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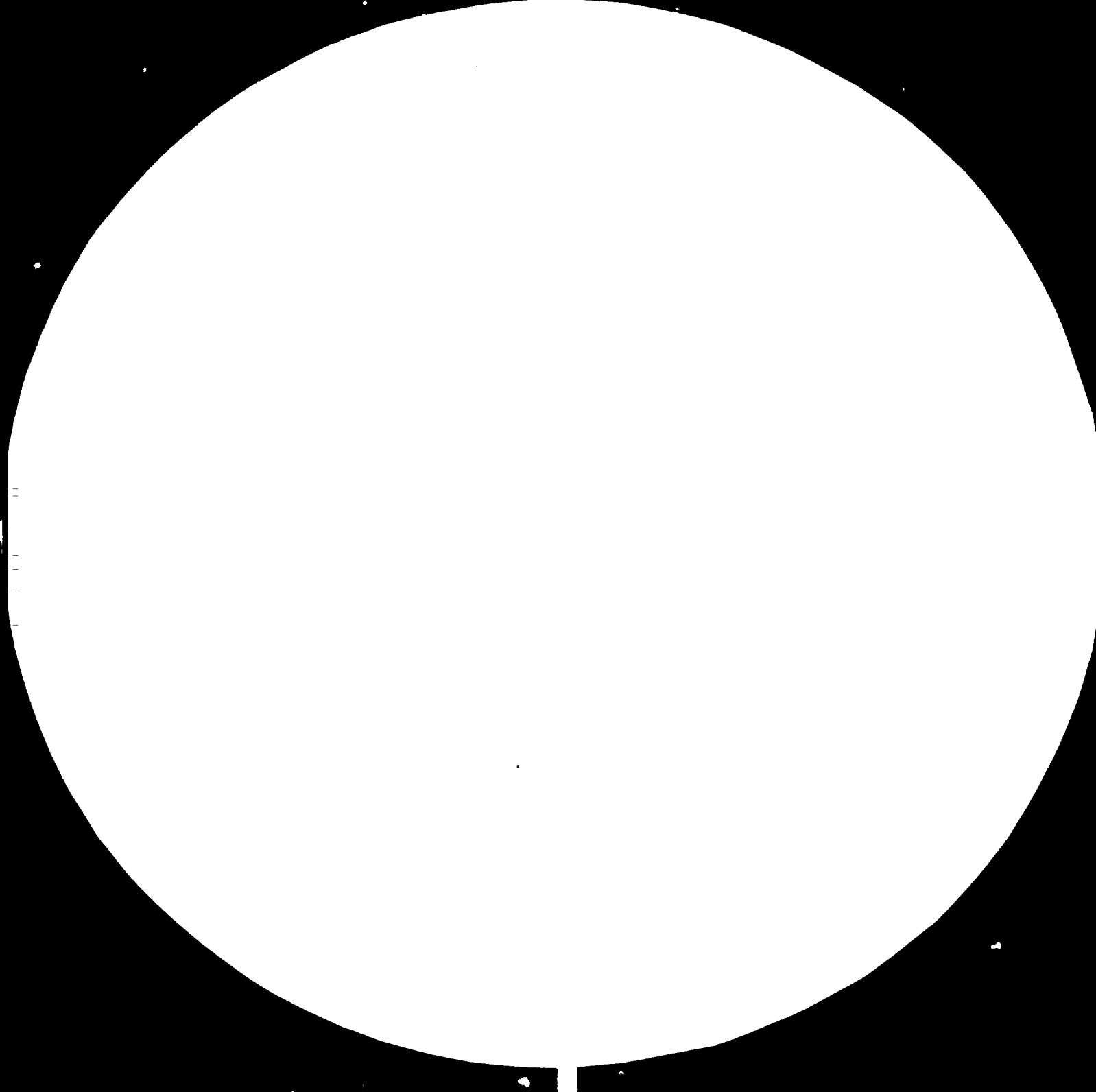
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ASSISTANCE IN ESTABLISHING A
PLASTICS DEVELOPMENT CENTRE

F I N A L R E P O R T

on

A SURVEY OF THE PLASTICS PROCESSING
INDUSTRY IN THE ARAB REPUBLIC OF EGYPT

900112

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The writer of this report is solely responsible for the views expressed therein which do not necessarily reflect the views of the Secretariat of UNIDO.

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ABBREVIATIONS

P.D.C.	-	Plastics Development Centre, Alexandria.
t.p.a.	-	Metric tons per annum
LE	-	Egyptian pounds
LE p.a.	-	Egyptian pounds per annum
LDPE	-	Low density polyethylene
HDPE	-	High density polyethylene
GPSS	-	General purpose polystyrene
HIPS	-	High impact polystyrene
PVC	-	Polyvinyl chloride
U-PVC	-	Unplasticised PVC
PP	-	Polypropylene
P-F	-	Phenol-formaldehyde resin
M-F	-	Melamine-formaldehyde resin
U-F	-	Urea-formaldehyde resin
sq.m	-	Square metres

S U M M A R Y

This report describes the findings of a survey of the Egyptian plastics processing industry, carried out between 23 June and 15 July 1980, in Alexandria and Cairo. Its relevance to the establishment of the Plastics Development Centre is discussed and recommendations made.

