B. Local technical capabilities for design and production of containers and container handling and transport equipment

KMC Ltd of Nicosia, manufacturer of commercial vehicles and buses, in addition to ensuring container repairs, maintenance and refurbishing, has the facilities and skilled labour to manufacture the following types of equipment:

- 20' and 40' steel dry-cargo and open-top containers
- 20' and 40' GRP-plywood dry cargo containers
- 20' and 40' GRP-plywood insulated and reefer containers
- 20' steel open-side (fruit) container
- 20' flat rack container and flats
- 23' and 40' container chassis
- 20' and 40' shipboard, low Ro-Ro trailer (roll trailer) with detachable goose neck
- Ro-Ro terminal tractors

The present production line for commercial vehicles can be used for Ro-Ro terminal tractor production. The KMC 12/1 8RV chassis can be modified to meet the international requirements for Ro-Ro terminal tractors. The necessary design information and specifications were passed on to KMC.

Small orders for container chassis and roll trailers can be manufactured with existing facilities, machinery and tools. Assembly jigs for the chassis and trailer frames are necessary. The necessary design information and specifications were passed on to KMC.

The following container chassis components would have to be imported: axles with suspension, brakes, wheels and tires; landing gear, kingpins, beams, twist locks, air brakes and electrical installation.

Import prices in Cyprus differ not much from those in continental Europe. Cross members can be manufactured locally. For larger orders it is recommended to make investments in a jig for manufacturing chassis beams by automatic welding.

The roll trailer components - chassis beams (J-beam 360 and 450) and cross members (J-beam and U-channels 100 to 240) - are standard hot-rolled sections. The running gear (solid rubber-tired wheels on oscillating axles and/or rocker arms) have to be imported. Wooden decking can be obtained locally. Import prices in Cyprus for roll-trailer components do not differ from those in continental Europe. Existing production facilities and machinery could not be used to meet small orders for 20' GRP-plywood, dry cargo, insulated and reefer containers, and also 20' steel open-side (fruit) containers and flat racks. The necessary investment for jigs could be kept low. The necessary design, material and production information was passed on to KMC, although manufacturing data and a materials list for the AM equipment has not been worked out. Moreover, it should be noted that the proposed GRP-plywood container design is suitable for dry freight, insulated and refrigerated truck bodies and van trailers.

For production of 20' and 40' steel containers as well as for mass production of any kind of container, larger investment is necessary (see annex II).

C. Approximate manufacturing cost per unit

For 20' steel containers the design and manufacturing data are presented in annex II.

The estimated costs are the following:

--	--

	<u>US dollars</u>
Material	1,345
Labour (including overheads), with a rate of \$15/h which is usual for continental Europe	<u>900</u>
	2,245
Test and certification	<u>20</u>
	2,265 ex work
Positioning cost to Trieste	<u>350</u>
Price delivered Trieste	2,615

The extent to which the labour cost can be reduced as a result of lower manpower costs in Cyprus could not be estimated because this depends very much on the exact investment necessary, annual production, amortization and return on the investment. Owing to the limited container market in the Mediterranean and existing production in Austria, Israel, Italy and Yugoslavia, it cannot be expected that the annual production will be more than 1,000 ton equivalent units (teu).

For 20' GRP containers the design and manufacturing data are presented in annex II.

The estimated costs are the following:

	<u>US dollars</u>
Material	2,131.80
Labour (including overheads) with a rate of \$15/h which is usual for continental Europe	<u>975</u>
	3,106.80
Test and certification	<u>20</u>
	3,126.80 ex works
Positioning cost to Trieste	<u>350</u>
Price delivered Trieste	3,476.80

As mentioned above, any reduction in the labour cost as a result of lower manpower cost in Cyprus has not been taken into account.

No approximate per unit manufacturing cost for special containers has been worked out. Special containers such as insulated, refrigerated open-top and open-side as well as flat-rack containers and flats are produced in a different manner, and a detailed cost analysis as carried out for 20' dry cargo equipment would have exceeded the scope of this mission.

II. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

1. The present range of KMC's commercial vehicles can easily, without any major cost, be immediately extended to Ro-Ro terminal tractors. The tractors can be produced within the present production capacity. The existing experience and the high labour rate for such equipment should make the tractors built in Cyprus competitive world-wide, especially since one of the two United States manufacturers ceased production owing to higher costs for producing in small quantities, and since United Kingdom production cannot be increased. Delivery terms up to 18 months are therefore common. The remaining manufacturers facing high production costs are in countries with high manpower costs such as Finland, the Federal Republic of Germany, the Netherlands and Sweden.
2. The market outlook is quite encouraging owing to increasing Ro-Ro traffic, containerization and improvements in cargo handling methods, especially in the Middle East, the Mediterranean area and Africa. Future technical assistance may be necessary in order to expedite the implementation of the programme and to meet existing road regulations. With regard to container chassis, there will soon be a need for some 23' chassis for Cyprus and 40' twistlock chassis for the Middle East.
3. With existing facilities at KMC, a series of 50 vehicles with each type of chassis can be easily manufactured without major investments. There should be excellent prospects for such equipment in the home and export markets, especially since chassis for export to the Middle East can be immediately used.
4. Roll trailers can be manufactured with nearly no investment. Du to their simple design no major technical assistance is necessary. However, some technical details have to be taken into account in order to ensure interchangeability with existing goosenecks and trailers and to accommodate recent improvements. In certain countries the roll trailer system is covered by a patent which does not however apply to production in Cyprus. Some marketing assistance would be needed.

B. Recommendations

1. The mass production of standard dry cargo containers should not be undertaken owing to the worldwide container production surplus and the imbalance in container traffic to and from Cyprus.
2. ~~The fast-growing Ro-Ro traffic in the Mediterranean area and to and from~~ the Middle East requires improved cargo handling methods and modern equipment such as Ro-Ro terminal tractors with detachable goosenecks and roll trailers of 25 to 40 ton capacity.
3. In view of the growing importance of containerization in Cyprus, the Mediterranean area and the Middle East, more special containers such as insulated, refrigerated, open-side (fruit) and flat-rack (fruit) containers should be manufactured. All this equipment is required in small quantities and its manufacture is labour-intensive. For small quantities no major investment is necessary and existing facilities are suitable. It should be noted that this equipment would complete the existing KNC commercial vehicle programme by the inclusion of chassis with dry-freight, insulated and refrigerated bodies and semi-trailers. Some technical assistance to start this programme is necessary.
4. New container repair facilities should be set up in order to avoid the use of damaged containers and to fight rising repair costs. The installation and equipment of suitable facilities (mobile vans) will require further assistance.
5. Existing skilled labour should be trained in modern steel, aluminium and GRP-plywood repair techniques.

TEXT

Annex I

CONTAINER TRAFFIC STATISTICS

Table 1. Containers handled in the port of Limassol^{a/}

Year and month	In			Out			Total in and out
	Full	Empty	Total	Full	Empty	Total	
<u>1975</u>							
January	187	--	187	67	51	118	305
February	188	--	188	113	61	174	362
March	252	--	252	77	152	229	481
April	193	5	198	144	105	249	447
May	227	81	308	140	165	305	613
June	112	14	126	112	25	137	263
July	217	58	275	159	91	250	252
August	169	35	204	167	58	225	429
September	169	31	200	96	83	179	379
October	229	31	260	199	43	242	502
November	237	15	252	143	87	230	482
December	316	85	401	164	158	322	723
<u>1976</u>							
January	195	37	232	153	102	255	487
February	371	34	405	220	143	363	768
March	507	52	559	199	356	555	1 114
April ^{b/}	628	16	644	531	159	690	1 334
May ^{b/}	424	55	479	283	189	472	951
June (not available)							
<u>Transit (included in totals above)</u>							
April	357	14	371	358	12	370	741
May	42	--	42	42	--	42	84
June ^{c/}	34	--	--	--	--	--	--

^{a/} Information received from the port authority of Limassol (26 July 1976).

