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**TRAINING AND  
DEMONSTRATION CENTRE  
FOR THE MANUFACTURE  
OF LEATHER FOOTWEAR  
AND LEATHER GOODS**

DP/PDY/71/514

**DEMOCRATIC  
YEMEN**

**TERMINAL REPORT**

Prepared for the Government of Democratic Yemen by the  
United Nations Industrial Development Organization,  
executing agency for the  
United Nations Development Programme



**United Nations Industrial Development Organization**

United Nations Development Programme

TRAINING AND DEMONSTRATION CENTER FOR THE MANUFACTURE OF LEATHER  
FOOTWEAR AND LEATHER GOODS

DP/PDY/71/514  
DEMOCRATIC YEMEN

Project findings and recommendations

Prepared for the Government of Democratic Yemen  
by the United Nations Industrial Development Organisation,  
executing agency for the United Nations Development Programme

Based on the work of G. Peterson, the project manager

United Nations Industrial Development Organisation

Vienna, 1977

### Explanatory notes

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

The monetary unit in Democratic Yemen is the dinar (YD). There are one thousand fils to a dinar. During the period covered by the report, the value of the dinar in relation to the United States dollar was \$US 1 = YD 0.343.

A slash between dates (e.g. 1975/76) indicates a financial year.

The use of a hyphen between dates (e.g. 1975-1979) indicates the full period involved, including the beginning and end years.

The following forms have been used in tables:

Three dots (...) indicate that data are not available or are not separately reported

A dash (-) indicates that the amount is nil or negligible

A blank indicates that the item is not applicable

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ABSTRACT

The Government of Democratic Yemen, in line with its policy of expanding light industry, decided to develop the Training and Demonstration Centre for the Manufacture of Leather Footwear and Leather Goods and, in September 1971, submitted a request to the United Nations Development Programme (UNDP) for assistance. Field operations commenced in July 1972 on the project "Training and Demonstration Centre for the Manufacture of Leather Footwear and Leather Goods" (DP/PDY/71/514) with the arrival of the project manager in Democratic Yemen. The project manager drafted a project document which was approved in May 1973 by the Government, the UNDP and the United Nations Industrial Development Organisation (UNIDO), the executing agency. The duration of the project was for a period of three years, until June 1975, later extended by 18 months to the end of 1976.

The Government provided a building - a garage - located in the industrial area of Maalla, Aden; its area of 1,300 m<sup>2</sup> is adequate and will allow for future production, in one shift, of 600-800 pairs of footwear and different leather goods. The factory has two floors and a large working hall, providing comfortable working conditions, with clear gangways, and offices, stores and toilets. The Government made financial provision for the necessary conversion of the building, provided equipment, offices and industrial furniture, and will ensure long-term staffing and financing of the project. The final contribution of the Government was YD 97,000 and of the UNDP, \$336,543.

The long-term objectives of the project were: (a) to train local labour to satisfy technological demands; and (b) to produce leather footwear and leather products using nationally produced leather in order to reduce imports.

The immediate objectives were: (a) to train operatives to use the cemented method of manufacturing footwear; (b) to introduce suitable modern techniques, methods and processes; (c) to train supervisory and technical managerial staff in modern technologies of footwear manufacture; and (d) to provide technical management and organisation in planning, production, quality control and technical departments, including the purchasing of materials and the marketing of products.

It was planned to turn the Centre, at the termination of the project, into a footwear factory, to be called the Leather Shoe Manufacturing and Training Centre. The National Tanning Factory in Sheikh Othman will supply suitable

quantities and quality of tanned leather to enable the Centre to diversify its products. In 1971, Democratic Yemen imported 202,800 pairs of leather footwear, valued at YD 153,400 and accounting for 95% of estimated local consumption. Increased investment in the Centre should improve the quantity and quality of products and eliminate the necessity of importing footwear.

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## INTRODUCTION

The economy of Democratic Yemen is mainly agricultural but priority is being given to industrialization using locally available raw materials such as raw hides and skins. In 1975, the livestock population was 2,200,000 providing a basis for a leather industry.

The Government, in line with its policy of expanding light industry, decided to develop the Training and Demonstration Centre for the Manufacture of Leather Footwear and Leather Goods and, in September 1971, submitted a request to the United Nations Development Programme (UNDP) for assistance. Field operations commenced in July 1972 on the project "Training and Demonstration Centre for the Manufacture of Leather Footwear and Leather Goods" (DP/PDY/71/514) with the arrival of the project manager in Democratic Yemen. The project manager drafted a project document which was approved in May 1973 by the Government, the UNDP and the United Nations Industrial Development Organization (UNIDO), which was the executing agency. The duration of the project was for a period of three years, until June 1975, later extended by 18 months to the end of 1976.

The Government provided a building - a garage - located in the industrial area of Maalla, Aden; its area of 1,300 m<sup>2</sup> is adequate and will allow for future production, in one shift, of 600-800 pairs of footwear and various leather goods. The factory has two floors and a large working hall, providing comfortable working conditions, with clear gangways, and offices, stores and toilets. The Government made financial provision for the necessary conversion of the building, provided equipment, offices and industrial furniture, and will ensure long-term staffing and financing of the project. The final contribution of the Government was YD 97,000 and of the UNDP, \$336,543.

The long-term objectives of the project were: (a) to train local labour to satisfy technological demands; and (b) to produce leather footwear and leather products using nationally produced leather in order to reduce imports.

The immediate objectives were: (a) to train operatives to use the cemented method of manufacturing footwear; (b) to introduce suitable modern techniques, methods and processes; (c) to train supervisory and technical managerial staff in modern technologies of footwear manufacture; and (d) to provide technical management and organization in planning, production, quality control and technical departments, including the purchasing of materials and the marketing of products.

It was planned to turn the Centre, at the termination of the project, into a footwear factory, to be called the Leather Shoe Manufacturing and Training Centre. The National Tanning Factory in Sheikh Othman will supply suitable quantities and quality of tanned leather to enable the Centre to diversify its products. In 1971, Democratic Yemen imported 202,800 pairs of leather footwear, valued at YD 153,400 and accounting for 95% of estimated local consumption. Increased investment in the Centre should improve the quantity and quality of products and eliminate the necessity of importing footwear.

The expert's recommendations are contained in the body of the report.

## I. FINDINGS

When the project began, shoe technology was completely lacking in Democratic Yemen. Shoes and sandals were produced in small workshops by individual shoemakers employing an average of three workers. There were 40 small workshops in operation in Aden and about 45 throughout the rest of the country with an estimated total labour force of 255 people. The work was all done by hand except for stitching the uppers, for which sewing machines were used. This situation allowed for problems dealt with during the project to be solved by modern techniques.

### A. Anthropometrical studies

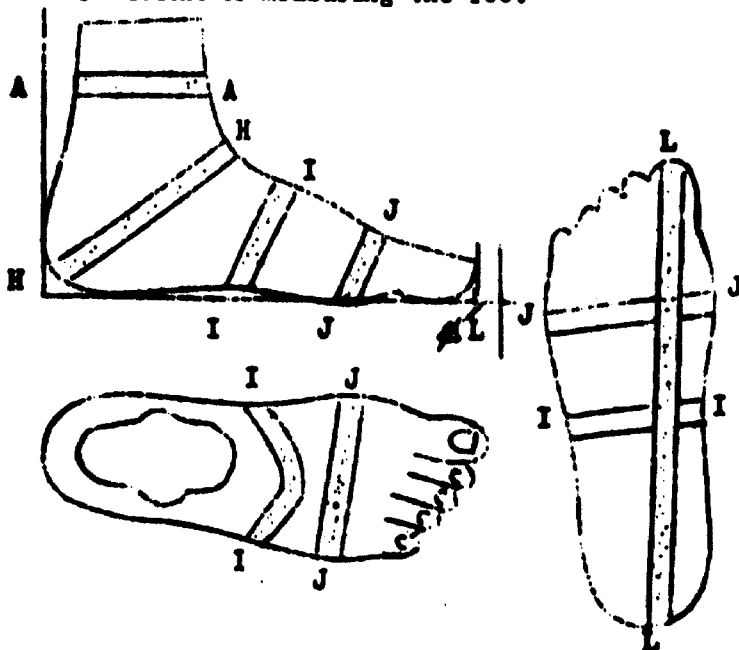
In the shoe industry, the most important tool is the last. The construction of imported lasts from countries in the Far East, including China, Hong Kong and Japan, does not correspond with the characteristics and dimensions of feet in Democratic Yemen; therefore, anthropometrical studies were made to obtain data on feet in order to establish measurements for lasts (see table 1 and figure I). After careful study of statistics obtained from a wide area the results were classified into keys for lasts suitable for use in Democratic Yemen (tables 2, 3 and 4).

Table 1. Differences in foot measurements between weight on and weight off

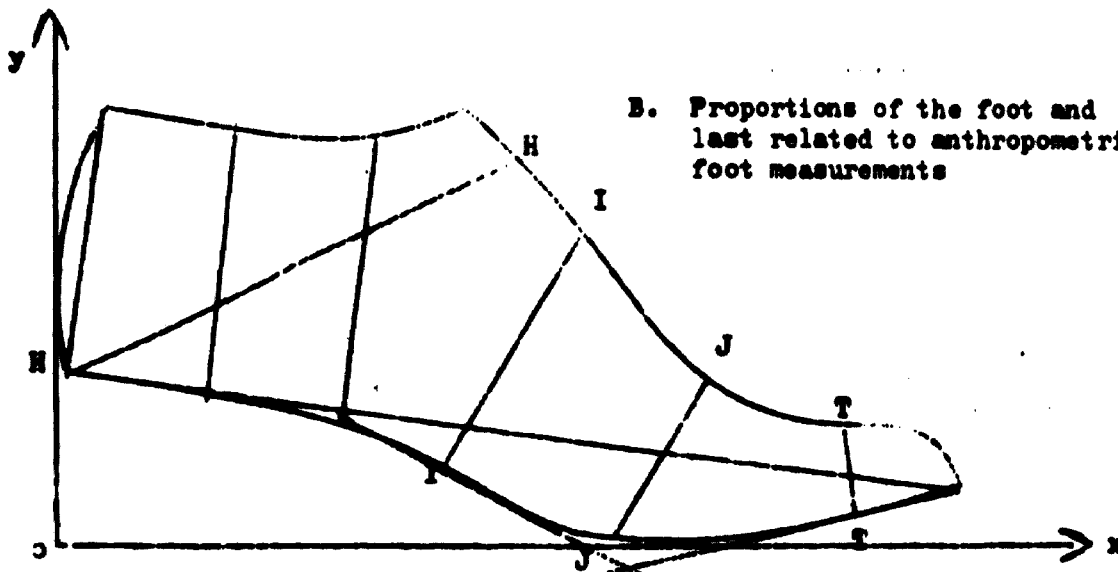
Part measured	Male	Female (in mm)	Children
Sole length	8-10	6-8	4-6
Joint girth	8-10	6-8	4-6
Instep girth	5-7	4-6	4-6
Heel girth	4-6	3-5	2-4

Figure I. Anthropometrical foot measurements

A. Positions of measuring the foot



B. Proportions of the foot and last related to anthropometrical foot measurements



- L - L The length of the foot.
- J - J The position of the joint.
- I - I The position of the instep.
- H - H The position of the heel.
- A - A The position of the ankle.
- T - T Thickness of the toe part.
- Δ - L Extension given to the length of the last over the foot.