The relative growth rates of the public and private sectors of the plastics industry are considered and, where appropriate, approximate predictions of future growth with respect to a variety of processing aspects and materials consumption are made. Guide-lines are outlined for possible continuing surveys and activities of the P.D.C.

1. INTRODUCTION

The primary objectives of this, one month, assignment were to ascertain the nature and degree of constraints experienced by plastics processors and to make recommendations as to how the Plastics Development Centre could assist in their resolution. These objectives were to be achieved as a result of effecting a survey of the plastics processing industry in collaboration with Egyptian counterparts currently employed at the P.D.C., while at the same time training them in survey methodology and preparation of appropriate questionnaires.

It is clear that, in the light of the very short time available and the dynamic growth of the private sector of the industry, particularly since 1975, this study can only be regarded as the preliminary stage of what should be an on-going study.

Owing to communication difficulties, such as the present slow postal services and the extreme difficulty in utilising the telephone service, prior appointments with the responsible officials of respondent organisations could not be made.

Despite this factor, however, we were most hospitably received and found a considerable willingness to co-operate on the part of most organisations visited. In both the public and private sectors of the industry the establishment of the P.D.C. was welcomed and frequent requests were made for the maintenance of continuing contact.

During the preparatory stage of the study and while visiting organisations in the Alexandria area the group was centred on an office in the factory of Egyptian Plastics and Electrical Company, which has been allocated to the P.D.C. pending

completion of its premises nearby. For those aspects of the study in the Cairo area, a centre was provided by the Petrochemicals Project; a joint venture between the Nasr Petroleum Company and Montedison of Italy, who also supplied a counterpart to accompany us in making local visits.

It must be emphasised at this juncture that, mainly as a result of time limitations, the survey was confined to conventional plastics processors and did not embrace resin manufacture or the utilisation of polymers in other industrial fields such as surface coatings or industrial binders, the latter being particularly relevant to overall industrial development.

2. PREPARATORY STAGE

On arrival in Alexandria a preliminary discussion was held in which the nature and preparation of the Questionnaire(s) together with an outline of proposed visits were considered. It was agreed that, owing to the diversity of activities in the plastics processing field and the variety of possible attitudes on the part of respondent organisations, a formal questionnaire would not be applicable but that the questionnaire should take the form of an aide-memoire whose main function would be to serve as a check list of questions to be asked and to enable a consistent sequence of questions to be put, thereby facilitating note taking and interpretation. The questionnaire was prepared: Appendix I: and the significance of each question fully discussed, with illustrations where necessary. In order to ascertain respondents likely reactions to the questions and to check on note taking, a trial run was organized with the co-operation of the staff of the Egyptian Plastics Company. The questions were approved/^{and} as a consequence of the trial it was agreed that all members of the group including the questioner would take separate notes and that these would be subject to interim reviews at approximately weekly intervals. The organisations visited, group member(s) in attendance, locations and dates of visits are given in Appendix II. Questionnaires were not prepared for visits to governmental institutions but the main topics for discussion agreed in advance.

3. OVERALL GROWTH AND TRENDS IN THE PLASTICS INDUSTRY

With the introduction of the present 'Open Door' policy in 1975 fundamental changes in Egypt's industrial structure have occurred. This policy has been specifically directed towards the encouragement of maximising growth of the private sector and maintaining a mixed economy. Current overall industrial growth rates have been stated (1) as public sector companies, 5% per annum, private companies 15% per annum. This effect has undoubtedly been reflected in the growth of the plastics industry. Owing to the very limited time available it was not possible to obtain figures for actual growth in the plastics processing sector. A strong indication of the private sector growth is as follows :

1972/3	130 companies - Hancock & Hagen, Final Report on Survey. (2)
1977	About 300 companies - Montedison Survey June 1977 (3)
1980	500 - 600 companies possibly in excess of 1,000 if all 'one man' unlicensed operations are included - assessments made by respondents in the present survey.

This growth rate is further substantiated by the following :

- i. Federation of Egyptian Industries Year Book 1977 (4) (out of a total of 504 licences approved for the private sector in 1977, 95 were for the chemical industry which included, inter alia, plastics processing)
- ii. Of the 7 private sector companies visited, one - Mitco Synthetic Leather - had only been in operation for 9 months and 3 others - Idam Fibreglass, Lashen Plastics and Al Shanti for less than 4 years. Private sector growth indications in the companies visited are shown in Table I.
- iii. While the overall growth rates of the 10 public sector companies visited appeared reasonably healthy, in one case - El Nasr Television and Electronics - production of their major lines had ceased and two others - Beida Dyers and Canaltex - had experienced static growth for several years and did not contemplate further expansion in the plastics field. Growth in certain