^{b/} Including 40' containers.

^{c/} 40' containers.

Annex II

CONTAINER PRODUCTION

A. Production of 20' x 8'6" steel containers (No. UFW 270 001)

Table 2. Materials list

Item	Component	Specification	Manufacturer	Quantity	Cost (\$US)	Delivery time	Delivery terms
1	Steel panels (sides, front, roof)	35.16 m ² x 1.5 mm		421.68 kg	128.61		c.i.f. Limassol
		11.72 m ² x 2 mm		187.52 kg	57.20		
		5.86 m ² x 2 mm		93.76 kg	28.60		
2	Steel door panels	1.5 mm		67.12 kg	20.47		c.i.f. Limassol
		50 x 50 x 3.2 mm/1/18 m		86.58 kg	36.90		
3	Locking gear	1" DI/CS Elair		1 set of 4	61.00	6 weeks	f.o.b. UK port
4	Hinges	MC3 Elair		1 set of 8	27.00	6 weeks	f.o.b. UK port
5	(a) 2 Top rails (b) 2 Bottom rails	50 x 50 x 3.2		109.62 kg	46.72		f.o.b. UK port
		50 x 50 x 3.2 (a) + (b) = 22.8 m		83.84 kg	25.57		
6	11 Crossmembers 2 Corner posts/ 2 Corner posts/ 2 Corner posts/ front	115 x 8/J-ENAM 100		299.62 kg	98.88		c.i.f. Limassol
				110.71 kg	33.77		
				101.28 kg	30.89		
7	Floor	GS45-3 35 mm Laminated softwood	Comver	1 set 11.8 m ² 16.58 m ²	99.00 196.80	6 weeks 4 weeks	Limassol

Table 2 (continued)

Item	Component	Specification	Manufacturer	Quantity	Cost (\$US)	Delivery time	Delivery terms
8	Paint	One-coat system	Hollac	98 kg 1.60 kg	156.00	4 weeks	f.o.b. Hamburg
9	Subsmall-clear sealing	Demitex 13 x 8	Demo-Chemie Leverkusen/ Federal Republic of Germany	11.36 m	3.84	3 weeks	ex works
10	Blanking	SC375-30	Scottical Brinkman Bremer	1 set	9.00	4 weeks	f.o.b. Bremer
11	2 Fastlift- products	MR 37-2	Made locally	182 kg \$US 0.78/kg	142.00		
12	Front-bumper	MR 37-2	Made locally	18.3 kg \$US 0.78/kg	14.00		
13	Door-bumper	MR 37-2	Made locally	26.4 kg \$US 0.78/kg	21.00		
14	Front-clip	MR 37-2	Made locally	34.3 kg \$US 0.78/kg	27.00		
15	Door-clip	MR 37-2	Made locally	34 kg \$US 0.78/kg	27.00		
16	Loading rings	M 12/1c 170		8 (1.2 m) (1.2 kg)	0.44		
17	Roof bars	25 x 25 x 1.25/ 30.29 m		13 27.26 kg \$US 0.33/kg	9.00		

Table 2 (continued)

Item	Component	Specification	Manufacturer	Quantity	Cost (\$US)	Delivery time	Delivery terms
18	Corner reinforcement	BST 37-2	Made locally	26.6 kg \$US 0.78/kg	21.00		
19	Bottom-corner reinforcement	BST 37-2	Made locally	2.39 kg \$US 0.78/kg	2.00		
20	Crashplate	BST 37-2 Galv. 2.5 mm		14 kg \$US 0.64/kg	9.00		
21	Door retainer			2	2.00		
22	Lashing cornerpost	RM 12/85 1g		4 (0.34 mm) 0.34 kg	0.11		
23	Screws with nut and washer	M6x60 Galv. Cad.8		32	3.00		
24	Self-tapping screws	M6x50 Galv. Cad.8		144	8.00		