Table 2. Last measurements for the joint perimeter

Men's Sizes in cm	Joint perimeter (in mm)									
	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	
Fittings:	6	223	227	231	235	239	243	247	251	255
	7	228	232	236	240	244	248	252	256	260
	8	233	237	241	245	249	253	257	261	265
	9	238	242	246	250	254	258	262	266	270

Boys' and girls' Sizes in cm	Joint perimeter (in mm)													
	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0	
Fittings:	5	173	176	179	182	185	188	191	194	198	202	206	210	214
	6	178	181	184	187	190	193	196	201	203	207	211	215	219
	7	183	186	189	192	195	198	201	204	208	212	216	220	224
	8	188	191	194	197	200	203	205	209	213	217	221	225	229

Infants' and children's Sizes in cm	Joint perimeter (in mm)								
	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	
Fittings:	5	125	128	131	134	137	140	143	146
	6	130	133	136	139	142	145	148	151
	7	135	138	141	144	147	150	153	156
	8	140	143	146	149	152	155	158	161

Table 2 (continued)

Men's	French sizes	38	39	40	41	42	43	44
		Joint perimeter (in mm)						
	6	223	228	233	239	244	249	255
	7	228	233	238	244	249	254	260
	8	233	238	243	249	254	259	265
	9	238	243	248	254	259	264	270

Boys' and Girls'

Boys' and Girls'	French sizes	27	28	29	30	31	32	33	34	35	36	37	38
		Joint perimeter (in mm)											
	5	164	169	174	179	184	189	194	198	203	208	213	218
	6	169	174	179	184	189	194	199	203	208	213	218	223
	7	174	179	184	189	194	199	204	208	213	218	223	228
	8	179	184	189	194	199	204	209	213	218	223	228	233

Table 3. Last measurements for the instep perimeters

	Instep perimeter (mm)	Fittings (in cm)			
		Men	Boys	Girls	Children
Boots	0-5	7.8	6.7	6.7	6.7
Shoes	5-10	6.7	5.6	5.6	5.6
Sandals	10-15	8.9	7.8	7.8	7.8

Table 4. Extension of the insole pattern connected to the shape of the toe g/

Toe shape	Extension (mm)
Broad, square	0-4
Medium, round	5-8
Pointed	9-20
Sandals	0-minus 5

g/ See figure I.

In addition to shoe sizes (denoting the standard length of last with any toe-part extensions), lasts are marked with fittings, in numbers or letters of smaller or larger perimeters.

All lasts ordered (13 forms and nearly 500 pairs) for the Centre were purchased after the new proportions were established.

After footwear made on the new lasts had been sold and worn, examination showed that the measurements were correct. However, a survey in the wear and adjustment of the established last proportions (see table 2) needs to be made.

### B. Training

Production consists of four elements: men, materials, machinery and methods; however, the finest materials, the most modern machinery, and efficient methods are of little use without the proper co-operation of labour.

The nature of the materials used for footwear make it impracticable to completely automate their manufacture. For the most part, the machines used are best described as power tools designed to follow hand practices. Hence,

a high degree of skill is required on the part of the worker who is able to greatly influence the results of the work done by machine. It is because of this dependence upon individual skill and judgement that the selection and training of labour for the industry are of great importance.

There is, however, no definite organization for the recruitment of labour for the shoe industry. In some areas where shoe factories are concentrated, there is a clear understanding of the industry's requirements and careful consideration of the qualifications of applicants.

It is desirable that selection should be made with regard to specific jobs as workers in the shoe industry rarely move from one job to another and it is therefore important to place them in the right department initially.

Undoubtedly, the foreman or team leader has the best knowledge of the requirements of his department and, to a certain extent, should have the right to express his opinion when he is held responsible for the work done.

When engaging labour at the Centre, the following considerations are made:

- (a) Health (the applicant's statement or a doctor's certificate);
- (b) Ability (i.e., the applicant's own rating or testing);
- (c) Experience, evidence of which should be given;
- (d) Character, usually based upon references;
- (e) Personality, as judged by the interviewer;
- (f) Social or family status;
- (g) No more than two persons from one family;
- (h) Local labour regulations.

Health is the first consideration. Ability is established by testing. For instance, a cutter (clicker) requires good eyesight with an ability to distinguish colours, as well as a good spatial sense, whereas the success of a machine operator depends to a large extent on manual dexterity and rhythm.

The main activity of the agency's project manager was technical and specialisation training. This included practical and theoretical instruction of techniques and processes and operation of the different machines, equipment and tools utilised in the manufacture of footwear and leather goods.

Work was hampered by the use of incorrect techniques, such as the cutting of box leather on the flesh side, the wrong use of adhesives etc., which led to many production faults resulting in claims.



The training programme was divided into two parts dealing with fellowships - in Democratic Yemen and abroad - and regular training courses.

Fellowships

Four candidates for the posts of: (a) co-manager; (b) shoe technologist; (c) leather goods technologist; and (d) mechanic were given fellowships for training at the factories of Bata Ltd in Alexandria, Egypt, for a six-month period from the end of May 1974 (see table 5).

Table 5. Fellowships in Egypt, 1974

Fellowship	Duration (months)	Name	Started	Completed
Co-manager	6 <sup>a/</sup>	S.A. Mansoor	May	November
Shoe technologist	6	S.M.S. Bahamish	May	November
Leather goods technologist	6	A.H.M. Taresh	May	November
Mechanic	6	N.M. Hibatullah	May	November

a/ Reduced from 12 to 6 months.

Training was aimed at giving practical experience in the latest modern techniques of the profession adapted to suit conditions and requirements of developing countries. The main aspects were: (a) departmental organization; (b) technological discipline; (c) efficient use of materials; (d) output; (e) quality; (f) training of labourers; and (g) payment systems.

After his return from Egypt, the co-manager carried out administrative and executive work in the small starting unit in the Centre.

During the primary stage of production (1974-1975), the main technological and training problems were solved by the project manager and footwear expert. Production was organized by the two technologists. One directed the manufacture of upper and bottom parts as technical co-ordinator, and the other worked as foreman in the making department (lasting, bottoming and finishing). Their work was satisfactory and continued to improve. This was also true of the mechanic who worked as chief of the maintenance department. However, the co-manager and the shoe technologist would have benefited more from their fellowships if their technological knowledge had been sounder.

It is the opinion of the project manager that fellowship training is only useful when the candidate has had serious practical training under local conditions, and when his technical knowledge has a solid basis.

Specialized courses were held at the Centre in selected subjects, such as modelling (shoe designing) and pattern making, and were of six-months duration (from May 1973 to October 1973). There were 11 participants.

#### Regular training courses

These were of a duration of three months each and were organised in 1974, 1975 and 1976 in the following departments:

- (a) Upper leather and lining cutting;
- (b) Upper preparation and closing (stitching);
- (c) Bottom preparation and clicking;
- (d) Making (lasting to finishing).

The regular training courses were conducted for skilled and semi-skilled operators to improve their competence (table 6).

All training activities were supervised by the project manager.

Workers were instructed in different skills as absences, retirements and dismissals are frequent.

The fulfilment of training objectives is demonstrated by the daily production of 120-200 pairs of shoes.

During practical training trainees were chosen to train new operators. From this group were selected: four team leaders; one upper-leather sorter; four controllers; and one quality controller.

The project manager personally trained the chief mechanic in the maintenance of sensitive and valuable machines (sewing, upper leather splitting, bottom clicking and pulling over and lasting machines). The training dealt with the adjustment, operation, action of mechanisms (hydraulic and electronic), faults and their repairs, reading of diagrams and plans, and the ordering of spare parts.

Labourers to management come in 5-120 minutes late for work. Frequently it is the same people who are late. No effective disciplinary measures are taken by management or by the labour union's representatives to reduce tardiness which has repercussions on production.

Table 6. Short-term training courses

Training	Duration (months)	Number of participants
<b><u>Specialized training course</u></b>		
Modelling (shoe designing) and pattern making	6	11
<b><u>Regular training courses</u></b>		
<b><u>First course, 1974</u></b>		
Upper and lining cutting	3	10
Upper closing, preparation	3	25
Bottom preparation	3	5
Lasting to finishing	3	<u>20</u>
		60
<b><u>Second course, 1975</u></b>		
Upper and lining cutting	3	5
Upper closing, preparation	3	20
Bottom preparation	3	3
Lasting to finishing	3	<u>12</u>
Leather goods manufacture	3	<u>4</u>
<b><u>Third course, 1976</u></b>		
Upper and lining cutting	3	10
Upper closing, preparation	3	10
Bottom preparation	3	5
Lasting to finishing	3	<u>5</u>
		30

Very surprising is that, for the first time, 60% of the staff in production are women. The cutting and closing departments, where the work done corresponds to their abilities, are staffed only by women, starting from the operators and finishing with the team leader. For heavier operations, in the bottom preparing and making departments, only men operators are employed.

The majority of the national staff is able, with supervised training, to become competent hand operators of machinery, thanks to their easy manual movements and quick understanding of various technological principles.

C. Recommendations

1. Rules should be laid down for the nomination and careful selection of fellows and training abroad should be given only to trainees who have professional experience in the industry, and who have undergone a period of work at the Centre at different levels of responsibility. Only in this way will the desired results be obtained from fellowships.
2. Some experienced personnel from the unit should be sent on periodic refresher courses to keep up with the latest technology and update their skills.
3. Lacking suitable personnel for training abroad, greater emphasis should be laid on such training within the country through bilateral and multilateral assistance.
4. A fellowship should be obtained to train a mechanic in Czechoslovakia where the main equipment is obtained.
5. Fellowships for shoe designers should be obtained from either: (a) the Technical College at Leicester, the United Kingdom; or (b) the Ars Sutoria Instituts, Milan, Italy.
6. Theoretical and operational training in different departments should be continued after a special training programme.
7. Seminars, with expert participation, should be arranged including one for cutters and clickers who use both upper (leather, leather lining) and bottom (rubber, leather fibre, cardboard) materials. Detailed instructions should be given on the rational use of materials, costing the cut sections and summarising the completed costings in the form of a profit-and-loss account showing the net result of cutting each kind of leather or material. At the same time, instructions should be given on the proposed payment system based on piece-work rates with an additional bonus system for the saving of materials.

## II. THE LEATHER SHOE MANUFACTURING AND TRAINING CENTRE

### A. The building

Three buildings were proposed for the project: the Store House in Crater, the Ali Maktari Building in Sheikh Othman and the Virginia House, Maalla. After the nationalization of buildings another, much more suitable building was proposed, namely, the Lancia Garage, located in the industrial area of Maalla, Aden. It has a ground floor with outside court and pillars. The utilized area is 1,300 m<sup>2</sup> which can accommodate a future production of 600-800 pairs of shoes per day in one shift. This new site is of an ideal size; it allows comfortable working space for operators with clear gangways and there is room for future expansion.

It has close access to communications, transportation and the commercial area of Maalla, and assures an easy recruitment of manpower from the vicinity.

Materials and equipment have been totally depreciated by pouring rains therefore the building should be carefully maintained with special attention given to the roof and the sewerage system to avoid overflow and accumulation of water inside the working area.

To reach, by 1979, the established production figures of 600-800 pairs of shoes per day, the existing working space should be enlarged by 500-600 m<sup>2</sup>.

### B. The layout of departments

The general layout of the departments and relative position of the terminal points are important (see figures II and III). The underlying principle governing the arrangement of departments was that provision must be made for the progress of work in such a way that the minimum of transit is necessary during the manufacturing process.