TABLE I PRIVATE SECTOR GROWTH

Organisation	Commenced operation	Current Consump. t.p.a.	Market Orientation (Main)	Polymer Consumption t.p.a.					
				LDPE	HDPE	PP	PVC	PS	Thermoset
Middle East Plastics (530)	Prior to 1970	5850	Packaging and textile ind.	1300	2000	600	1000	650	P-F 150 U-F 150
Azza Plastics	-do-	3300	Packaging and foodstuffs	2400	300	nil	600	nil	nil
Mitco Synthetic Leather	October 1969	1000 em. PVC	Upholstery, travel goods etc.	nil	nil	nil	1000	nil	nil
El Shariff Plastics	1 factory prior to 1970 1 factory in 1976	5300	Inj.moulders pipe extruders and compounders	nil	nil	200	5000	100	nil
Idam Fibreglass	2-3 years ago	400	Boats, tanks and sanitary ware	nil	nil	nil	nil	nil	USP 400
Lashen Plastics	3 years ago	1150	Agricultural etc. packaging	750	nil	400	nil	nil	nil
Al Shanti for Chemical Ind.	2 est. factories 1 under construct.	3500+	Pipe extruders and compounders to private sector	nil	nil	nil	4500	nil	nil

+ Intend to produce perforated pipe for agricultural drainage

TABLE II

PUBLIC SECTOR GROWTH

Comparison of polymer consumptions 1972/3 with 1979/80 (t.p.a.)

Organisation	1972/3							1979/80						
	LDPE	HDPE	PVC	PP	PS	Others	Overall	LDPE	HDPE	PVC	PP	PS*	Others	Overall
Egyptplas	-	-	-	-	-	-	-	350	2800	1500	125	1182	343	6298
National Plastics	-	-	-	-	-	-	6500-7000	9000	2000	1000	500	1200	1320	15000
Medical Packing	-	-	-	-	-	-	2400	2500	4000	700	300	900	1924	10324
Canaltex	nil	nil	500	nil	nil	neg'ble	-	nil	nil	600000 sq.m. tiles	nil	nil	only carpet tiles	-
Electrocable	nil	nil	4500 (Comp'd)	nil	nil	nil	4500	2000	nil	8000 (Comp'd)	nil	nil	nil	10000
Delta Industrial	nil	nil	nil	nil	830	nil	830	nil	nil	nil	nil	800	acrl coats	800
Verta Paper Convertors	750	nil	nil	nil	nil	nil	-	2000	nil	nil	nil	300	nil	-
Beida Dyers	nil	nil	?	nil	nil	nil	-	nil	nil	115	nil	nil	nil	-
Nasr Television	-	-	-	-	-	-	-	nil	1200	nil	nil	nil	nil	-
Bata	nil	nil	1900	nil	nil	nil	1900	Took questionnaire - reply awaited by P.D.C.						
Totals	750	-	6900	-	830	-	18880	15850	10000	app. 12000	825	4382	3587	46644

lines attractive to the small manufacturers, particularly blown LDPE film, had become fairly static in the larger organisations. This is demonstrated by comparison of actual polymer consumptions disclosed during the two UNIDO surveys Table II.

This situation was also having a marked effect on the geographical distribution of the industry for whereas in 1977 it was considered (3) that about 70% of the industry was located in the Cairo area and 30% in the Alexandria area, the current situation was considered, by a representative of the Petrochemicals Project to be 50% in the Cairo area, 25% in the Alexandria area and 25% in other areas, including Port Said, Suez and Tana.

Mainly owing to the limited time available, statistics relating to the import of plastics materials and the production of plastics products could not be obtained. Some limited figures for 1976 and 1977 have been published (4). These are displayed in Tables III and IV respectively. It is anticipated that corresponding figures for 1978 and 1979 will be contained in the 1979 edition of the Federation of Egyptian Industries Year Book, due to be published later this year.

With the exception of certain thermosetting resins manufactured by the El Nasr Company for Chip-board and Resins, Mansours (not visited) and small quantities of phenol-formaldehyde made on special request at the coal tar distillation unit, all polymeric materials are currently imported. The Petrochemicals Project for the manufacture of suspension polymerised PVC is expected to commence manufacture in 1984 and the manufacture of L.D. polyethylene from either the high pressure process or the Union Carbide Low pressure process in 1986.

TABLE III IMPORTS OF PLASTICS RAW-MATERIALS

Material	1976		1977	
	Volume tons	Value LE x 10 ³	Volume tons	Value LE x 10 ³
Liquids (emulsions and solutions)	2,213	1,074.1	1,082	2890
Monofilaments or Tubes	0.5	1.3	12	33.7
Rods & Sticks	419	131.1	54	59.8
Polymerization Products	3,243	1707	55,289	22,356.3
Phormaldehyde ⁺	3	12.1	201	31.4
Miscellaneous	3,140	2,010.7	3,450	2,646.9
TOTAL	9,018	4,936.3	63,088	28,018

+ As spelt - could refer, for example, to phenol-formaldehyde moulding materials.

