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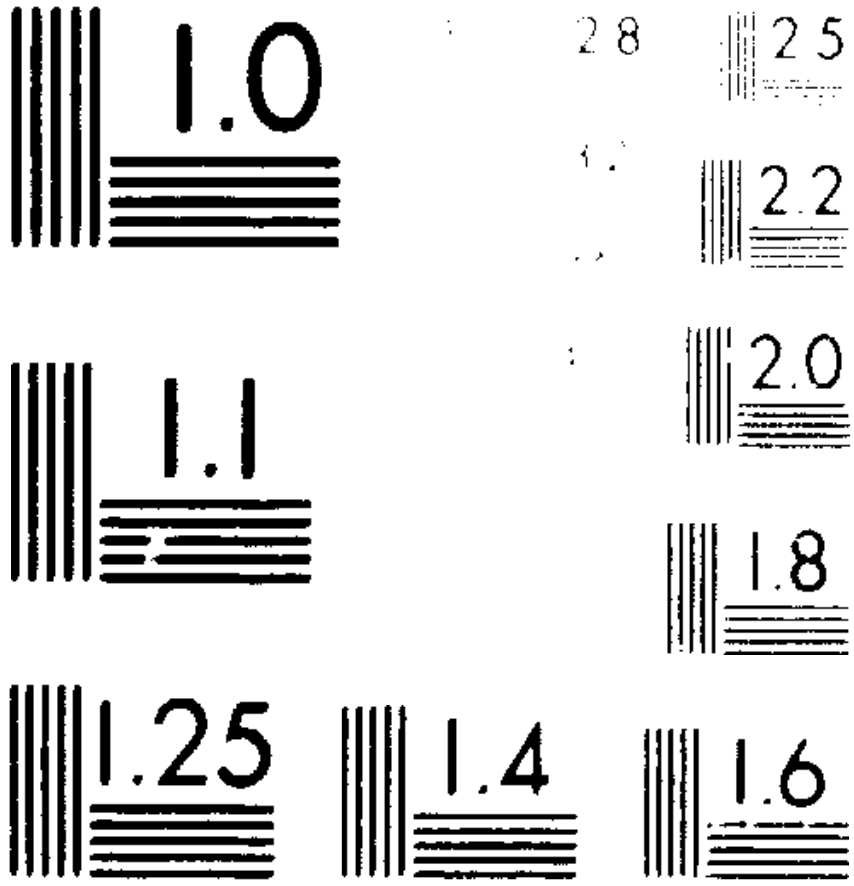
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org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15 July 1982

SURVEY OF THE EGYPTIAN RUBBER MANUFACTURING INDUSTRY AND CREATION OF A DEVELOPMENT CENTRE

SI/EGY/82/801/11-01

Terminal Report

Prepared for the Government of the
Arab Republic of Egypt

by

Philip McLean Swift

CONTENTS

ABSTRACT

The Egyptian rubber industry uses only 10,000 MT/y of rubber. The state sector uses about 9,000 MT/y, about 1,000 MT/y being used by the private sector, which consists of a few small companies (100-200 MT/y) and many tiny companies (about 10 MT/y). Current expansion in the state sector, including joint ventures, will double the size of the industry by 1984-5, when it will satisfy 80% of home demand.

Further expansion depends on increasing industrialization of Egypt, with accompanying rise in per capita demand, or on export, currently nil. Export will depend on the development of suitable products with good quality control.

Development facilities are almost non-existent, and it is proposed that a development centre be set up to undertake development of components particularly suitable for use in Egypt and neighbouring countries, and to foster quality control in the smaller companies to assist their expansion.

INTRODUCTION

The Egyptian rubber industry is fairly small, using around 10,000 tons of rubber/year (natural and synthetic), and filling only about half the current home market demand. Per capita consumption is small, about 0.5 kg per head. The purpose of this report is to describe the present industry and its plans for the immediate future, and to indicate how far a development centre could usefully increase the technical expertise available to the industry to assist its expansion. Some consideration is given to products which might economically be made in Egypt for export.

The survey was initiated by the Government of the Arab Republic of Egypt. The job description is appended (Annex 1). The survey was undertaken by the writer of this report with the co-operation of, principally, Mr Fathi el-Feki of Trenco, and Mr Galal Azmi of Narubin.