The different departments have to be spacious enough to permit machinery to be laid out in such a way that the operative has more than the minimum space allowance so that shoes may be passed directly from one process to the next. Generally, the order is:

First, an assembly point where making-lasts are stored and where the various upper and bottom components are treated separately and simultaneously;

Figure II. Technological arrangements of the Leather Shoe Manufacturing and Training Centre, Aden

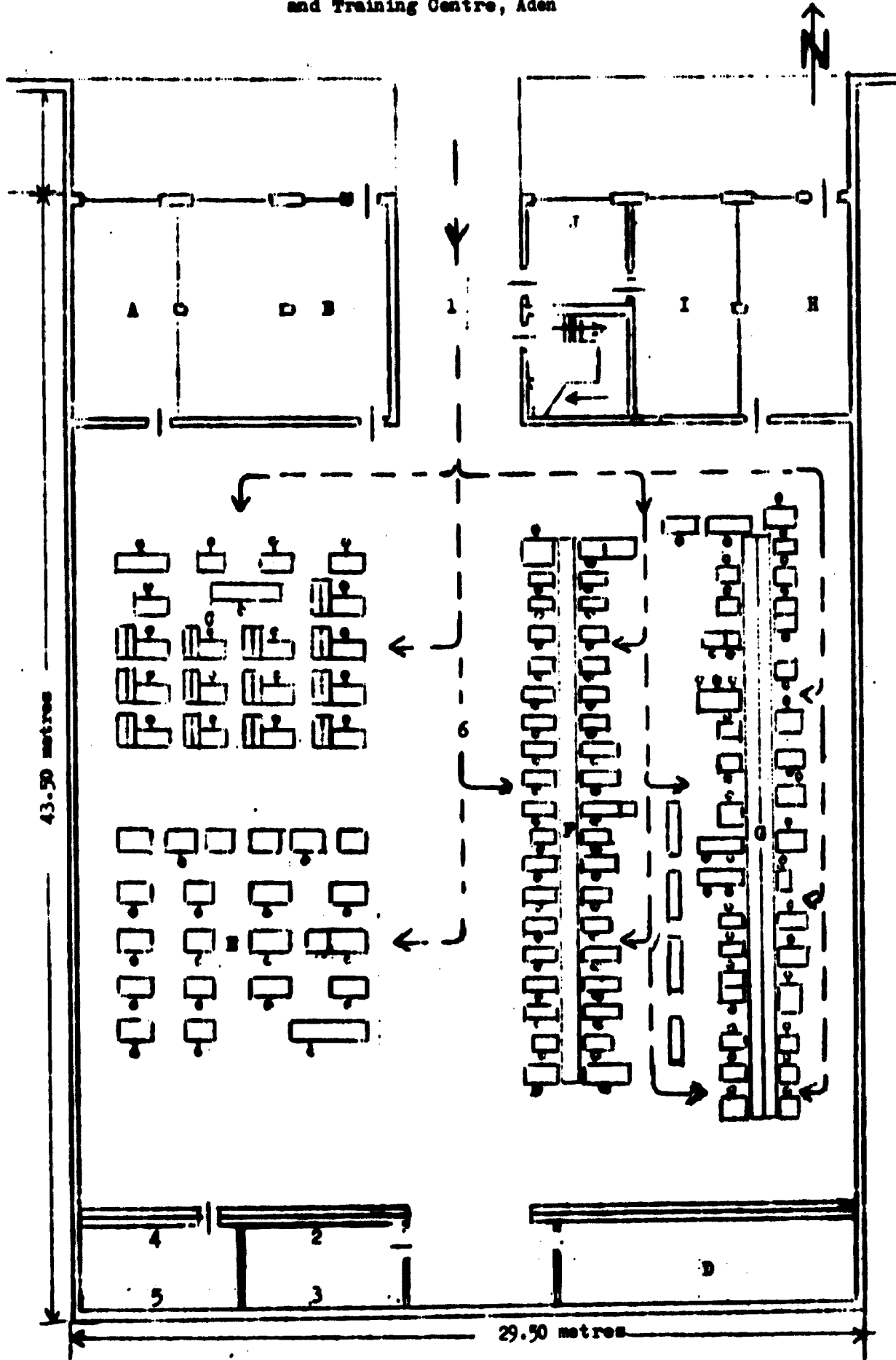
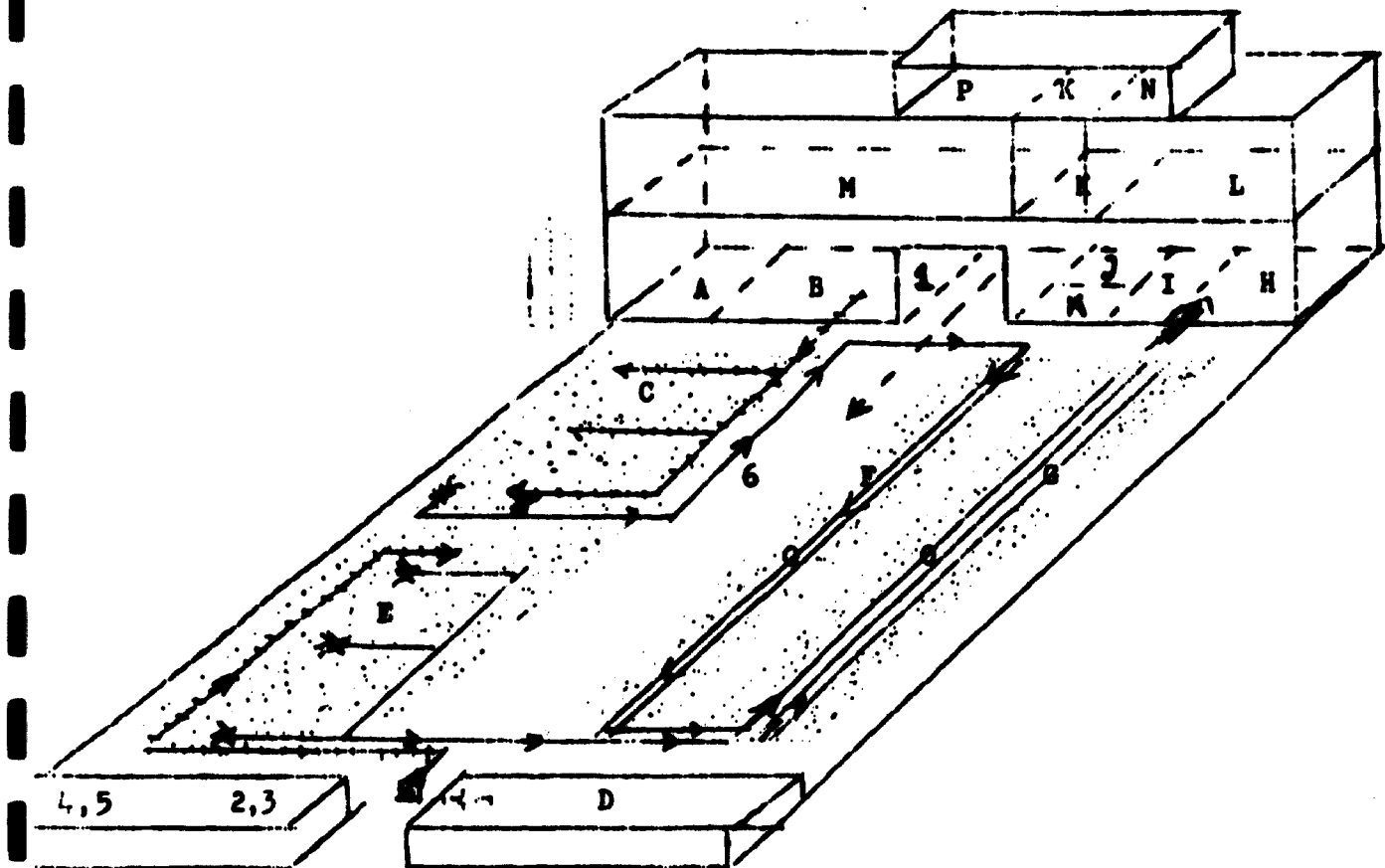


Figure III. Flow chart of the Leather Shoe Manufacturing and Training Centre, Aden



- |   |  |   |                                      |
|---|--|---|--------------------------------------|
| A | Departmental office                      | I | Technical office                     |
| B | Storeroom for leathers and materials     | J | Commercial department                |
| C | Upper cutting department                 | K | Staircase                            |
| D | Storeroom for bottom materials           | L | Offices                              |
| E | Bottom clicking and preparing department | M | Modelling department and sample room |
| F | Closing (stitching) department           | N | Spare parts store                    |
| G | Making department (lasting to finishing) | O | Conveyors                            |
| H | Storeroom for finished products          | P | Project manager's office             |

Annex

- 1 Entrance hall  
2,3 Women's toilets

- 4,5 Men's toilets  
6 Passage

- ← Production line scheme  
- - - Workers' entrance  
· · · · · Materials scheme

Secondly, the making, lasting, bottoming and finishing departments follow in regular sequence;

Thirdly, stores of raw materials should be within easy reach of the upper cutting and bottom clicking departments;

Fourthly, the finished shoe-store is conveniently placed in relation to the departments served.

The footwear departments are:

- (a) Pattern and sample making;
- (b) Upper and lining cutting;
- (c) Closing and preparation;
- (d) Bottom clicking and preparation;
- (e) Making (lasting, bottoming and finishing).

#### Upper and lining cutting department

This department includes the cutting and preparation of parts of upper leather and of various kinds of leather, textiles (fabric), and synthetics used for the upper and lining parts of footwear.

Later, when the technical staff have been trained, the manual cutting of parts can be carried out on mechanical clicking presses with the aid of press knives.

For this mechanical production, machines and equipment should be provided with safety devices to substantially reduce vibrations which may have an unfavourable effect on the building structure.

#### Bottom clicking and preparation department

This is an important section in the preparation of footwear components. Its importance is demonstrated by up-to-date production technology where the requirements for correctly-prepared parts ensure high quality.

The production of pre-finished soles contributes to a progressive technology and enables the introduction of automation and semi-automation which results in high productivity.

The bottom clicking room is divided as follows:

- (a) Clicking of bottom parts;
- (b) Preparation of bottom parts;
- (c) Manufacture of heels.



The modern hydraulic clicking press, and perfect press knives are a guarantee of the high-quality clicking of the bottom parts of leather, rubber, cardboard and all kinds of artificial leathers and non-leather materials.

The machines and production equipment of the bottom preparation room ensure perfect production of various bottom parts, such as in-soles, counters, toe-puffs, soles and middle soles, as required by individual shoe constructions. The machines are equipped with plugs and are easily moved from one place to another. They are also fitted with individual exhausts and waste separators which improve conditions in the parts preparation room.

#### Closing (stitching) department

Cut upper parts are assembled in the closing room. Here the upper components, after preparation (folding, bindings, perforation etc.), are closed on the various sewing machines.

The sewing machines and working places are provided with individual stands, electrical motors and electrical installations (plugs and sockets).

The continual supplying of materials and cut components is facilitated by the locally manufactured roll-push conveyor and racks made according to the design of the project manager.

#### Making department (lasting to finishing)

Most footwear manufacturers (70%), throughout the world, use mainly the cemented method of construction which consists in attaching the sole to the margin of the lasted upper with special adhesives. Such footwear is light and flexible. This method should be the main one used in the factory (80%) with smaller quantities of sewn and nailed shoes.

The machines purchased by UNIDO for the production of cemented footwear are of excellent quality and have improved productivity. Other machines, also purchased by UNIDO, facilitate the production of heavy footwear with reserved sole stitching and nailing.

Less expensive footwear can also be manufactured such as false welt footwear and small quantities of stitchdown shoes.

The footwear is manufactured from the first to the final operations on lasting lasts, which allow correct settings and a better appearance.

A big problem in the shoe factory is the storage of lasts. They are kept on shelves to minimise damage caused by careless handling and facilitate their assembly but this requires considerable storage space.

It was necessary to establish the percentage of humidity in Democratic Yemen, its effect upon leather and adhesives, and the necessity to use drying agents. Local conditions, of high humidity and high temperatures, required the installation of mulling and natural drying plants in the working departments.

Small quantities, in the range of 1,000 to 3,000 pairs of manufactured footwear, are deposited in the special temporary storerooms. However, due to lack of sufficient space, the general shoe store has to be located outside the factory.

Future development should concentrate on higher productivity, elimination of strenuous physical labour, economical production, simplification of servicing and machine maintenance, and clean and satisfactory working conditions. These measures will assure a good quality of footwear and economic results.

### C. Machinery, equipment and installations

The machines, equipment and tools required for footwear and leather goods manufacture are established for a production of 150,000-210,000 pairs per annum. Production output is made in one shift per day.

The depreciation of machines is set over a 10-year period.

Manual operations, such as perforating, folding and eyeletting, should be done by machines.

The amount of non-expendable equipment established by UNDP/UNIDO for the Centre's activity is sufficient. The sum of approximately \$80,000-90,000 for equipment, tools and spare parts is insufficient for a continually increasing production.