TABLE IV PRODUCTION OF PLASTICS (Local Output)

Overall:

Private Sector	LE	4.1 x 10 ⁶	4.6 x 10 ⁶
Military Sector	LE	0.86 x 10 ⁶	0.72 x 10 ⁶
Overall (including Public Sector)		17.72 x 10 ⁶	22.06 x 10 ⁶

BREAKDOWN

Product	1976			1977		
	mx10 ³	tons	LEx10 ⁶	mx10 ³	tons	LEx10 ³
Insulating pipes(conduits)	1518	-	67	1497	-	90
Plastic Pipes	-	765	759	-	866	881
Atraps Sheets	92.4	-	254	108.6	-	299
Plastic coated cloths	-	-	4421	-	-	5840
'Nylon Bags'	-	2311	1381	-	3489	1945
Plastic Products	-	-	9574	-	-	11778
Polyester	-	229	410	-	245	487
Phormaldehyde ⁺	-	3140	533.8	-	2515	4440.1
Military Sector Products	-	-	325	-	-	266.8
Total Value	-	-	17725	-	-	22059

' Probably refers to Polyethylene
+ As spelt

4. MARKET ASPECTS , ESTIMATES OF CURRENT CONSUMPTION AND GROWTH POTENTIALS

.1 Low Density Polyethylene

.1 By far the greatest bulk of LDPE consumed is as bags and films for packaging. Currently this is distributed between: Heavy duty grades for sacks and bags, which are mainly used for fertiliser and agricultural produce packaging. In this field the larger processors still retain a dominant position. - Light duty grades, including liners for woven polypropylene sacks, are also continuing to be manufactured by the larger organisations but encroachment by smaller companies in the private sector is pronounced.

Current polymer consumption in this field is estimated to be in the order of 15,000 tons per annum with approximate market shares as follows :

National Plastics	- 25%	(Film Heavy and Light duty)
Medical Packing	- 20%	(Mainly heavy duty)
Azza	- 18%	(Dominate carrier bag market)
Verta	- 15%	(Heavy: light duty-4:1)
Lashen plastics	- 5½%	(PPsack liners and Heavy Duty film)
Others	- 16½%	(Mainly small manufacturers -Light duty film)

Current growth rates are considered to be in the order of 10% per annum with future growth rates likely to increase for heavy duty film with the introduction of LDPE greenhouses. Thus it is estimated that consumption by 1985 will be likely to exceed 30,000 t.p.a.

.2 It is estimated that approximately 10,000 t.p.a. is consumed in the production of extruded pipe, a field in which National Plastics has a 40% share of the market

for LDPE and U-PVC combined. This is regarded as a high growth area, as, despite increased production, National Plastics market share has declined from complete dominance in 1975. With continued increase in demand for agricultural applications arising from its superior UV resistance to PVC, consumption could rise to 25,000 t.p.a. by 1985.

.3 Electrical insulation - Although up to the present, the use of LDPE insulation has been confined to low voltage flexible wiring which consumes about 3,000 t.p.a., Electro Cables are currently installing equipment for cross-linked PE insulation by the Corning Catenary Process, which is expected to supercede the use of PVC in the 15Kw to 20 Kw range. Thus demand by 1985 could well be in the order of 10,000 t.p.a.

.4 Other significant fields of application for LDPE include mainly injection moulding and, blended with HDPE for blown containers. In the former case, the field is fragmented and includes many small injection moulders and thus quantities could not be assessed from the present survey. In the latter case, quantities involved are minor and probably do not exceed 500 t.p.a.

.2 High Density Polyethylene

Of the five organisations visited who used HDPE their total current consumption was in the order of 12,500 t.p.a. distributed in approximately equal proportions between injection moulded crates for beverage bottles and farm produce and blow moulded bottles of up to at least 2L capacity. Penetration of the crate market was considered to be practically 100%, a major contributing factor being the cost of imported timber. One respondent, however, expressed the opinion that

if raw materials costs continued to increase, this trend could be reversed.

With the major exception of carbonated beverages, blown bottles in HDPE and, to a lesser extent, U-PVC, had made considerable inroads in the packaging field for a very wide range of liquid and other products.

Future growth in the consumption of HDPE for these applications was considered likely to be in the region of from 5 to 10% per annum over the next five years.

.3 Polypropylene

Although consumption of PP by the organisations visited is significantly lower than that of the other major thermoplastics, viz. 2,126 t.p.a., probable overall consumption is likely to be in the order of 5,000 t.p.a. with a probable distribution as follows :

Miscellaneous Injection Mouldings	25%
Textile cones	25%
Weaving tapes	20%
Ball point pens	20%
Extruded strappings	10%

It should be noted that the above figures do not include PP Cordage, which, it is understood is manufactured in the Port Said area.

All the above sectors are confident of high future growth, probably in excess of 20% p.a. during the next five years.

For example :

- Injection Moulding - the possible replacement of P-F washing machine agitators
- Textile cones - Production by Middle East Plastics is expected to increase to 2,000 t.p.a. by 1981

Ball point pen components

- including particularly the extruded ink tubes is expected to increase by 2½ times in 3 years.

Woven Sacks

- so far the penetration of the jute sack market is only in the order of 20% but, as jute has to be imported, it could increase rapidly. Woven PP carpet backing was not encountered.

In addition to these items a most probable area for increase will be the development of injection moulded battery boxes during the next five years. Varta, with about 40% of the present battery market, are establishing a production line which will involve the importation of about 1,000 t.p.a. of PP boxes, for approximately 40% of their production, and expect to be moulding their own boxes by 1984/5. It is also understood that General Batteries have arranged a joint venture with Chloride (U.K.) which is expected to start production in 1982 based on 50% in PP and 50% in hard rubber. To date, however, National Plastics, the largest battery producer, are confined to hard rubber and have not announced any plans to change. Thus by 1985, consumption of PP for battery boxes alone could well exceed 2,000 t.p.a. and overall consumption of PP could exceed 20,000 t.p.a.