This document is concerned with the survey and with brief recommendations that a development centre should be set up. These recommendations are amplified in the Project Document.

PRESENT STATE OF THE INDUSTRY

The industry is small but expanding. Current rubber consumption is 10,000 MT/y producing goods to the value of LE 20m, currently matched by about an equal volume of imports. There is no export trade. The distribution of rubber consumption is shown in the table below, about 9,000 MT/y being used by the state sector, the rest in the private sector, which consists of a few small factories, and many tiny one-room factories. Current expansion in the state sector, including joint ventures with state and foreign participation, will approximately double its size by 1985, when it will satisfy about 80% of home demand. There was no intimation of expansion in the private sector.

Rubber Consumption in Egyptian Industry

Product: Tyres (car, truck, tractor)

Companies	Consumption MT/y
State Sector	
Trenco (current)	6000
Trenco (planned expansion)	3000
Trenco/Dunlop J V	9000
No private sector	

Product: Footwear, conveyor belts, V belts, hose, general mechanical goods

Companies	Consumption MT/y
State Sector	
Narubin (current)	3000
Narubin/EMS J V	2000
Bata	
Private Sector	
SEPAC	100-200 (of EVA)
United Rubber Works	100-200
African Rubber	70-100
Small factories about thirty	10- 20

In general, techniques are not modern, though joint ventures will of course go far to remedy this where appropriate. Where the product demands a special shop, organization appears efficient, but general rubber goods production left much to be desired, presses and surroundings being normally dirty and untidy. A general criticism is that compound awaiting further processing was exposed to contamination by floor dirt. Compound was sometimes kept on the floor and frequently pallet stored compound had overlapped onto the floor. Mixing equipment was in general good and efficiently used.

The above remarks apply to the public sector and particularly to the private sector. The two small (10 MT/y) factories inspected were well organized, as is often so when the proprietor is 50% of the total staff. Two of the larger private sector factories each making a special product, were also particularly well organized.

FUTURE EXPANSION

A Replacing imports

As has been noted above, it is expected that Egypt will produce 80% of home requirements of tyres in the next few years through the joint venture with Dunlop and the current expansion of Trenco.

B Increasing per capita consumption

This can only come through the increasing industrialization of Egypt. There is a close link between industrial activity and rubber consumption in developing countries, exemplified by data from the United Nations Statistical Yearbooks,

Year	1960	1970	1977
Production Index	50	100	150
Rubber Consumption Million MT/y	0.25	0.77	1.4

Several forecasts have been seen of rubber consumption in Egypt. These differ quite widely, but all depend on some view of the industrial future. In one case an apparently complex attempt to forecast rubber consumption as a function of several variables amounted to no more than a simple linear extrapolation of recorded consumptions.

Accepting a link between rubber consumption and industrialization, the rubber industry should be seen, in this particular respect only, as following the industrial health of Egypt, and not of itself contributing to it, other than of satisfactorily supplying the home market, as in A.

C Export

Export offers the only chance of substantial expansion, whether to developed countries or to neighbouring countries to which Egypt may have exported in the past. For instance Saudi Arabia imports 50,000 MT/y of tyres and tubes, and over 10,000 MT/y of other rubber products. The sources are Japan (60%), Europe (25%), US and increasingly Korea. Saudi Arabia is also of course eager to improve her own rubber industry,

and for joint venture tyre manufacture. The car tyre market is very cost conscious, and truck tyre would probably offer a better chance. After tyres the most important product is irrigation hose, which is already a major product of Egyptian industry.

Currently wage rates in Egypt are low, and this gives Egypt some advantage. This is quantified below for various classes of non-tyre products, as made in UK and in Egypt, assuming that material costs and overheads are the same, and that labour costs in Egypt are 20% of those in the UK.