Table 3. Production plan (No. CYP-001) for 20' steel containers TEXT

Stage No.	Description	Manpower
1, 4, 6, 9	Material storage	
10, 12, 20		1 fork-lift driver
2	Door end-frame assembly	2 skilled welders
3	Door corner-post assembly	2 skilled welders
7	Front end-frame assembly	2 skilled welders
11	Front header, door header	2 skilled welders
	Front sill, door-sill assembly	
13	Fork-pocket assembly	2 skilled welders
21, 23	Side-front and roof-plate automatic welding machine	2 skilled welders
24	Sidewall assembly	1 welder
37, 38, 39	Material storage	1 fork-lift driver
17, 19		
40, 41	Door assembly	4 (2 welders, 2 helpers)
5, 8, 25	Component storage	1 gantry crane driver
16	Base-frame assembly	2 welders
18	Component storage	Gantry crane
26	Container assembly	3 welders
27	Welding station	2 welders
28	Welding station "roof"	2 welders
29	Finishing and shot-blasting station	2 unskilled workers
30, 31	Painting station	2 skilled workers
32, 33, 35, 36	Floor installation, marking and inspection	6 semi-skilled workers
34	Material storage	2 semi-skilled workers
A, B, C	Two-level walkways	
D	Machinery (compressors etc.)	

Investment plan for 20-inch steel and GHP-plywood container production plant (No. GYP 001)

TEXT

- 1. Production shed
50 x 20 m
- 2. Finish and painting shed
10 x 20 m
- 3. Cutting and forming shed
- 4. Transport
 - 2 3-ton forklifts for handling sheet metal and raw materials
 - 1 5-ton forklift for container handling
 - 1 gantry crane (half spread), 5-ton capacity, for assembly operations
 - 5 500-kg hoists for assembly operations and handling
 - 32 bogies for the flow line

<u>5. Jigs</u>	<u>Stage No.</u>
1 front frame assembly jig	7
1 door frame assembly jig	2
1 door corner post assembly jig	3
1 door header assembly jig	11
1 front header assembly jig	11
1 door sill assembly jig	11
1 front sill assembly jig	11
1 fork pocket assembly jig	13
1 base frame assembly jig	16
2 door assembly jigs	40 + 41
1 panel conveyor	21 + 23 ^a
1 side wall assembly jig	24 ^a
1 assembly jig	26
2 welding stations (2 levels)	27 + 28
2 side wall/roofplate storage jigs (movable)	25 ^a
2 end frame storage jigs (movable)	5 + 8

^a Not necessary for 20' GHP-plywood container production.

6. <u>Tools</u>	<u>Stage No.</u>	TEXT
17 CO ₂ welding machines ^{b/} 1 Cloos automatic welder 1 mechanical guillotine shear 2550 x 6 1 mechanical press brake 2550/2100 1 circular saw 1 sand blast facility 1 paint facility Hand tools: 5 grinding machines 4 drills	22 ^{a/} 29 30 + 31	
7. <u>Extra investment for 20' GRP-plywood container production</u>		
1 panel supply jig 2 two-level walkways Additional hand tools: 4 drills 2 Huck bolt machines		
<p style="text-align: center;"><u>Employment productivity investment</u> <u>(No. OYP.001)</u></p>		
<u>Emploees</u>		
41 (based on production plan contained in table 3 above)		
<u>Productivity</u>		
Daily man-hours:		
$41 \times 8 \text{ h/shift} = 328 \text{ man-hours}$		
Daily container production:		
$328/60 \text{ h/container} = 5 \text{ to } 6 \text{ containers/shift}$		
Annual container production per shift:		
$200 \text{ days} \times 5.5 \text{ containers} = 1,100 \text{ containers per year}$		
\checkmark For 20' GRP-plywood containers: 14 CO ₂ welding machines.		