.4 Polystyrene

Three main grades of polystyrene are imported; General Purpose, for injection moulding, High Impact in the form of granules for sheet extrusion and possibly also for a small amount of injection moulding and extruded sheet. By far the greatest amount of HIPS is used for thermoforming by vacuum and pressure, and expandable grade for the manufacture of 'Styropor'.

Because of the fragmented nature of the injection moulding field and the possible large number of small moulders, overall consumption of GP PS cannot be fairly assessed but it is probably in excess of 3,000 t.p.a. Expansion in demand is unlikely to exceed 5% p.a. and is likely to reach less than 4,000 t.p.a. by 1985.

Approximately 2,000 t.p.a. of HIPS is used in vacuum forming by the larger processors approximately 25% of which is consumed in the manufacture of consumer durables such as refrigerator components and the bulk of the remainder for cartons of various sizes. Growth is expected to be significantly higher than that of the GP Grades and could approximately double by 1985.

There are currently three manufacturers of expanded PS blocks and mouldings for packaging and insulation. The largest is Egyptian Plastics, with about 65% of the market, the others Misra Foam (Cairo) and Deplast (Alexandria) sharing the remainder. Current consumption is in the order of 1,500 t.p.a. and with a growth rate averaging 10% p.a. it should reach about 2,500 t.p.a. by 1985.

.5 Polyvinyl Chloride

.1 Suspension Grades: of the approximately 20,000 t.p.a. currently consumed by the respondent organisations, the following breakdown is estimated in terms of polymers :

Cable insulation	- 25%
Pipes, conduits and hoses	- 30%
Bottles	- 5%
+Compound Manufacture	- 40%

+ In general this is supplied to the local private sector the larger, public sector organisations tend to import ready-compounded materials.

Current overall consumption may well be in excess of 45,000 t.p.a. High growth rates are anticipated and many plants are being extended. The use of PVC in agriculture, particularly for drainage and irrigation is likely to have a pronounced effect on immediate future growth as is illustrated by the following :

- i. Underground Drainage Authority - In a joint venture with Cincinatti (Austria) one factory for the production of perforated concertina piping went 'on stream' in May 1980 and another is under construction, and planned to commence operations in September 1980. The raw-materials are initially being imported from U.S.A. (Diamond Channel) monthly delivery of the initially contracted 6,000 tons of U-PVC compound will be completed by November.
- ii. Al Shanti are currently constructing a new factory for the production of perforated U-PVC pipes for irrigation, which is expected to increase their overall capacity from 15,000 to 30,000 t.p.a.

A small but technically important application for U-PVC or lightly plasticised PVC is the production of sintered separators for automotive and other batteries. At present about 150 t.p.a. are required. These are mainly imported but a manufacturing company has been set up in the Cairo area (United Industries Company- Private Sector). So far their products are considered to be inferior in quality to the imported separators, most probably due to teething troubles - unfortunately there was insufficient time to visit them.

.2 Emulsion Grades: By far the major proportion of emulsion PVC is used in the production of artificial leather, the production of which has expanded rapidly during the last few years. Of the six companies involved in its manufacture (4 public and 3 private), those visited - Egyptian Plastics and Mitro claimed 25% and 15% market shares respectively.

The current overall consumption of polymer for this application is about 6,500 t.p.a. and is expected to be at least double by 1985.

~~In contrast,~~ the production of PVC coated fabric of the 'American cloth' variety has become fairly static and polymer consumption is in the order of 1,000 t.p.a. The use of emulsion polymer for dip coating and other applications was not investigated.

.6 Other Thermoplastics

Of the organisations visited the consumption of other thermoplastic polymers was negligible, apart from consumptions of 800 t.p.a of nitrocellulose for spectacle frames and 50 t.p.a. cellulose acetate for toothbrush handles by Medical Packing who also used about 10t.p.a. of PMMA cast sheet and 5 t.p.a. of PMMA granules. The combined consumption of the engineering plastics, nylon, acetal and polycarbonate amounted to a mere 25tp.a.

.7 Thermosets

.1 Moulding Powders

As far as could be ascertained only straightforward compression moulding was employed for processing thermosetting powders. It was considered that the electricity supply was too uncertain to permit the use of injection moulding techniques. Apart from the organisations visited, who had an overall consumption of about 3,000 t.p.a., there were thought to be a number of small compression moulders. The approximate breakdown is shown in Table V.

TABLE V THERMOSETTING MOULDING MATERIALS

Material	Current consumption t.p.a.	Major Applications	Dominant Firm and approx. Market share.
Urea-Formaldehyde	336	Bottle etc. closures	National Plastics
Phenol-Formaldehyde	1508	Electrical components, consumer durables etc.	Medical Packing
Melamine-Formaldehyde	1150	Picnic and Table ware. Decorated tableware	National Plastics 50 - 60%

.2 Decorative Laminates

National Plastics, who claim to be the only laminator in the Middle East, have increased production from 300 t.p.a. in 1975 to a current figure of 1,600 t.p.a., expect to increase production to 2,500t.p.a. with the introduction of a further production line. To date, their production is based upon imported impregnated papers but future plans include effecting their own impregnation with M-F and P-F resins. With an import embargo on thin laminates, they have a monopoly for these grades. Thicker grades are imported.