	% Contribution by			
Conveyor belting	Materials	Labour	Overheads	Total
UK	75	12	13	100
Egypt	75	3	13	91
Moulded Goods				
UK compression	45	30	25	100
UK injection	45	15	30	90
Egypt compression	45	6	25	76
Extrusion				
UK conventional	25	35	40	100
UK continuous cure	25	20	40	85
Egypt conventional	25	7	40	72
Inflatable Goods				
UK	20	40	40	100
Egypt	20	8	40	68

The above is an approximation and further consideration would have to be given to suggested specific items. For instance in the case of pipe sealing rings, the contribution of overheads to the cost of production will vary with required weekly production, because this influences not only the type of machine to be bought but also mould depreciation cost. In conveyor belting, where the difference between UK and Egypt is small, the comparison will depend particularly on availability of carcass material from within Egypt.

Clearly for articles with a high labour content Egypt has an advantage, and though the comparison has been with the UK, there should still be an advantage over countries such as Korea where wage increases have accompanied export-based prosperity. Pipe sealing rings should be carefully evaluated in terms of the relative cost of injection moulding and compression moulding. This is a high value precision product and the numbers required can vary widely. In the UK the cost advantage of injection mould depends critically on choice of machine. Compression moulding in Egypt would certainly be cheaper, given proper quality control, adequate precision and semi-mechanisation of the process to give maximum throughput.

Reflecting road-studs are a profitable line. The original patents have expired, and several versions are believed to be now being made. The demand is not large, probably not more than 500 MT/y of rubber worldwide, and obviously depends on new road building and upgrading of existing roads.

TECHNICAL REQUIREMENTS FOR EXPANSION; THE ROLE OF A DEVELOPMENT CENTRE

To compete successfully in home or export market will require that products shall be suitable for service conditions, shall be of assured quality, and shall be produced efficiently. It is suggested that a development centre will be of considerable assistance in all these respects, particularly if it is desired to give the private sector opportunity to expand.

To develop components suitable for particular service conditions can require one year to four years. In that time typically there will have been experimental compounding, processing and testing in laboratory terms, factory trials and service trials. This requires development facilities, of which there are few in Egypt, and those which do exist are not available to the industry as a whole. Even more important it requires staff whose time is mainly devoted to development, and is not monopolized by the daily requirements of factory production.

Efficient quality control is necessary. In fact some major buyer of rubber components not only impose quality specifications, but also insist that a manufacturer's quality control arrangement shall be to their liking. An application might demand particular qualities. It would be the duty of a development centre to discover those qualities and to translate them into laboratory tests. Further the centre should develop simple tests which would assure the small manufacturer of meeting the required specification without necessarily performing all the specified tests, and would police the manufacturer's production by regular checks. For instance, to develop standard compounds (or masterbatches) made by the larger companies for sale to the smaller companies, strictly to specification, and requiring minimum conversion by the small man would solve many of his problems.

A development centre should also become conversant with the possible manufacturing techniques, and the relative cost of these in Egyptian terms, in order to give the manufacturer at least preliminary advice on choice of method. It should be aware of new developments in materials and methods, and should be prepared to comment on the value of them to Egypt, and to perform development work as necessary.

BRIEF DESCRIPTION OF A DEVELOPMENT CENTRE

Detailed suggestions for a development centre are contained in a separate Project Document. There follows a summary of the suggested structure, equipment and staffing of such a centre.

The structure is of a Director, an administrator, four senior technologists working on development and technical service, a senior technologist in charge of physical testing and a librarian or intelligence officer. Each development technologist and the intelligence officer is to have a graduate assistant. There is at least initially to be no permanent mill room staff engaged solely on mixing and curing.

There is to be a management committee whose function will be to discuss with the Director and senior staff the choice and conduct of work. The members of this committee should between them express the point of view of the industry and its problems; the government and the general economic requirements; and research and development and problems and conduct thereof. Ultimate responsibility for the centre should lie with the Ministry for Industry.

Senior staff will be English speaking graduates in chemistry or chemical engineering with some years experience in various branches of the industry. In the time necessary to build and equip the centre they will be sent to the UK to gain a degree in polymer science and technology, or in rubber technology (two years) and to gain experience in the laboratories of various suppliers who are expected to co-operate.

Junior staff will be new graduates who will be assistants to individual seniors. They will perform all practical operations. It is envisaged that in two or three years time the best will be sent to the UK to take rubber qualifications and the rest will be encouraged to return to industry.

Pay must be suitably adjusted to retain staff.