The layout of machinery and equipment for the different footwear and leather goods departments has been properly organised. Each machine is placed in the best possible position with regard to the available daylight and for handling operations.

After the project document was approved by UNIDO, detailed specifications and requisitions for equipment, tools and materials were made.

The project manager visited Vienna in October 1973 in order to resolve problems concerning the type of machinery to be obtained, and details of firms and prices. Owing to the delay in the start of the project part of the equipment reached Aden only in the first half of 1974. Only by the procurement of a few machines from the Government's counterpart fund was it possible to start the training course for shoe design.

Most of the equipment reached the project site at the end of 1974. Part of the delay was due to the necessity to re-order from new supplies owing to inflation and currency devaluation. Certain equipment essential for practical training, such as shoe lasts, only arrived in March 1975. As a result of heavy weather in the North Sea, three machines were destroyed in December 1974 and replaced in 1975. The last machines arrived in May 1976.

Up-to-date equipment with hydraulic, mechanical or pneumatic mechanisms was provided including semi-automatic machines which perform two or three operations simultaneously such as the pulling over and lasting machine, heel-seat lasting machine and sole attaching press.

Departmental layout consists of single rows of machines adjacent or parallel to a side wall or conveyor on account of the need for daylight and electrical connexions (see figures II and III). Each machine is driven by an individual electric motor which permits a more flexible layout and better use of the floor area. It also allows best advantage to be made of the light and the best working position to be chosen.

Each machine which produces dust or powder in such operations as in buffing, roughing, trimming and scouring was provided with exhaust fans.

Pushing roll conveyor belts were selected as the mode of transportation, so important to the closing and making departments. The advantages of a system of semi-mechanical transportation are decreased standing time between operations, savings of floor space and time and a strong working discipline.

Mobile racks are also used as transportation within the sections of a department and contribute to higher production and better use of manpower.

Machines and equipment purchased by UNIDO and the Government are detailed in the annex.

Each machine is provided with important accessories and spare parts to last 3,000-4,000 h, and individual motors of 415 V ( $\pm 6\%$ ), 3-phase AC, 50 Hz, tropicalized and with protecting relays. The machine lamps have step-down transformers from 220-240 V to 12, 24, or 36 V.

There were no mechanics in Aden capable of servicing the various types of shoe machinery. It was therefore necessary to train a mechanic and electrician to repair inoperative machines and prevent loss of production.

Nearly 800 spare parts, classified according to machine and stored in a special room, are treated with great care as are technical catalogues, operator or service manuals, spare parts indexes etc., which are available for all equipment or machines.

#### Fire prevention

The factory itself is a fire-resistant structure and adequate means of prevention and escape are provided in accordance with the requirements of building by-laws and the factory act.

There are many potential sources of fire in a shoe factory - heating devices, inflammable adhesives and dressings, solvents, dust-extraction systems etc. - and great care should be taken to ensure that operators are aware of the risks involved.

Lighting, heating, power, gas and water supplies should be carefully considered so that full provision for these are made when the building is constructed.

#### Installations

Electricity is provided by the Public Corporation for Electric Power in Aden. The total installed power and light is nearly 70-100 kW. Fluorescent lamps are used.

Ventilation is assured by ceiling fans and normal current.

Water is assured for industrial consumption and potable water for social requirements by the Public Water Corporation in Aden. Drainage of domestic waste is connected to the town network.

The necessary air volume is assured by air compressors.

E. Recommendations

1. Lights should be installed on the roof and on individual machines.
2. The small working tables used for upper preparation should be replaced by higher tables so that manual operations can be carried out in a standing position.
3. The present shoe-racks only hold a production of 200-300 pairs per day. More racks should be obtained of the same kind and sizes as the present ones but without metallic supports which are inclined to rust.
4. Machines should have protective covers against dust, powder, humidity and rust.
5. Lubrication, cleaning of equipment and dust collectors to avoid fires, greasing against humidity and rust, accident prevention devices and correct handling by operators should all be checked periodically to avoid loss of production and production of sub-standard goods by badly-maintained machines.
6. All important quotations and offers of plant and machinery should be carefully preserved for future reference and updated periodically to get the latest available information.
7. It is recommended that the Government supply the factory with equipment; the type of machine now in use should be bought.
8. It is recommended that the following machines be purchased: 4 flat-bed, single needle, sewing machines; 2 post-bed, single needle, sewing machines; 1 twin needle sewing machine; 1 zigzag sewing machine; 1 upper numbering machine; 1 upper leather clicking machine; 1 counter-forming machine; 1 insole-forming machine; 1 oscillating scouring machine; 1 pulling over and lasting machine; 1 upper leather roughing machine; 1 edge trimming machine and 1 heel scouring machine. The estimated value of these machines is \$60,000.

### III. FACTORY ORGANIZATION

Much trouble and friction between the staff is eliminated if the limits of responsibility of each member are well defined at the outset; hence, the duties of each executive ought to be clearly stated in order that the organisation may function as a complete unit. (See figure IV.)

In July 1976, the former co-manager was replaced by a managing director whose function was clearly defined. His first duty was to decide upon business policy. In the case of the shoe and leather goods manufacturing this policy is mainly concerned with the establishment of a suitable distribution network.

The project manager studied the requirements of each section and held various meetings at different levels with all concerned. He defined the following job descriptions: (a) technical departments (works manager, planning, production, technical, maintenance, labour and modelling); (b) quality control (quality supervisors, sorters, examiners, final controller and damage record sheet); and (c) commercial (purchase, sales and store-keepers).

Generally it must be assumed that the extent to which specialisation can be carried out is in direct relationship to the size of the unit. It is noticed that many factories suffer from a lack of organisation. This leads to a loss of manpower and an increase in the cost of products. In practice, it is desirable for all staff (office clerks and operatives) to be supervised.

#### A. The organisation of the Centre

Two objectives of the Centre were: (a) to train national labour, supervisory and technical staff; and (b) to introduce suitable modern techniques, methods, and processes and particularly to give a productive-training orientation. The Centre had therefore the onerous task of administrative control and of preparing the factory to achieve the targets set and to implement the Government's decision to develop the Centre at the termination of the project in 1976 into an economic unit called the Leather Shoe Manufacturing and Training Centre.

The work of the project manager consisted mainly of organising: (a) the necessary inputs, such as manpower, material and equipment sources, to secure the most economic production; (b) the setting up of production levels; (c) the fuller utilisation of installed capacities; and (d) continued technical

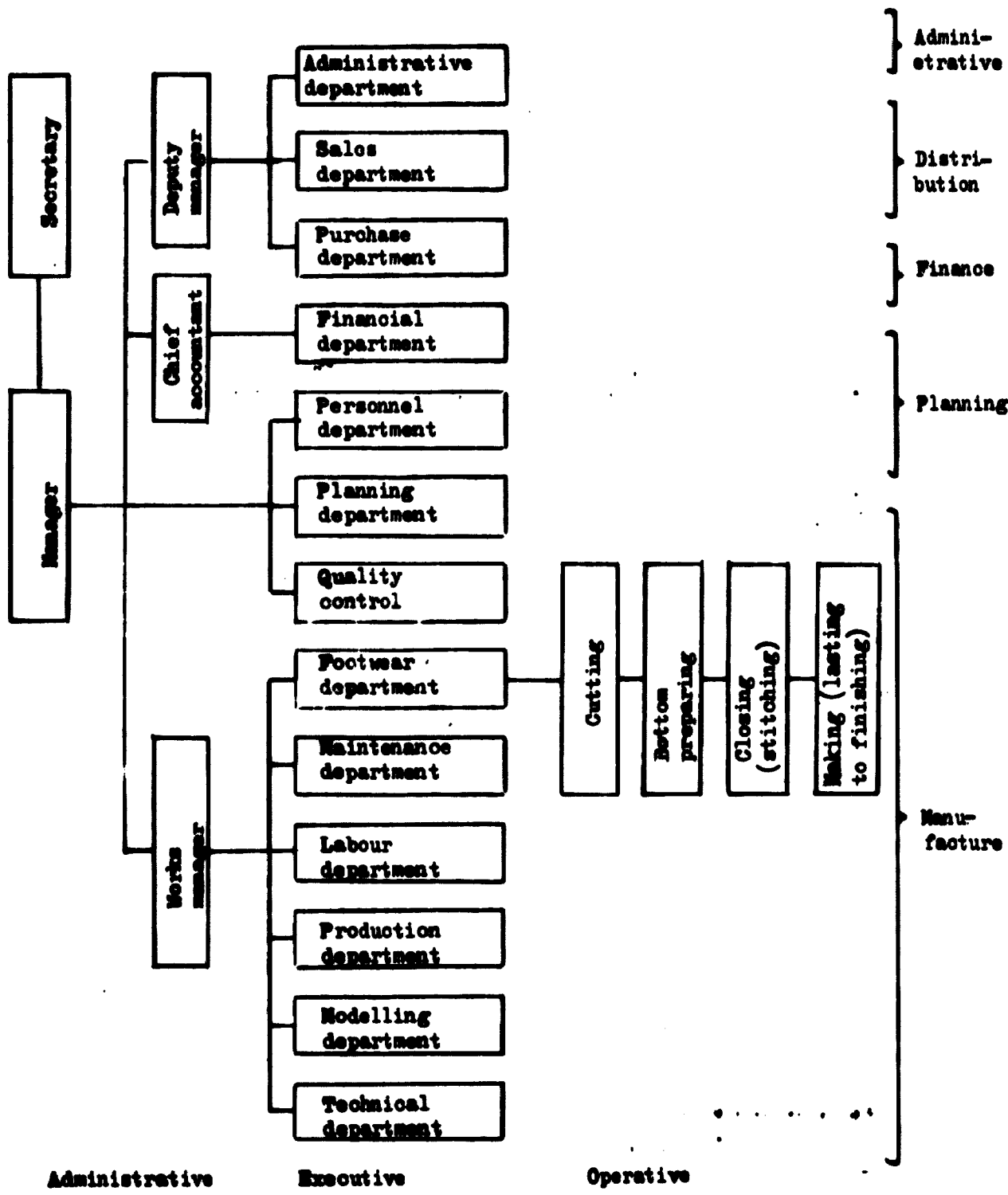


Figure IV. Planned organisational chart of the Leather Shoe Manufacturing and Training Centre (planned production between 500-800 pairs/day in one or two shifts)

and administrative surveys. The quality of products and market demand were matters that also required his attention. In practically all stages of implementation there was a constant liaison with the counterpart's management during the development of the project.

Considerable changes are taking place in the footwear industry. Manufacture is based on construction of footwear from various components which are prepared exactly to conform to the exigent requirements of semi-automatic machines.

The selection of permanent personnel, especially technical staff, preceded the establishment of the Centre (tables 7 and 8). This was of great importance as time was allowed for technical training at home and later abroad.

Table 7. Government personnel at the Centre

Post	Name	Starting date	
Co-manager	Basabrain, S.	July 1972	August 1973
Co-manager	Mansoor, S.A.	Sept. 1973	June 1976
Manager	Taweel, A.B.	July 1976	Dec. 1976
Works manager	Mansoor, S.A.	July 1976	Dec. 1976
Shoe technologist	Bahamish, S.M.S.	April 1973	
Leather goods and shoe technologist	Tareh, A.H.M.	July 1973	
Mechanic	Hibatullah, N.M.	Oct. 1972	
Marketing officer	Abdulazeez, A.	July 1973	August 1975
Marketing officer	Musleh, A.M.	Sept. 1975	Sept. 1976
Marketing officer	Mahfood, A.	Oct. 1976	Dec. 1976

Table 8. UNIDO personnel at the Centre

Post	Name	Arrived	Departed
Project manager	Popescu, C.I.	July 1972	December 1976
Footwear manufacturing expert	Rogers, H.S.	October 1974	September 1975

In the training period, through June 1976, transfer of technical personnel from one post to another was made only in exceptional cases, and with justified reason, and generally gave the candidate a chance for more responsibility.



After the transfer of full responsibility to the counterpart in July 1976, the co-manager was installed as works manager and the factory received a new manager.