3. Glass Reinforced Polyesters

It was understood that there are three significant manufacturers in this field with about ten smaller producers. The overall current consumption of imported unsaturated polyester resin is thought to lie between 3,000 and 5,000 t.p.a. The only organisation visited was Idam Fibreglass who are currently consuming some 400 t.p.a. of resin in the manufacture of boats, tanks, baths and other sanitary

ware items, although they only commenced production 2½ years ago. All production is based upon hand lay-up techniques with benzoyl peroxide as the preferred catalyst.

Spray lay up techniques are not considered suitable in view of the high ambient temperatures which would lead to unacceptably high styrene loss by evaporation.

.4 Polyurethanes

Although no polyurethane processors were visited during the study, it was understood that Egyptian Plastics, Styropor Division, were considering the possible future production of polyurethane foams.

AND

5. PLANT/EQUIPMENT- CONSTRAINTS AND PROBLEMS

In view of the limited time available and the multiplicity of plant items involved, this area could only be probed superficially. The results are, however, summarised in Table VI. While the majority of firms visited had workshop facilities and although most of the equipment items were imported from the Western countries, two companies - Azza and Middle East Plastics - constructed their own presses, extruders and blown film equipment and were able to export machinery to other Arab countries.

Complex moulds and dies were imported but the trend towards manufacturing these items was increasing and included, in some cases, designing, modifying and copying. Those firms marked with an asterisk in Table VI had hardening and electroplating facilities.

Most equipment related constraints devolved upon capacity limitations imposed by, for example, poor cooling resulting from high ambient temperatures, fluctuations and frequent failures in power supplies. To offset the latter, three firms had installed their own generators and others had planned

TABLE VI PLANT SUMMARY

Organisation	Inj. Mldg.	Extruders	Blow Mldrs	Blown Film	Thermo-forming	Compr. Mldg.	Others	Age Range	Sources etc.
Egyptian Plastics									
1. Leathercloth							5 coating 2 printing 2 embossing 2 Block	From 1944-1973	Imported
2. Styropor	4	-	-	-	-	-			Home made pre-expanders
Verta Paper				6	2		Printing		Imported + 1 pilot laminating
Middle East	Range		12	Range	1	Range	From 30 yrs to new		4 Blow Mldg on order
Azza +	2	4	2	6				Vary	Design and make own
Beida Dyers	-	-	-	-	-	-	1 coating line	at least 8 years	No expansion
Mitco	-	-	-	-	-	-	1 coating 1 embossing	new	Expanding
Delta	17	3	-	-	3 vac + 3 therm	-	Range	Varies to new	Expanding and replacing older machines
National + Plastics	Many	Many	Many	Many	-	Many	Laminating m/cs	Wide	3 factories expanding
El Shariff ⁺	Many	Up to 4" diam	-					From 1958	2 factories expanding
Medical Packing ⁺	20 man. 10 auto	5 up to 50 mm	6	4	1	-	1 inj. blow moulding	From 50 yrs. to new	Expanding with orientation to agric. market

TABLE VI PLANT SUMMARY

Continued

Organisation	Inj. Mldg.	Extruders.	Blow Mldrs.	Blown Film	Thermoforming	Compr. Mldg	Others	Age Range	Sources etc.
Nasr Television	Many	-	-	-	-	?	-	-	Prod'n limited to 1 contract
Electro Cables	-	range	-	-	-	-	-	-	Specialised All imported
Lashen	-	-	-	-	-	-	14 tape looms	3 yrs	Imported adding 1 B.M. and 32 looms
Al Shanti	Range	range	-	-	-	-	2 comp'g lines	3½yrs	Large expansion 2 factories

such a move. It was considered that plant limitations were very much more common among the smaller manufacturers who experienced difficulties in obtaining consistent production. The compounders, in particular, were called upon to give frequent advice.

Craft training was carried out on an 'In-service' basis but this had to be continuous as skilled men were attracted by the higher remuneration offered by other Arab states, particularly Kuwait and the Gulf States. There was also a tendency for skilled workers to move from the public to the private sector but, in one instance, this was reversed by the greater security offered by the former.

6. QUALITY CONTROL

With^{an} expanding and largely non-critical market and, with the exception of firms manufacturing technically critical items such as electrical insulations, little quality control is being practised. Test equipment is generally unavailable and, with a shortage of hard currency, there is little motivation to purchase.

Primary raw-materials are mainly purchased from reputable suppliers of, in most cases, an international character.

Thus a high degree of consistency is achieved without recourse to raw-materials testing. As more raw-materials are produced indigenously, particularly during the early stages of production, raw-materials testing is likely to assume importance. In particular, melt and rheological properties of polymers and blends will require invigilation and if such new materials as Low Pressure Low Density Polyethylene are introduced a

thorough evaluation, especially by smaller manufacturers, is likely to be required.