Annual labour productivity

60 man-hours/container x 1,100 containers/year = 66,000 man-hours/year
66,000 h x \$1.50/h = \$99,000 per year (labour costs)

Investment

Equipment investment excluding buildings:

Approximately \$300,000 to \$400,00 (North European prices)

If only a 20' GRP-plywood container line is required, investment is 10% less than total investment for steel containers.

20' steel container

Size:

20' x 8' 6" - 9 high stacking ISO specification 1496/1

Costs
(in \$US)

Material (in accordance with table 1 above)

1,345.00

Labour:

60 hrs

\$15.00/h

900.00

Total

2,245.00

Additional charges

Testing - \$3,450/500 (approximately)

7.00

Certification according to TIR (Transports Internationaux Routiers), Lloyds or others

13.00

Total

2,265.00

Present market price

\$1,850 to \$2,000

Positioning charges to Trieste

\$350.00

3. Production of 20' x 8' x 8' 6" GFR-plywood steel container

Table 4. Materials list

Item	Component	Specification	Manufacturer	Quantity	Cost (\$US unless otherwise indicated)	Delivery time	Delivery terms
1	GFR panels (sides, front, roof)	21.6 mm 15.2 mm	Plyfront	26.1 m ² sides 4.76 m ² front 12.53 m ² roof	739.00	12 weeks	c.i.f. Lissensal
2	Door panels	Sheet notched or steel	Meuburger	1 set	975.00	6 weeks	f.o.b. Hamburg
3	Locking gear	1" IL/CS	Blair	1 set of 4	61.00	6 weeks	f.o.b. UK part
4	Hinges	IK 3	Blair	1 set of 8	27.00	6 weeks	f.o.b. UK part
5	2 Top rails 2 Bottom rails 11 Crossmembers 2 Corner posts/ door 2 Corner posts/ front	1271 2769 2775	Beckh Manufactured sections	1 set	349.00	12 weeks	ex works Schwerte/ Westfalen
6	Corner	GM3-3	Corner	1 set	99.00	6 weeks	c.i.f. Lissensal
7	Floor laminated softwood	35 mm	Ballboard	11.8 m ²	196.80	4 weeks	c.i.f. Lissensal
8	Paint	One-coat system	Ballas	35 kg	56.00	4 weeks	f.o.b. Hamburg

Table 4 (continued)

Item	Component	Specification	Manufacturer	Quantity	Cost (\$US unless otherwise indicated)	Delivery time	Delivery terms
9	Backbolts	06L3-88	Gehr.	136	DM 14.68	from	ex works
		96	Fitzinger	16	DM 1.75	stock	
		108	Omsberfick/ Federal	24	DM 2.67		
		116	Republic of Germany	54	DM 6.16		
		128		222	DM 25.90		
		136		156	DM 19.67		
	Bushing	146		608	DM 31.25		
		SLC-28-88			40.00		
10	Small seal leaf seal Preventall seal	Terostat 4002	Teroson Maidelberg/ Federal Republic of Germany	10.3 kg	15.00	ex stock	f.o.b. Hamburg
11	Small-floor sealing	Densitex 13 x 8	Denso-Chemie Leverhausen/ Federal Republic of Germany	11.36 m	3.84	3 weeks	ex works
12	Marking, including logotype	SC375-30	Scotchcal, Brinkmann Bremen	1 set	21.00	4 weeks	f.o.b. Bremen
13	Inside rivet rail	Galv. steel profile 1.5 mm	Made locally	54.5 m 48 kg DM 1.65/kg	31.00	6 weeks	
14	2 Forklift- pockets	ERT 37-2	Made locally	182 kg DM 2.00/kg	142.00		
15	Front header	ERT 37-2	Made locally	18.3 kg DM 2.00/kg	14.00		

Table 4 (continued)