The new manager started to change technical and administrative personnel, with and without consultations, such as:

(a) The foreman after training in the making department and a six-month fellowship abroad in shoe technology, was installed as head of the modelling department. His work there is inefficient because of lack of experience in this particular field;

(b) The head of the modelling department was demoted to shoe designer stylist;

(c) The technical co-ordinator and head of the production department, who had been sent on a six-month fellowship abroad to train in footwear and leather goods technology, and who had wide experience in production preparation and organization, was suspended;

(d) The marketing officer, after nearly three years in the field, was dismissed.

#### B. Recommendations

1. The footwear industry cannot prosper without the guide and support of a responsible industrial department of the Ministry to help with production and management.
2. Regulations should ensure that trained personnel are kept in their posts in order to guarantee continuity.
3. Specialised staff should be given more profitable and secure employment to eliminate their changing jobs too often.
4. After careful analysis of the work of the indirect labour force, a minimum output should be established for each working man. This would reduce indirect labour costs (table 9).
5. Regulations on attendance should be elaborated and applied to all personnel without exception and efficient disciplinary measures taken to decrease the loss of working hours.

Table 9. Labour and wages, 1975-1979

A. Labour and salary requirements for 1975-1979

Year	Direct labour			Indirect labour			Total	
	No. of workers	%	YD	No. of workers	%	YD	No. of workers	YD
1975	110	83.3	26,520	22	16.7	7,190	132	33,710
1976	140	84.3	33,600	26	15.7	8,480	166	42,080
1977	160	85.1	38,400	28	14.9	9,150	188	47,550
1978	170	85.8	40,980	28	14.2	9,150	198	50,070
1979	180	86.5	43,200	28	13.5	9,150	208	52,350

B. Labour costs

Year	Pairs		Direct labour	Indirect labour YD/pair	Total
	Per year	Per day			
1975	36,000	170	0.737	0.199	0.936
1976	94,000	340	0.357	0.090	0.447
1977	142,000	500	0.270	0.064	0.334
1978	186,000	660	0.220	0.049	0.269
1979	217,000	800	0.199	0.042	0.241

C. Official payment scales

Workers	Monthly (25 days)	Daily
	YD	YD
Highly-skilled	21.000-23.000	0.840-0.920
Skilled	19.000-22.000	0.760-0.880
Semi-skilled	18.000-20.000	0.720-0.800
Technical	26.500	1.060
Technical	28.000	1.120

Table 9 (continued)

B. Wages for direct labour in 1975-1979

Worker	1975		1976		1977		1978		1979	
	No.	Wages/month (YD)	No.	Wages/month (YD)	No.	Wages/month (YD)	No.	Wages/month (YD)	No.	Wages/month (YD)
Team leader	4	100	4	100	5	124	5	124	5	124
Highly-skilled	28	615	34	748	39	856	43	946	44	966
Skilled	46	920	59	1,180	66	1,320	71	1,420	76	1,520
Semi-skilled	32	575	43	772	52	902	51	922	55	992
Total	110	2,210	140	2,800	160	3,200	170	3,410	180	3,600

#### IV. PRODUCTION

##### A. Size of production unit

In the case of a small productive unit controlled by one man, the supervision of manufacturing, buying and selling must all receive his attention. Full knowledge of these different subjects, however, is rarely possessed by one man and, in any case, can only be achieved after much practical experience.

In a large unit or firm there is the advantage of employing men with specialized knowledge and executive ability. There is also the possibility of using planning systems and of undertaking experimental work. It would appear, therefore, that the larger the output, the greater the efficiency of the factory but there are certain disadvantages in connexion with large organizations.

In many cases, the minimum economic capacity with regard to boot and shoe machinery is approximately 300-400 pairs per day.

Using the rack or conveyor system of transportation, the lowest production cost occurs when the output is approximately 700-1,000 pairs per day, but this varies according to quality and type of footwear. If the optimum capacity with regard to equipment, management, and marketing were accurately ascertained, then it would only be necessary to reconcile the data to determine the best size of production unit.

It is widely believed that as the capacity of the factory is increased, there is no limit to the economies in the cost of production. In the United States and Europe, where mass production in single factories has been fully exploited, there is a tendency, for many reasons, to regard favourably the smaller manufacturing units. In such units, decisions are usually made quickly and with a considerable flexibility. Much of their success is due to the intense personal interest of the owners or managers who take an active part in the organisation. Also, the smaller unit is less affected by changes in products. On the other hand, there are obvious disadvantages in manufacturing small quantities, for instance, expensive machinery may remain idle for long periods. The advantages of the division of labour in the form of increased dexterity, continuity of work, and the use of machinery need no emphasis but, if production costs are to be kept to a minimum, the output must be sufficiently large to use most of the machinery equipment at approximately full capacity.

## B. Production

The Centre was designed to demonstrate various facets of the establishment and functioning of the modern footwear industry, and to investigate uses of local raw materials.

The Centre's planned capacity, in one shift, is 130-780 pairs of footwear daily or 36,000-220,000 pairs per annum. These figures allow for future expansion with the possible addition of 50 machines and some equipment. It is proposed to start, in 1977, making footwear with plastic soles by the latest method of injection moulded, granulated, thermoplastic rubber; 50% would have leather uppers. The planned annual capacity is 300,000 pairs.

The success of the Centre's aim of producing 220,000 pairs of leather footwear per annum for local consumption depends on the availability of (a) tanned leather of a suitable quality; and (b) skilled personnel.

Local demand for leather footwear is higher than the present local production. Per capita consumption varies from 0.105 to 0.120 pairs according to the availability and prices of shoes.

The Centre's planned capacity, as stated in the project document and based on the operational figures provided in the five-year plan (1974/75-1978/79) for economic and social development, is given in table 10. The figures are based on the existing possibilities taking into consideration the reduced output of modern equipment adapted to the local conditions (table 11). The planned capacity for the first two years was not achieved. In 1975, the shortfall was 24,300 pairs and the country imported footwear (table 12) at a cost of YD 32,200.

Production management is included to lower production figures so as to obtain benefits for the next working cycles.

Full capacity will be obtained in 1980 when production will increase from 0.40 to 4.40 pairs per man/day and the number of labourers will remain stationary at 180. It will then be advantageous to have only one shift, as it is known from experience that in the second shift productivity is 10-20% lower than normal; this is owing to administrative activity in production time.

Table 10. The Centre's planned footwear production, 1975-1979

A. Planned footwear production, 1975-1979  
(in pairs)

Type	%	1975	1976	1977	1978	1979
Children's	10	3,600	9,400	14,200	18,600	21,700
Girls' and boys'	15	5,400	14,100	21,300	27,900	32,550
Boys'	25	9,000	23,500	35,500	46,500	54,250
Men's	<u>50</u>	<u>18,000</u>	<u>27,000</u>	<u>71,000</u>	<u>93,000</u>	<u>108,500</u>
Total		36,000	94,000	142,000	186,000	217,000

B. Footwear size ranges

Type	Sizes			Shoes	Boots
	Metric	French	English	— % —	— % —
Children's	14.5-19.0	22-28	6-11	30	70
Girls' and boys'	19.5-23.5	29-35	11½-3	70	30
Boys'	24.0-26.0	36-38	3½-6	80	20
Men's	26.0-29.5	39-45	6-10½	80	20

C. Characteristics of principal upper leathers

Type	Thickness (mm)	Origin	Finish
Infants'	1.00-1.25	80% cattle	Smooth grain
Children's	1.00-1.25		Printed grain
Girls' and boys'	1.25-1.50	15% camel	Glased kid
Boys'	1.50-1.75		Moroccan grain
Men's	1.75-2.00	5% goat	Heavy suede

D. Characteristics of principal bottom components

Type	Compact resin rubber	Microcellular rubber	Moulded soles
Children's	20	80	-
Girls' and boys'	40	30	30
Boys'	30	20	20
Men's	30	20	20

Table 10 (continued)

B. Planned production of leather footwear, 1975-1979

Year	Month	No. of workers	Pairs		
			Per day	Per month	Per year
1974/75					2,600
1975/76	January	80	30	800	
	February	80	40	1,000	
	March	80	50	1,200	
	April	80	60	1,500	
	May	85	70	1,700	
	June	85	80	2,000	
	July	90	100	2,400	
	August	100	130	3,100	
	September	115	160	3,900	
	October	120	190	4,600	
	November	125	220	5,300	
	December	130	250	5,900	36,000
1976/77	January	130	240	5,500	
	February	130	260	6,000	
	March	135	280	6,500	
	April	135	300	6,900	
	May	140	320	7,300	
	June	140	340	7,800	
	July	140	350	8,000	
	August	140	360	8,300	
	September	140	380	8,700	
	October	145	400	9,300	
	November	145	420	9,700	
	December	145	430	10,000	94,000

**Note:** These figures are subject to alterations as the Government is planning to set up a moulded-rubber shoe factory by the middle of 1978 and 50% of its products will be made with leather uppers.

Table 11. Output of machines in eight working hours

Item	Output (pairs of footwear)
<b>A. <u>Pattern making</u></b>	
Pattern grading device	-
Pattern cutting shears	-
Pattern binding machine	-
Pattern strip forming machine	-
<b>B. <u>Upper preparing</u></b>	
Upper leather clicking machine	150-250
Upper leather splitting machine	500-1,000
Marking machine	2,000-4,000
Upper leather skiving machine	200-400
Cement-applying machine	2,000-3,000
Edge-folding machine	200-400
Perforating machine	100-200
Punching and eyeletting machine	600-800
Punching and eyeletting device	100-200
<b>C. <u>Closing</u></b>	
Flat bed single needle sewing machine	Capacity of one sewing machine
Heavy flat bed single needle sewing machine	Capacity of one sewing machine
Post bed single needle sewing machine	10-20 pairs of uppers (complete)
Heavy post bed single needle sewing machine	10-20 pairs of uppers (complete)
Twin needle post bed sewing machine	10-20 pairs of uppers (complete)
Cylinder bed single needle sewing machine	10-20 pairs of uppers (complete)
Cylinder bed hemming machine	10-20 pairs of uppers (complete)
Zigsag sewing machine	200-600
<b>D. <u>Bottom part preparing</u></b>	
Hydraulic bottom part clicking machine	1,000-2,000
Sole rounding machine	300-400
Splitting machine	1,500-2,500
Splitting knife grinding machine	- -
Sole cutting and ranging machine	100-300



Table 11 (continued)

Item	Output (pairs of footwear)
Embossing machine	8,000-10,000
Universal cementing machine	1,500-3,000
Heavy skiving machine	2,000-4,000
Oscillating scouring machine	800-1,500
Spray cabinet	2,000-3,000
Sole pre-trimming (finishing) machine	400-600
Sole breast splitting machine	1,000-1,500
Sole moulding machine	1,000-2,000
Counter forming machine	1,000-2,000
Sole channelling machine	200-500
Clicking board planning machine	- -
<b>E. Making (lasting to finishing)</b>	
Counter dipping apparatus	1,000-2,000
Toe-puff thermo press	1,500-2,000
Insole stapling machine	1,000-2,000
Counter pre-moulding machine	800-1,500
Insole edge cementing machine	600-1,500
Pulling over and lasting machine	400-800
Heel seat lasting machine	1,000-1,500
Upper leather roughing machine	400-600
Sole activator	800-1,500
Sole attaching press	1,000-2,000
Outsole stitcher	400-600
Lookstitch sole stitching machine	200-400
Loose nailing machine	400-600
Edge trimming machine	200-400
Heel attacher	200-400
Heel attaching machine	1,000-1,500
Foil embossing machine	800-1,500
Brushing machine	1,000-2,000
Last pulling machine	800-1,500
Belt strap and lace cutting machine	- -
Hand guillotine	- -

Table 12. Imports of leather footwear and other leather products

Year	Imported leather footwear		Imported leather goods	Imported leather
	Pairs	YD	YD	
1967	198,300	165,500	7,400	17,600
1968	360,400	334,600	13,300	29,700
1969	291,200	273,000	8,500	20,300
1970	239,600	219,800	9,300	8,300
1971	202,800	153,400	2,800	9,100
1972	112,800	...	...	...
1973	111,700	...	...	...
1974	84,200	108,860	6,880	7,460
1975	24,300	32,200	390	...