In-process controls are rendered difficult by the fluctuating power supply and are largely visual or by the use of gauges.

Finished products, although some produced to Egyptian, I.S.C. or appropriate recognised standards, are mainly manufactured to informal standards agreed with the customers.

By far the most frequently requested function of the P.D.C. was to provide a facility for quality testing, possibly with certification of finished products.

As the organisations visited represented the larger processors, it is considered that more difficulties are experienced by the smaller organisations. This view is enhanced by the custom of the larger organisations to dispose of the scrap, not capable of being re-cycled, down market, to the smaller firms. Further confirmation of this view was expressed by the compounders interviewed who had to exercise more technical service to the smaller companies.

7. DISCUSSIONS WITH INSTITUTIONS

.1 The use of Plastics in Low Cost Housing.

Our visit to the Building Research Institute confirmed that they had a very active interest in the development of suitable materials as major components in the development of low cost housing. Such building materials would be expected to embody durability and non-flammability with favourable economics and, in the longer term, be reliant upon indigenous products. Sand was considered to present the ultimate low

cost filler and they had obtained sales literature relating to a novel sand-resin combination 'GRALITHEON' (5) from West Germany. Although the nature of the binder had ~~not been disclosed, samples were~~ being obtained and an investigation planned. It was envisaged that a material of this type could be used as panels in, for example, reinforced concrete framed housing blocks of up to two or three stories. A range of possible binder resins were discussed, including those currently in use in the foundry industries of the developed countries such as phenolics, furanes and modified ureas. It was suggested that they approached the foundry industry for possible cross-fertilization of ideas. They would be grateful if UNIDO could send them all available information on Low Cost Building Materials supplemented with information on the use of natural tannins in adhesives (Report of UNIDO Symposium)

2. National Research Institute

Although the N.R.I. has a Materials Testing Laboratory and are equipped to carry out conventional physical tests, they are also equipped to investigate creep and fatigue. The Polymer Division is primarily concerned with plastics, rubber and surface coatings and has also carried out research in the industrial binders field, particularly with respect to ~~brake and clutch linings~~. While they are mainly research orientated they also function as arbitrators in industrial disputes of a technical nature. It is a well established institution with well trained personnel and collaborates with the Agency for International Development. They welcome the establishment of the P.D.C. and regard its activities as likely to supplement their efforts, particularly in its

function as a test centre available to plastics processors and users in both the public and private sector of industry.

.3 Government Departments

~~In order to obtain further information~~, particularly with respect to the firms in the private sector, visits were made to The Government Organisation of The Chemical Industry and the G.E.O.I. Unfortunately they were unable, or unwilling, to assist us, although the respondent at the G.E.O.I. stated that had they had advance notice of our visit, a committee could have been convened to answer some of our questions.

.4 The Underground Drainage Authority

Discussions on the use of Concertina irrigation pipes are summarised in Section 4.5 (PVC) of this report.

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- (5) W. Germany - Patent Application 953,770 (Priority 1976) K.F.Helmut Hoedt.

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CONCLUSIONS AND RECOMMENDATIONS

1. In view of the apparent lack of quantitative knowledge of the private sector of the plastics processing industry a survey should be carried out on a continuing basis.
2. It should, however, be preceded by the compilation of a register of processing companies classified by main activities, size and geographical location. In this context assistance should be sought from relevant Government Departments including Customs and Excise and also the major PVC compounders to the private sector.
3. In addition to conventional plastics processors, the use of plastics, particularly thermosets, by other industrial sectors, should be investigated. The initial approaches should be made via resin manufacturers and relevant trade associations.
4. Terms of reference for the scope of the activities of the P.D.C. should be clearly defined in terms of both materials and their applications. For example, should the activities of the P.D.C. embrace surface coatings, adhesives and/or industrial binding applications ?
5. The P.D.C. should maintain a close relationship with organisations active, or potentially active in promoting the use of plastics in fields of 'Greatest Need', in particular the Agriculture Research Institute and the Building Research Institute. If requested they should be prepared to assist them according to their expertise.
6. The P.D.C. should actively promote the establishment and improvement in Quality Control standards throughout the plastics industry; perhaps eventually by issuing appropriate quality certificates after testing.

7. Particularly in view of the rapid growth of the plastics industry, it is probable that ecological and environmental problems may arise. Initially these should be monitored by ~~the P.D.C. who should then~~ assist in their solution.

8. The need for improved facilities for the dissemination of information on the industry itself and also on current developments was stressed by certain respondents. It was considered that the P.D.C. should play an active role in meeting this need.

PLASTICS INDUSTRY SURVEY
QUESTIONNAIRE (Aide-Memoire).