Item	Component	Specification	Manufacturer	Quantity	Cost (\$US unless otherwise indicated)	Delivery time	Delivery terms
96	Door handle	MSR 37-2	Made locally	26.4 kg IM 2.00/kg	21.00		
97	Front mill	MSR 37-2	Made locally	31.3 kg IM 2.00/kg	27.00		
98	Rear mill	MSR 37-2	Made locally	34 kg IM 2.00/kg	27.00		
99	Loading rings/ floor	Blensitch	Blensitch	8	7.78	4 weeks	c.i.f. Linnascol
20	Loading rings/ roof	MS 15/45 kg		8			
21	Roof bars	30X110X2.5		4 - 27.5 kg IM 1.30/kg	14.00		
22	Corner reinforcement	MSR 37-2	Made locally	26.6 kg IM 2.00/kg	21.00		
23	Bottom corner reinforcement	MSR 37-2	Made locally	2.39 kg IM 2.00/kg	2.00		
24	Crashplate	MSR 37-2 Only. 2.5 mm		14 kg IM 1.60/kg	9.00		
25	Door retainer			2			
26	Loading component	IM 12/05 kg		4			

Table 4 (continued)

Item	Component	Specifications	Manufacturer	Quantity	Cost (\$US)	Delivery time	Delivery terms
27	Screws with nut and washer	M6 X 30 Galv. Cad. 8		24			
28	Screws	M6 X 22 Galv. Cad. 8		28			
29	Rivet nut	M6 No. 206	Limbeck	8			
30	Rivet	5 X 28		8			
31	Bolt	5 X 20		8			
32	Washer	M7 Galv. 15 mm		160			
33	Self-tapping screws	M6 X 50 Galv. Cad. 8		20			
34	Screws with nut and washer	M6X45 Galv. Cad. 8		112			
35	Backstainer	6 Ø		4			
Total					2,131.80		

Production plan for 20' GRP-plywood containers

TRNT

Basically the same production line as for 20' steel containers can be used.
 Stage Nos. 20 to 25 inclusive (side wall) and No. 28 (roof welding station) remains idle. GRP-plywood side wall and roof material will be supplied at stage No. 34. One extra supply jig will be necessary as well as 2 two-level walk ways for side and roof panel riveting at stage Nos. 33 and 36.
 Less welding equipment is required.

20' GRP-plywood container

Size:

20' x 8' x 8' 6" - 9 high stacking
 ISO specification 150 - 1496/1

Costs (in \$US)

<u>Material</u> (in accordance with table 3 above)	2,131.80
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<u>Labour:</u>	
65 h	
15.00/h	<u>975.00</u>
Total	3,106.80

<u>Additional charges:</u>	
Testing \$3,450/500 (approximately)	7.00
Certification according to TIR, Lloyds or others	<u>13.00</u>
Total	3,126.80

Present market price:
 \$2,800 to \$3,100
 Positioning charges to Trieste:
 \$350.00

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Annex III

TEST

DOCUMENTATION ON CONTAINERIZATION

Monthly journals

Cargo systems

CS Publications Ltd
185 High St.
New Malden/Surrey
United Kingdom

Containerization International

National Magazine Co. Ltd
680 Garrat Lane
London SW17 ONP
United Kingdom

Container News

Communications Channels, Inc.
461 Eighth Ave
New York, N.Y. 10001
United States of America

Other publications

Containerization: International Year Book, 1976

Jane's Freight Containers, 1975

The publications mentioned include information about the following matters: worldwide container lines; worldwide container ports and port facilities; container, container transport and handling equipment; international organisations for containerization; worldwide container lessors; registered container prefixes with owner's address and name.