The Ministry of Industry requested that a second shift should be established but this is not recommended until the established production figures are realised and production has been stabilised for two or three years.

In the five-year plan it is established that of the total production 60%-70% would be men's and children's footwear and 30%-40% would be semi-manufactured parts, from which the craft industries will benefit. The production of footwear components is uneconomical for the Centre and it is recommended that this production be transferred to the local co-operatives which are also equipped with mechanised machines to produce footwear. These component parts can then be sold as footwear at better prices and without disturbances in production.

Production in the Leather Shoe Factory will consist mainly of standard goods, such as desert or Sahara boots, and of smaller quantities of men's, boys' and children's shoes.

After the materials purchased by UNIDO were exhausted, little support was received from the Centre's management, the Department of Investment and Construction or the Ministry of Industry in the purchasing of material for future production. The materials were ordered in March 1976 and arrived at Aden in November 1976. This delay led to low production in the months of July, August and September 1976 (table 13).

Table 13. Footwear production, January-November 1976  
(In pairs)

	<u>Planned production</u>		<u>Output</u>	
	Per day	Per month	Per day	Per month
<u>Production training period:</u>				
January	30	800	30.5	810
February	40	1,000	27.2	690
March	50	1,500	31.0	820
April	60	1,700	46.3	1,150
May	70	2,000	60.0	1,620
June	80	<u>2,400</u>	71.3	<u>1,780</u>
Total		9,400		6,870
<u>Full production:</u>				
July	100	3,100	69.3	1,730
August	130	3,900	84.0	2,100
September	160	4,600	63.3	1,520
October	190	5,300	121.0	3,030
November	220	5,500	104.0	2,610
December	250	<u>(5,900)<sup>a/</sup></u>	-	-
Total		22,400		10,990

a/ Not included in total.

### C. Organisation

The five-year plan indicates that at the end of the production training period in December 1976, the Centre will be transformed into a footwear factory named the Leather Shoe Manufacturing and Training Centre.

A complete reorganisation of production would consist of:

- (a) The co-ordination of labourers, materials, machinery and methods in such a way that economic production is possible;
- (b) Estimating requirements of labour, materials and expenditure;
- (c) Checking production results by means of costing, labour records etc., and comparing them with the estimates for using machines, materials and labour.

It is clear that information must be collected and used to co-ordinate the work of the production staff.

Production at the Centre is the responsibility of the works manager. He is expected to establish a routine, methods of manufacture and to control all production activities including design and pattern making, production control, quality control and maintenance of premises, plant and equipment. In addition, he undertakes other technical activities. The co-ordination of departments is his special responsibility which is not easy as factory routine, quantity and quality of production and cost are affected if insufficient attention is paid to this. To transfer full responsibility to the counterpart the project manager, with the approval of the Permanent Secretary of the Ministry of Industry, drew up a concrete management plan. This plan was divided into three periods, as noted below.

Productive training period (January-December 1975)

(a) Project manager and footwear experts: material purchases, production organisation, actual production, production control, quality control, training of personnel, maintenance of equipment, accident prevention and market analysis;

(b) Co-managers: attendance, internal rules, employment of personnel, safe custody of equipment and installations and other observations of regulations.

Transfer of technical management responsibility to the counterpart (January-June 1976)

(a) Project managers: production organization, actual production, quality control and maintenance of equipment;

(b) Co-managers: transferred duties from the project managers: material purchases, production control, training of personnel, accident prevention, market analysis plus the duties from the first period.

Full administrative, technical and production activity assumed by the counterpart (July-December 1976)

(a) Project managers: transfer of the whole technical and production activity and supervision to the co-manager;

(b) Co-manager: assumes full responsibility.

Considerable attention was given to the technical co-ordinator, foreman and team-leader in the field of industrial administration to help them acquire the necessary know-how. The foreman is the link between employer and employed and, as such, carries a responsibility that is far-reaching. To the worker, the foreman is a direct representative of the management.

As supervision is the primary work of a foreman, a thorough knowledge of the principles underlying the work in the department is essential and was transmitted to him by the project manager. Generally, the foreman earns his promotion from the ranks. This is undoubtedly the best method of training, because it ensures an understanding of the difficulties and view points of the operators.

Each foreman and team leader is responsible for:

- (a) Departmental organization and discipline;
- (b) Efficient use of materials;
- (c) Quantity of work;
- (d) Quality of work;
- (e) Training of labour.

#### D. Production control

##### Leather goods

The leather goods department in the Centre has been neglected because the high prices of leather and large production of similar articles, by local co-operatives in Aden, from substitute materials make normal marketing impossible.

Additional equipment, locally purchased and imported machines, and a larger number of manual operations, increased production to 150-200 pairs per day, in one shift, from July 1976.

Prior to production, as many samples as possible from different houses, exhibitions, shows, magazines and countries should be studied in order to judge the general conditions of the market not only from the point of view of style, but also of prices and values.

All the upper leather used as samples, such as calf, camel, kid and sheep leather for linings, is purchased from the National Tanning Factory.

Limited quantities of sole leather are imported because that obtained from the tannery is not compressed, is very spongy and does not satisfy industrial requirements for cemented footwear.

##### Footwear samples

Footwear samples will be made at the Centre after an assessment of public demand and in accordance with predicted styles.

Special courses were held on styles and samples and practical training was given in footwear designing, pattern making, pattern grading, classical groups and other styles of footwear such as Oxford, Derby, laced, bars, tie and sandals. These activities were supervised and directed by the project manager.

The collection of samples of footwear and leather goods follows fashions forecast for the following season. In Democratic Yemen, the season is not definitely marked as is the case in some other countries and buyers see samples and place orders throughout the year. In the first quarter of 1975, the Centre introduced about 200 different samples. The basis for this collection was the purchase of lasts and the preparatory work connected with component parts and pattern making.

In July of the same year, a national agricultural-industrial exhibition was held at which the Centre took the Second Prize for industrial products.

#### Sizing

On the local market, two sizing methods are in use: (a) French sizing with 6.66 mm between sizes; and (b) English sizing, with 4.23 mm between the half numbers. In Europe, many countries have adopted metric measurements for footwear with 5 mm between sizes.

#### Lasts

Changes in style are confined almost entirely to the shape of the toe of the last. The back part is maintained in the standardized form to facilitate forming moulds, reinforcing press knives etc. Men's and children's footwear stays in fashion longer than women's and therefore the standard lasts are in production for a longer period.

#### Orders

Sales orders, which are the basis for production, may be received from several sources (firms, staff, customers etc.). The order should contain full details with special directions as to variations in style, stamping, packing, dispatch etc. Conditions of purchase and delivery should be clearly stated and for the purposes of identification, special care should be taken to ensure that the order number is quoted on all incoming goods. Then the order should be entered in an order register giving shoe specifications and working instructions.

Each customer should be allocated an order file, as this ensures quick reference in the case of inquiry and is also invaluable when repeat orders are received.

As customers' orders arrive they should first be approved for credit, then the details, such as price and reference to previous orders, checked for accuracy. If the order is correct, its receipt should be acknowledged and, if necessary, a delivery date given.

There is a natural tendency for sales staff to promise, without consultation with the management, delivery within a required period. As a general rule, no special delivery dates should be accepted until the details of production capacity, similar orders etc., are carefully considered by the production management.

For production, two classes of items need to be considered:

(a) Those which are subject to changes of style; and (b) standardised items.

Research to determine the basic models, such as specification of materials and methods of manufacture, is very important as it results in simplified production of standardised footwear at lower cost.

Design covers the complete specifications of the models upon which production is based, including details of the foot, last, footwear design, pattern cutting, pattern making, materials, allowances and methods of manufacture. The shoe specifications demonstrate the way in which it is proposed to identify materials, methods, design etc. A full description of each item is impossible in practice, and symbols are used.

Despite difficulties, satisfactory results are obtainable by adopting planning systems and these are applied successfully at the Centre. The planning of industrial operations consists of analysing both orders for requirements and manufacturing facilities and working out the best combination in the form of a production programme. Briefly, the work is based upon knowledge of type, quality and availability of the material used, equipment, method of operation, time and sequence.

Every planning system depends upon the use of correct data concerning materials, equipment and labour. The time taken for delivery of materials and finished products is an important factor. Without a planned schedule of

work it is extremely difficult to make reliable promises of delivery; failure to keep such promises has unfavourable results when orders are solicited in a competitive market.

After orders are registered, master and supplementary working tickets are made out in accordance with sample specifications.

When recording the capacities of processes, data are best expressed in terms of time for each style of shoe.

Regarding labour capacities, to begin with information must be collected from records of past performance.

In addition to total factory capacity, the limits in respect of different factors should be shown; for instance, in weeks containing holidays capacity must be adjusted.

Preliminary classifications determining the sequence in which orders can be put into operation to the best advantage were expedient. Annual production was divided into quarterly sections and a reservation card used to represent each calendar day as a delivery period. The card is divided between departments to show the last, style, method of attachment etc. of the orders, and other features of particular importance to the production balance.

When production was not planned, manufacturing time varied between wide limits and, in most cases, was in excess of that allowed under a planned production schedule.

The data referred to with regard to capacity are required as initial information and it should not be assumed that, once obtained, they stand for all time. There should be a continuous collection of facts likely to affect the progress of work, and provision must be made for revising this information when any new method or equipment is established.

The order register, daily working programme and progress log are found in some form in every factory system. Great divergences exist in the methods used for the organization of manufactured products. These depend upon the nature of the work and the trading policy. The system does little more than provide a description of the goods to be produced and the means for recording their progress through the factory. The limitations of equipment, labour and materials are often ignored.



In many factories production is organized but trouble occurs because efforts are not co-ordinated.

Promises concerning delivery are often given before the order is secured, or before it is put into production, and the management is hard pressed to effect delivery as promised. In many cases, preference is given to certain orders with the result that others are neglected and the routine of the departments is dislocated.

Many problems appear in production which the designer is called upon to solve. After a careful investigation it is often necessary to check up on the work at each stage and to eliminate hindrances. Standard instructions in the modelling and working departments should be adjusted when changes in items are made. Control may be defined as setting these plans into operation and observing and recording actual results in order to compare them with those planned.

All the introduced printings for: work tickets, programme calendar, cutting (clicking) sheets, production order etc. are maintained and in use.

No attention is given to enlarging the range of goods. Introduction of new items for which interest is shown by buyers, and for which materials are available and costs are low, is not worked out by special trial production.

There is a lack of co-ordination and balance between departments and between many materials, machinery and methods.

Insufficient interest is paid to increasing production and reducing labour costs and little attention is given to the claims of customers, regarding quality.

Most departments function without any control by management although this is very important. Group discussions were held by the counterpart and staff to share experiences and solve problems.

The maintenance of equipment is satisfactory and denotes a good professional training and a special ability for machines by the chief mechanic. The use of spare parts is made with competence and judgement.

Semi-automatic machines are damaged by ill-prepared component parts.

### E. Purchase of supplies and materials

The purchase of materials and supplies required for shoe manufacturing is often carried out by a representative of the firm, work manager or foreman.

The project manager, after studying the different requirements of the Centre (table 14), made estimates for a full season's trade and for short periods and made out a catalogue stating the required amounts of grinders, findings, upper and bottom materials etc.

Under present competitive conditions, goods are required in the shortest possible time and it is necessary to determine, as nearly as possible, delivery dates and exact quantities required.

Purchasing of materials was planned so that the continuity and quality of production and minimum costs are ensured.

The best method of dealing with the purchase of supplies is to determine maximum and minimum quantities and to make provision for the amount of stock held. The rate of use, speed of delivery and economic size of purchase are the chief considerations when determining these limits.

It would be advantageous for the Centre's technical staff and project manager to visit the tanneries periodically to judge leather in bulk and act in an advisory capacity with regard to quantity, grading, delivery and new products.