Mill room plant is to be laboratory scale except that the extruder should be of sufficient size (50 mm) to give results which relate to larger extruders, and except for the injection moulding machine which similarly must be of a minimum size. Injection moulding has little place in Egyptian industry now, but in 4-6 years time the situation will probably begin to change. Pilot mixing plant is not recommended, and even at a later date should be considered very carefully.

Physical test equipment will allow all usual tests to be performed. Local construction is recommended of specific test jigs as needed.

The library or intelligence section will subscribe to the abstracting service of the Rubber and Plastics Research Association, UK, which is available on paper or on tape. By the time that the centre is operating this service should be available on Euronet. Consideration should be given to obtaining access to this.

UNIDO technical experts should be called in as follows:

1 A technical advisor to advise (at least in the early stages) on choice of equipment and conduct of development programmes.

2 An expert in physical testing to start up the physical testing laboratory, to ensure that tests are correctly conducted and that the significance of results is properly appreciated.

NEW MATERIALS AND METHODS

New materials come forward continually. At present there is a tendency to replace emulsion polymers by solution polymers, thermoplastic rubbers are displacing vulcanizable rubbers in some applications, powdered rubbers in conjunction with new processing techniques have been much discussed. It will be a function of the development centre to be aware of these developments, to do appropriate practical work and to make appropriate recommendations. These might be for manufacture of particular materials in Egypt, eg for certain types of rubber or thermoplastic rubber or for adoption of new materials or methods for specific products.

Thermoplastic elastomers requiring no vulcanization stage have been used for many years, the polyurethane elastomers being introduced in 1951. These have established a place as rather expensive but hardwearing materials for special products. In recent years there has been a resurgence of interest in cast tyres for car, truck or tractor, and it appears likely that polyurethane tractor tyres will be marketed in 2-3 years. It is not yet established, at least in published data, that they have any advantage over normal tractor tyres, and the published costing appears increasingly doubtful in view of rapid rises in chemical costs. For truck and car polyurethane tyres appear likely to fail on grounds of softening, even melting, in panic stops when the tyre is overheated, and through poor wet grip and poor handling.

More recently, general purpose thermoplastic rubbers have made a restricted impact. The limitation on their use is the same factor as allows their moulding, ie heat softening. Their main applications are in sports shoe soles and tubing, and no major application appears to be developing.

The production of synthetic polyisoprene has not increased for several years, except in the USSR. In that country the use of PI has increased markedly, for reasons of self sufficiency, and much is exported at quite low price. The defects of PI as normally produced

are principally low green strength and low tear resistance under some circumstances, and these have prevented wholesale adoption. It reputedly improves mould flow, and this is a major reason for its use, at least in Western Europe and USA.

Of all these newer polymers, the most important to Egypt are the solution polymers, since decisions will have to be taken when the time comes to embark on synthetic rubber production.

MACHINERY MANUFACTURE IN EGYPT

Mills and presses are relatively simple items, and it is not uncommon for manufacturers to make their own. Expansion of the smaller companies would call for some number of mills and presses. In discussion, it appears that the Egyptian engineering industry should be capable of making these of sufficient size (eg at the ship repair yards in Alexandria). There is the further possibility of an export trade, for instance Japanese, Korean, and Chinese mills are frequently seen. It is suggested that this should be further investigated, with the assistance of an appropriate engineering expert. This may well be done in conjunction with the UNDP project Engineering and Industrial Design Development Centre.

LOCATION

There are two natural choices, Cairo and Alexandria. In locating the centre, there should be considered the proximity of the industry to be served, the availability of buildings and acquisition and retention of staff.

Though most non-tyre rubber companies are in Cairo, this could well change quite rapidly, eg the joint venture Narubin/EMS is at Tantra, and companies seeking larger premises may well leave Cairo, if there were financial incentive. Further, most enquiries will be by telephone or letter, and personal visits are fairly easy by a good train service.

For building, a site is available in Alexandria on land belonging to Trenco, and this site will allow expansion. No doubt a suitable site could be found in Cairo.

The overriding factor is acquisition and retention of good staff. Alexandria is generally held to be the pleasanter place to work, though rents are higher than in Cairo.

It is recommended that the centre should be built in Alexandria, and that staff (particularly senior staff) should be paid sufficient to retain them.