- A. Organisation
 - 1. Name
 - 2. Address
 - 3. Type
 - 4. Affiliations
- B. Respondents
Names and Positions
- C. Size of Organisation:
 - 1. i.e. Capital and/or Turnover
 - 2. Employees
- D. Product Range
- E. Markets:
 - 1. Supplied
 - 2. Shares
 - 3. Degree of Penetration
 - 4. Growth (Past)
 - 5. Potential
- F. Competition:
 - 1. Home
 - 2. Abroad
- G. Materials Used:
 - 1. Polymer Types/Grades/Sources
 - 2. Quantities
 - 3. Re-cycled
 - 4. Scrap
- H. Equipment (Plant):
 - 1. By Type, Ages, Capacities
 - 2. Future Plans
- I. Moulds and Dies:
 - 1. Types
 - 2. Sources
- J. Quality Control:
 - 1. Testing facilities (Internal)
 - 2. Testing facilities (External)
 - 3. Specifications Used.
- K. Development:
 - Technical :
 - 1. Materials
 - 2. Plant
 - 3. Capacities
 - 4. Markets
 - 5. Economic
 - 6. Labour
- M. General Discussion
- N. Forecasts - Past Growth
- O. Other Comments

With particular reference
to the establishment of
the P.D.C.

PARTICULARS OF VISITS

Members of the accompanying counterparts are as follows :

Code

1. Dr. Abu Said, Director, Plastics Development Centre Project.
2. Mrs. Nadia Nosseir, Deputy Director, P.D.C. Project
3. Chem. Mohamed el Said, Leader of Formulation Section, P.D.C.
4. Eng. Mohamed Mohamed, Petrochemicals Project

Public Sector Companies Alexandria Area

Egyptian Plastics & Electrical Industries Team 1,2, and 3

Respondents: Chem. Salah Roushdy, Head of Technical Organisation and heads of the various Divisions and Departments

Verta Paper Converting Co. 29 June Team 3.
Employees in Plastics Section 100

Respondents: Director Farouk Fran and ors.

Misr Beida Dyers 2nd July Team 2 and 3
Employees in Plastics Section 12

Respondent: Fuad Abdel Rahman, i/c Planning and Production Control

Misra Bata Co. 30 June Team 2 and 3
Affiliated to Bata Developments Ltd.(Canada)

Respondents: Chem. Eng. Mousey, Production Manager

Public Sector Companies Cairo Area

Petrochemical Project - Centre of Cairo Field Study 6 July

Dr. Famol Fayaz, Technical Director
Dr. El Warraky, Head of Research Dept. and members of Research and Marketing Sections

Delta Industrial Co. 7 July Team 3 and 4
Employees in Plastics Section - 50

Respondent: Nabil El Wardany, Project Manager

National Plastics Co. 8 July Team 3 and 4
2,300 employees (100 graduates)
Turnover 18-19 x 10⁶ LE p.a.

Respondent Cagal Nasser, General Technical Manager

Medical Packing Co. 8 July Team 3 and 4
3,000 employees, 70 technical and 100 commercial graduates
Turnover 5 x 10⁶ LE p.a.

Respondents: Samuel El Djengal, Chairman
Nasral G. Ghabriel, Chemist

Public Sector Companies - Cairo (Cont'd)

Nasr Television & Electronics Co. 9 July Team 3 and 4

Hiatus in Plastics Production

Respondent: Ali Wagdy, Head of Plastics Division

Canaltex Co. Licensed - Dunlop U.K. 13 July Team 4

300 employees - 30 graduates
Turnover 5 x 10⁶ LE p.a.

Respondent: Salah El Mehelmin, Chairman

Electro Cables Egypt 14 July Team 4

3,000 employees - 50% secondary educated and skilled craftsmen.

Respondent: Kamel El Mansi, Production Manager.

Private Sector Companies Alexandria Area

Middle East Plastics 29 June Team 3

600 employees

Respondent: Zakey Faraq Manager

Azza Plastics 30 June Team 3

44 employees

Respondents: Mohamed Mossou, Chairman
Abdel Aziz M. Osman

Mitco Synthetic Leather 31 July Team 2 and 3

Employees 45
Turnover 1.5 x 10⁶ LE p.a.

Respondents - Mr. Haly Hanga Partner
Eng. Farouk Hanga -do-

Private Sector Companies Cairo Area

El Shariff Plastics Co. 8 July Team 3 and 4

2 Factories, 700 employees, 35 graduates
175 skilled craftsmen

Respondent: Mohamed Barghout, Technical Manager

Idam Fibreglass Co. 10 July Team 3 and 4

Respondent: Abraham Makure, President

Lashen Plastics Industries Co. 14 July Team 4

150 employees

Respondents: M/s Nabila Lashen and Eng. A.M. Lashen

Al Shanti for Chemical Industries 15 July Team 4

70 employees - 10 graduates
Turnover 750,000 LE p.a.

Government and Other Institutions

Government Organization of the Chemical Industry
7 July Team 3 and 4

Respondents: Director General and
Section Leader of Chemical
Industry Costing

Building Research Institute 9 July Team 3 and 4
Dr. R. Hames

Respondent: Director General for Housing, Building
and Planning Research.

National Research Institute 9 July Team 3 and 4

Respondent: Dr. Nadim Ghanem, Head of Polymer Division

Underground Drainage Authority 10 July Team 3 and 4

Respondent: Mohamed Sami Ohsen Vice President

Government Organisation for Quality Control
of Industries 15 July Team 4

Dr. Michal Goreos El Sabawy - Head of Chemistry Dept.

G. E. O. I.

Mr. Said Iman, Chemistry Dept.