### Storage

Upper materials should be stored away from strong daylight, using blinds or curtains if necessary, and should also be kept free from dust. Bottom leather or materials should be stored so that the minimum of trouble will be experienced in supplying the needs of the working departments.

A wide bench is required for sorting upper leather, and this should be placed in such a way so as to obtain the maximum amount of daylight.

The bottom leather or materials should be stored so that the minimum of trouble will be experienced in supplying the needs of the working departments.

Table 14. Materials, findings and accessories, 1975-1979

	1975	1976	1977	1978	1979
			YD		
<b>A. <u>Rubbers</u></b>					
Compact (resin) rubber	2,800	7,310	11,060	14,480	16,900
Microcellular rubber	3,550	9,230	13,920	18,240	21,300
Moulded soles	4,290	11,240	16,920	22,170	25,860
Moulded heels	<u>1,780</u>	<u>4,640</u>	<u>7,020</u>	<u>9,190</u>	<u>10,730</u>
Subtotal	12,420	32,420	48,920	64,080	74,790
<b>B. <u>Leather fibre, laminated materials and cardboard</u></b>					
Leather fibre	650	1,685	2,550	3,340	3,890
Insole laminated materials	1,920	5,025	7,580	9,930	11,590
Cardboard	<u>5,790</u>	<u>15,120</u>	<u>22,860</u>	<u>29,910</u>	<u>34,900</u>
Subtotal	8,360	21,830	32,990	43,180	50,380
<b>C. <u>Textiles, threads and cords</u></b>					
Textiles and fabrics	2,490	6,480	9,790	12,840	14,970
Threads	505	1,315	1,990	2,605	3,040
Cords	<u>65</u>	<u>135</u>	<u>200</u>	<u>235</u>	<u>300</u>
Subtotal	3,060	7,930	11,980	15,680	18,310
<b>D. <u>Metal fastenings</u></b>					
Wires, nails, strips and tacks	270	720	1,100	1,430	1,680
Ornaments and accessories	<u>2,010</u>	<u>5,250</u>	<u>7,930</u>	<u>10,390</u>	<u>12,110</u>
Subtotal	2,280	5,970	9,030	11,820	13,790
<b>E. <u>Wooden materials</u></b>					
	1,130	2,960	4,470	5,860	6,840
<b>F. <u>Chemicals</u></b>					
Adhesives and solvents	4,540	11,840	17,900	23,430	27,240
Finishing materials	<u>480</u>	<u>1,270</u>	<u>1,930</u>	<u>2,520</u>	<u>2,940</u>
Subtotal	5,020	13,110	19,830	25,950	30,180
<b>G. <u>Other materials</u></b>					
Abrasives	930	2,425	3,660	4,800	5,600
Metallic strips (foils)	<u>150</u>	<u>375</u>	<u>570</u>	<u>740</u>	<u>870</u>
Subtotal	1,080	2,800	4,230	5,540	6,470
Total	33,350	87,020	131,450	172,110	200,860

For purposes of checking, the store is established in such a position that all materials received, including upper and bottom materials leather, pass under the review of the storekeeper who acts as receiving clerk.

Stores control is now regarded as a matter of importance in most manufacturing units. Storekeeping requires something more than clerical ability, and the position is best filled by a person who has organizing ability and a knowledge of the work of all departments.

Little interest was paid by the works manager to the problem of purchasing production materials. For instance, a pro-forma invoice was received in March 1976 for the rubber materials necessary for the production period starting in July 1976. However the letter of credit was only forwarded in June 1976. As the rubber factory was closed for two months the materials were not shipped until the end of September, arriving in Aden in November 1976. This attitude of the works manager is regrettable.

The Centre depends on the use of upper leather and leather linings made from local leathers available from the National Tanning Factory, and this leads to a reduction in imports. In the estimate of working capital requirements for 1977 (table 15), it is calculated that the leather stock should suffice for two months.

Table 15. Estimated working capital requirements for January-December 1977

Production target	12 unit months	94,000 pairs	
Production costs	Unit months	YD	YD
<b>Direct costs</b>			
<b>1. Materials</b>			
Upper leather, leather lining	2	10,100	
Materials, findings, spare parts, tools, accessories (lasts, press knives etc.)	12	96,400	
2. Labour (direct)	2	5,900	
Subtotal			112,400
<b>Indirect costs</b>			
1. Labour (indirect)	2	1,680	
2. Overheads (excluding depreciation)	1-12	2,000	
Subtotal			<u>3,680</u>
Total			<u>116,080</u>

Many problems regarding quantity and quality of upper leather have been solved by the tannery's management. The requested quantities were assured for the present but there is an increasing gap between requirements and availability of finished leather. Leather lining is exclusively from sheep and goats.

The quality requirements of upper leather for the Centre were made taking into consideration the local conditions of raw hides and skins. Defective component parts were replaced in the cutting department. The quality of upper leather is not constant and no chemical or mechanical analysis is carried out. One problem is the tearing resistance of ~~30%-40%~~ instead of ~~60%-70%~~ which is dangerous for use on the semi-automatic lasting machines.

The Centre's technical, production and commercial staff should visit the tannery periodically to judge the quantity and quality of leather.

#### Pricing policy

The Centre buys leather at a 10% discount and an average price of YD 3.42/m<sup>2</sup> (YD 0.318/ft<sup>2</sup>), and leather lining at YD 1.100/m<sup>2</sup> (YD 0.100/ft<sup>2</sup>). Even with this discount, the prices of upper leather are high compared with those on the world market.

Materials are imported by the Ministry of Industry with the approval of the Ministry of Finance and the Ministry of Commerce and Supplies.

#### F. Recommendations

1. It is recommended that the Ministry of Planning and the Ministry of Industry be approached in order that adjustments may be made in the production targets given in the five-year plan. These adjustments are inescapable as, owing to inflation and currency devaluation, it was necessary to re-order equipment from new suppliers. The major part of this equipment reached the project site only at the end of 1974 and the middle of 1975.
2. The counterpart should make an effort to increase the production figures thereby reducing the loss in the planned quantities. The average of 120 pairs of footwear per day in October 1976 demonstrates that it is possible to increase

the maximum result obtained of 170 pairs per day by good management. Trained operators attained those figures in two to three working hours, the rest of the time being spent in ill-organized production.

3. The production of semi-manufactured footwear components which represents 30%-40% of total production, should be either transferred to local co-operatives, thus maintaining total production figures for footwear, or split up as: (a) footwear; and (b) components.

4. Counterpart staff and management should be taught that planned quantities must be fulfilled. Another important task for both is to find adequate measures to eliminate difficulties or bottlenecks occurring in production, and not simply to explain these away which is a very dangerous attitude.

5. The production departments of the Ministry should play a larger and more efficient part in production control and in solving some of the factory's problems such as co-ordination with the tannery, prompt imports of materials and accessories, financial facilities and investments.

6. Closer co-operation between the Leather Shoe Manufacturing and Training Centre, the tannery and industrial departments in the Ministry will be necessary to secure the quantities required in the future. In this regard, a contractual basis is not excluded.

7. The project manager discussed with the manager and the commercial department the foreseeable orders for the first half of 1977 for materials, spare parts, tools and accessories. The following groups of materials were covered: leather, rubber, leather fibre, laminated materials, cardboards, threads, metal fastenings, shank materials, and chemicals (adhesives, solvents, hardener, glues). Small quantities of other materials remained from the equipment purchased by UNIDO (abrasives, wires, threads, solvents, pattern cardboard and pattern binding strips). The management of the Leather Shoe Factory should attend to the replacement of materials.

8. The mechanical analysis of upper leather should be introduced. This is important for the semi-automatic lasting machines, especially the tensile elongation, stretching strain, resistance to tearing, breaking strength, and humidity. This can be carried out in the laboratory of the High College of Education, Aden, the Maalla Technical Institute or other existing laboratories.

9. In the future, when the public sector will deal with foreign trade and inputs will be regulated by the State and by the availability of hard currency, importation of all materials will be centralized in the Ministry of Industry and be carried out by the Ministry of Commerce and Supplies or by the State Company for Foreign Trade. This procedure will assure a better distribution of the stored and centralized imported materials and, in case of shortage, a redistribution will be made more efficiently.

10. Arrangements for bulk production of new lasts, main forms, samples, pullovers, pilot patterns, and all necessary patterns and shapes for bottom component parts, devices, dies, press knives etc., to cover all the manufacturing departments need to be made.

## V. QUALITY CONTROL

When planning quality control, it is necessary to consider:

- (a) The type of inspection;
- (b) The degree of control necessary;
- (c) The organization of the required inspection.

Two kinds of inspection are carried out at the Centre, namely: (a) a full and regular inspection by the examiners in every production unit; and (b) sampling or inspection of random pieces.

Quality control includes inspection of raw materials, ready-made components, the work at different stages of assembly, and the final products.

Quality is not absolute but only determined by comparison with a specified standard. At the Centre, arbitrary quality standards were set up and the product judged accordingly. At the commencement of the project, quality control rested entirely in the hands of the project manager. Gradually, this was transferred to the foreman but it is the duty of the works manager to check the standard of quality control in the various departments by comparing samples from the production lines with factory samples.

As the quantity of work increased, inspection was delegated, in part, to other persons. Controllers are employed at certain important points, such as the cutting, bottom preparing and lasting departments, and the final inspection is carried out by specially qualified quality controllers.

After examination in the various departments, the work is given a final examination which is comprehensive; it includes a thorough inspection of the workmanship as well as the material. Special attention is paid to cleanness, absence of damage and to pairing up.

Footwear rejected because of quality defects should be classed as low-grade, clearly marked as such and sold at special prices.

The problem of quality control cannot be solved by laying down National Industrial Standards. It can only be done by technologically respected and stabilized production.

Laboratory testing can be done concurrently with inspections. It could be started by mechanical testing of upper leather. All the imported materials, if requested, have an analysis certificate.



## VI. LABOUR

Where the number of employees is large and the labour turnover relatively great, a department should be established to take over full responsibility for personnel. The personnel manager's duties should consist of hiring and dismissals in consultation with departmental foremen, records, and general welfare work.

For several reasons, in particular because the number employed in the average shoe factory is small, the system of engaging labour has received little consideration. This observation is applicable to the Centre.

### Proposed payment systems

The proposed wages and salaries in the Leather Shoe Factory for the manufacture of footwear are divided by department and planned to obtain the highest output of work. Four systems of payment were proposed: (a) time (or day) -rates; (b) piece-rates; (c) collective-rates; and (d) bonuses. The proposed payment system for each department is given below.

### Department

Modelling	Time work
Cutting	Piece-work combined with bonuses
Bottom preparing	Piece-rates combined with bonuses
Closing	Piece-rates
Making	Collective-rates combined with bonuses

Minimum wages in the case of time-rates and piece-rates (commonly called piece-work rates) are approved by the Ministry of Labour and Civil Services, and are used in the Leather Shoe Factory.

Time-rates. Wages are paid at an agreed rate for the time worked, with additional wages on an agreed scale for overtime.

Time-rates are given to personnel involved in production, including, team leaders, sorters, controllers, pattern-makers, mechanics, electricians etc.

Bonus (or premium) system. This system is used in the shoe industry; the operator is assured of a basic wage for the time taken to produce a given quantity of work. Above this quantity, and beyond a standard allowance for material, a bonus may be earned.

Piece-work rates. These were introduced to give a worker opportunity to benefit directly from any extra effort he makes. These rates are fixed so that the average worker can earn 25% more on piece-work than the minimum wage on time-rates.

The piece-work system is fair to both the worker and management; it is an advantage to be able to fix definitely the cost of operations and, as the maximum output of work is obtained, overhead labour costs are kept to a minimum. However, there is a danger of work being produced at the expense of quality and provision must be made for efficient inspection and supervision.

Piece-work rates take time to establish so to begin with experimental rates were given to the two departments of cutting and bottom preparing. These rates will have to be officially approved.