IICL Guidance and Procedure Manual for Container Repair and Maintenance

ISO-TC 104 Standards and Recommendations

"Specification and testing of series 1 containers, ISO 1496"

"Dimensions and ratings of series 1 containers, ISO 668"

"Marking of series 1 containers, ISO 790"

"Specification of corner castings for series 1 container, ISO/R 1161"

TEXT

"Minimum internal dimensions for series 1 containers, ISO/R 1894"

"Identification marking code for freight containers, ISO 2716"

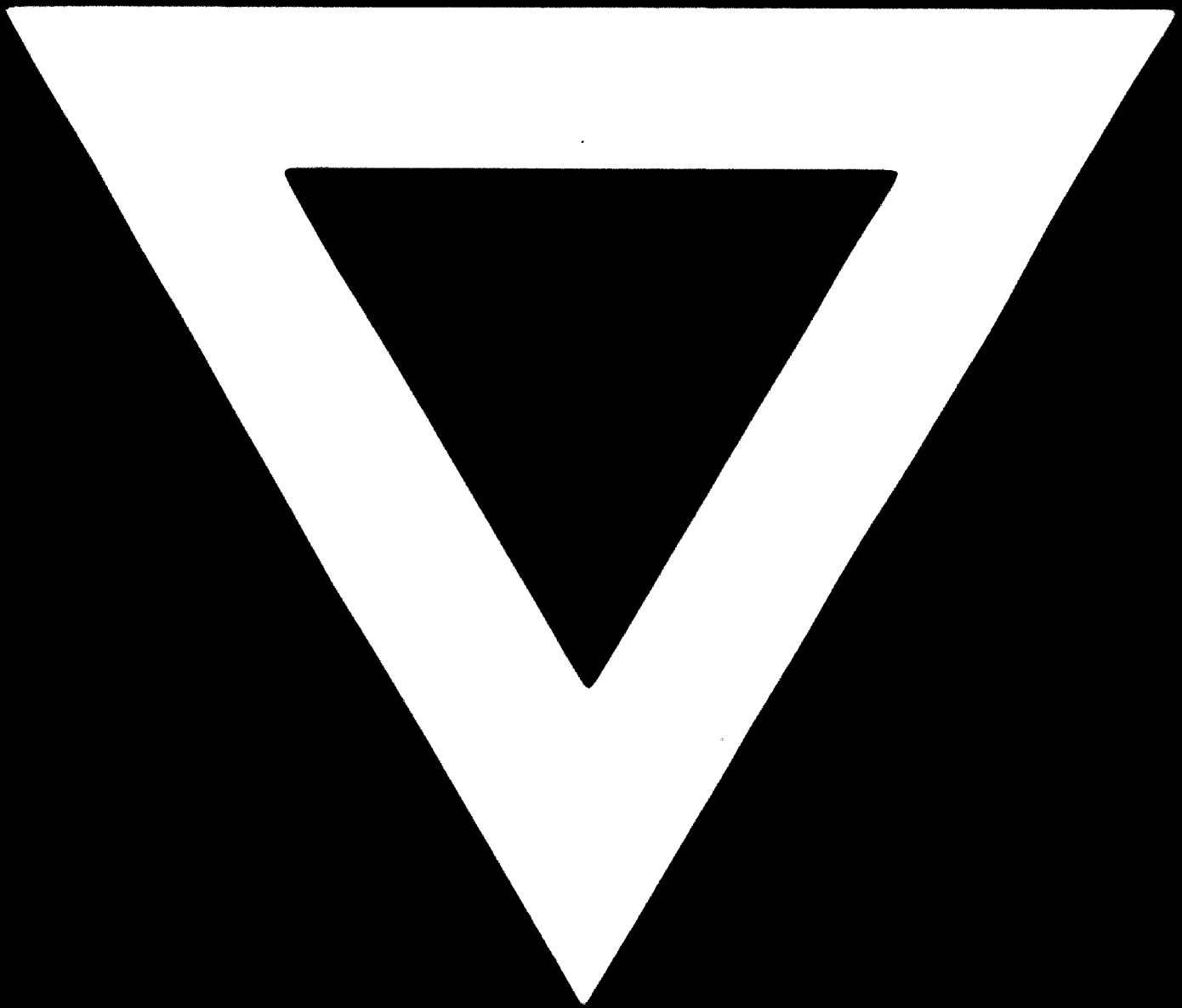
UN/INCO Conventions

"Safe containers (OSC)", Geneva, December 1972

"Customs regulations", Geneva, December 1972.



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