Motion study. Adequate piece-work rates are established by specially trained rate setters familiar with the technology, working arrangements and the operator's method of working. It is proposed to set piece-rates by analysing the work of a number of operators and selecting from each the most effective movements in order to establish the best way of doing the job. This motion study should take into account among other things:

- (a) Condition of work;
- (b) Preparation required for the work and machine;
- (c) Actual operation;
- (d) Finishing and inspection.

Time-keeping. This is closely associated with payment systems; attendances must be proved, absence recorded, and a check made on punctuality. For the purpose of checking the work, and to provide a basis for payment in the case of piece-workers, several methods of time-keeping are proposed, i.e., work books, work slips, a coupon system etc.

Personnel who do badly should be given a job where they will not be working on expensive materials.

#### Collective payment system

The collective payment system is based on the production of a given quantity during a specific period. This system is usually combined with the bonus system and it is employed when conveyors are used and, at the Centre, in the making department.

Welfare

Part of management's task is to ensure working conditions that will be acceptable to, and provide for, each worker's physical comfort and well-being and allow full use of his abilities by allocating duties with care. Clean, well-lighted, well-ventilated factories are essential.

Working conditions, working hours and the frequency and duration of rest pauses are important factors in industrial fatigue. Good working conditions are mainly a matter of common sense; the height of the working level, position of tools, and provision for easy removal and replacement of work are examples.

Accident prevention, first aid and special treatment in the case of illness are available for the welfare of employees.

The Centre provides training and educational facilities for local personnel, as well as employment, especially for women, which help the development of social and economic life in the industrial areas or surroundings.

It is estimated that 250 people will be engaged in this industry in 1979. There is a continual demand for industrial workers for the local footwear industry, but the technical requirements cannot be met by local personnel.

Monthly wages, regulated by the Ministry of Labour and Civil Services, established a scale between YD 18-23 for controllers and YD 26-28 for team leaders. These low wages, paid on a time-rate scale, are not encouraging. To obtain a higher output, piece-work rates, bonuses and collective rates are recommended.

## VII. MARKETING

As more than half of the wholesale price of footwear represents the cost of materials, the purchasing side of the business is of considerable importance.

With bulk selling there are many advantages which should result in lower selling costs such as sharing the expense of advertising between buyers, establishing chain shops, and holding a larger variety of stock.

The sales price of a pair of shoes is about YD 1.500-3.600 (with an estimated upper leather price of 400 fils/ft<sup>2</sup>) but definite prices will be established later, possibly after consultation between the ministries.

The consumer pays a high price for a commodity which is neither of standard quality nor comparable with imported footwear, which is better in quality and has an average price of YD 1.330 (table 12).

Local market demand is not satisfied by imported footwear. In the Centre are stocked nearly 4,000 pairs of different types of footwear but no action is taken to distribute these.

Footwear is packed in plastic bags and delivered in bulk. To protect quality, it should be packed in boxes and then in cartons.

Further studies in respect to marketing footwear are required.

Annex

Machinery received and machinery planned for by the Ministry of Industry, 1974-1979

Item	Machinery received				Machinery planned			
	UNEP/UNIDO		Ministry		Ministry		Ministry	
	No.	1974-1976 (\$)	No.	1975 (\$)	No.	1977 (\$)	No.	1978 (\$)
<b>A. Pattern making machines</b>								
Pattern grading device	1	350						
Pattern cutting shears	1	640						
Pattern binding machine	1	480						
Pattern strip forming machine	1	660						
<b>B. Upper preparing machines</b>								
Upper leather clicking machine								1 3,000
Upper leather splitting machine	1	2,080						
Upper numbering machine							1	2,000
Upper leather skiving machine	1	1,040	1	500				1 1,000
Adhesive applying machine							1	1,000
Edge folding machine	1	760						
Perforating machine	1	3,340						
Punching and eyeletting machine	1	1,800						
Punching and eyeletting device	1	170						

Item	Machinery received			Machinery planned								
	UNIP/UNIDO		Ministry	Ministry								
	No.	1974-1976 (\$)	No.	1975 (\$)	No.	1976 (\$)	No.	1977 (\$)	No.	1978 (\$)	No.	1979 (\$)
<b>C. Closing (stitching) machines</b>												
Flat bed single needle sewing machine	6	3,260	6	3,420			2	1,400			4	2,400
Heavy flat bed single needle sewing machine	1	610										
Foot bed single needle sewing machine	1	670	1	670			2	1,400			2	1,400
Heavy post bed single needle sewing machine	1	810										
Twin needle post bed sewing machine	1	750					1	800				
Cylinder bed single needle sewing machine	1	460										
Cylinder bed hemming machine	1	720										
Zigzag sewing machine		-	1	300							1	800
<b>D. Bottom part preparing machines</b>												
Hydraulic bottom part clicking machine	1	1,610									1	2,500
Sole rounding machine	1	5,140										
Splitting machine	1	700										
Splitting knife grinding machine	1	250										

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Item	Machinery received		Machinery planned			
	MINTA/AGRIDO Ministry		Ministry			
	No. 1974-1976	No. 1975	No. 1976	No. 1977	No. 1978	No. 1979
	(S)	(S)	(S)	(S)	(S)	(S)
Sole cutting and rugging machine	1	400	-	-	1	1,000
Embroidering machine		-	-	-	-	-
Universal cementing machine	1	1,970	-	-	-	-
Heavy shiving machine	1	2,360	-	-	-	-
Oscillating scouring machine		-	1	1,500	-	-
Spray painting cabin	1	1,680	-	-	-	-
Sole finishing machine		-	-	-	1	8,000
Sole breast splitting machine		-	-	-	1	4,000
Insole moulding machine		-	1	6,000	-	-
Counter forming machine		-	-	-	1	9,000
Sole channelling machine	1	830	-	-	-	-
Clicking board planing machine	1	960	-	-	-	-
<b>B. Making machines</b>						
Counter dipping apparatus		-	-	-	1	1,000
Toe puff thermo-press		-	-	1	1,500	-
Insole stapling machine	1	870	-	-	-	-
Counter pre-moulding machine		-	-	-	1	3,000

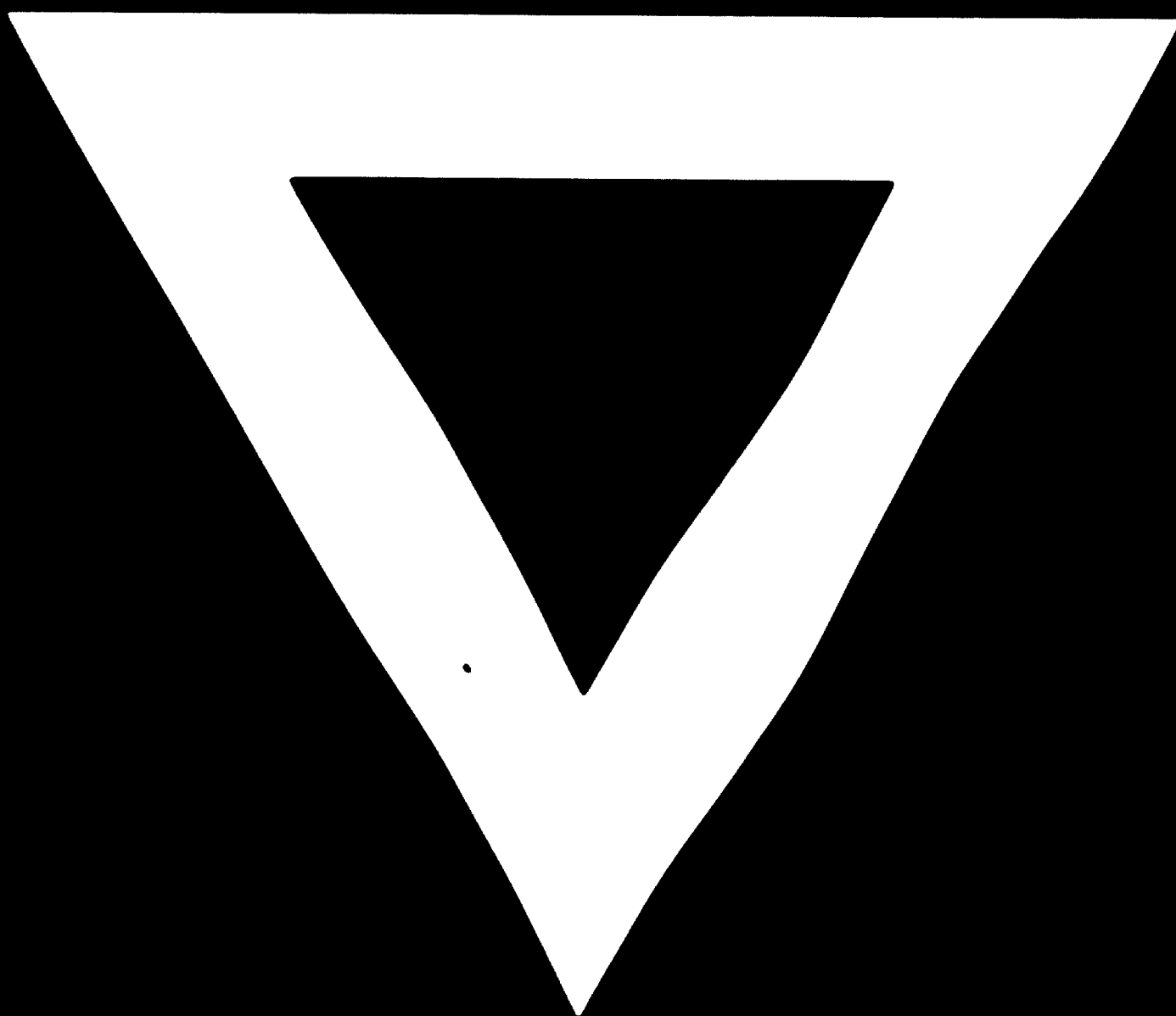
Item	Machinery received		Machinery planned			
	UNEP/UNIDO Ministry		Ministry			
	No. 1974-1976 (8)	No. 1975 (8)	No. 1976 (8)	1977 (8)	No. 1978 (8)	No. 1979 (8)
Insole edge cementing machine	-	-	-	-	-	1 2,000
Pulling over, toe and side lasting machine	1 6,300	-	-	-	1 15,000	-
Heel seat lasting machine	1 5,200	-	-	-	-	-
Upper roughing machine	1 1,000	-	1 1,500	-	-	-
Sole cement activator	1 860	-	-	-	-	-
Sole attaching press	1 2,880	-	-	-	-	-
Outsole stitcher	1 2,440	-	-	-	-	-
Lockstitch sole stitching machine	1 2,590	-	-	-	-	-
Loose nailing machine	1 7,890	-	-	-	-	-
Edge trimming machine	1 1,000	-	1 2,000	-	-	-
Heel attacker	1 580	-	-	-	-	-
Heel attaching machine	1 1,800	-	-	-	-	-
Heel scouring machine	1 820	-	1 2,000	-	-	-
Combined finishing machine	1 2,240	-	-	-	-	-
Foil (sole) embossing machine	1 900	-	-	-	-	1 1,000
Brushing machine	-	-	-	-	-	-



Item	Machinery received		Machinery planned			
	UNIP/UNIDO		Ministry		Ministry	
	No. 1974-1976	No. 1975	No. 1976	No. 1977	No. 1978	No. 1979
	(S)	(S)	(S)	(S)	(S)	(S)
Last palling machine						1 1,000
Dust collectors (filters)	2	2,080				
Air compressor	1	670				1 800
<b>F. Leather goods machines</b>						
Belt, strap and lace cutting machine	1	1,220				
Hand guillotine	1	1,460				
<b>G. Moulded footwear<sup>a/</sup></b>						
(In reserve)					(20,000) <sup>a/</sup>	
Injection moulding machine					28,600	
Total		77,300	5,090	15,500	28,600	13,400

<sup>a/</sup> The Government is planning to set up a moulded-rubber shoe factory in which case this machinery will be needed but the cost has not been added into the total.

**C-344**



**77 . 10 . 06**