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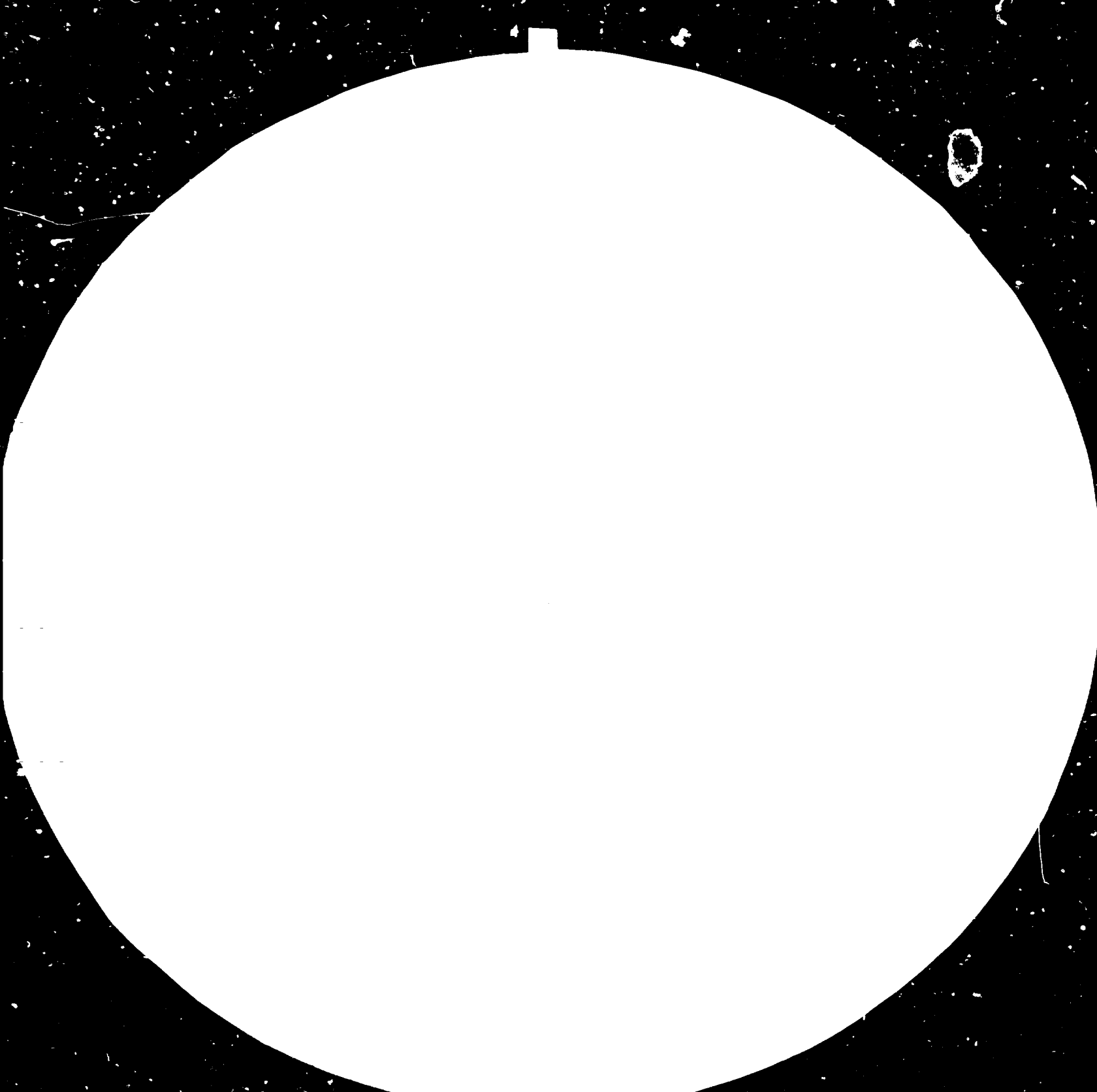
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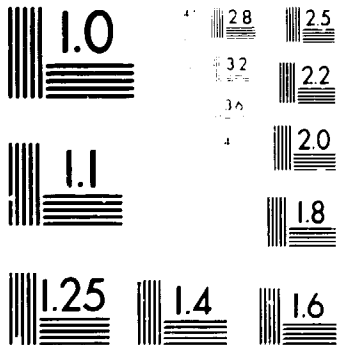
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LEATHER AND LEATHER PRODUCTS INDUSTRIES DEVELOPMENT

DP/URT/78/010

UNITED REPUBLIC OF TANZANIA .

Technical report: Assistance in the establishment of a centralized
maintenance system at the Tanzania Shoe Company Ltd. (Bora)

Prepared for the Government of the United Republic of
Tanzania by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of F. Malata, shoe
machinery maintenance engineer

United Nations Industrial Development Organization
Vienna

Explanatory notes

The monetary unit in the United Republic of Tanzania is the shilling (TSh).

TLAI is the Tanzania Leather Associated Industries Corporation
TSC stands for the Tanzania Shoe Company Ltd.

Mention of firm names and commercial products does not imply the endorsement of the United Nations Industrial Development Organization (UNIDO).

ABSTRACT

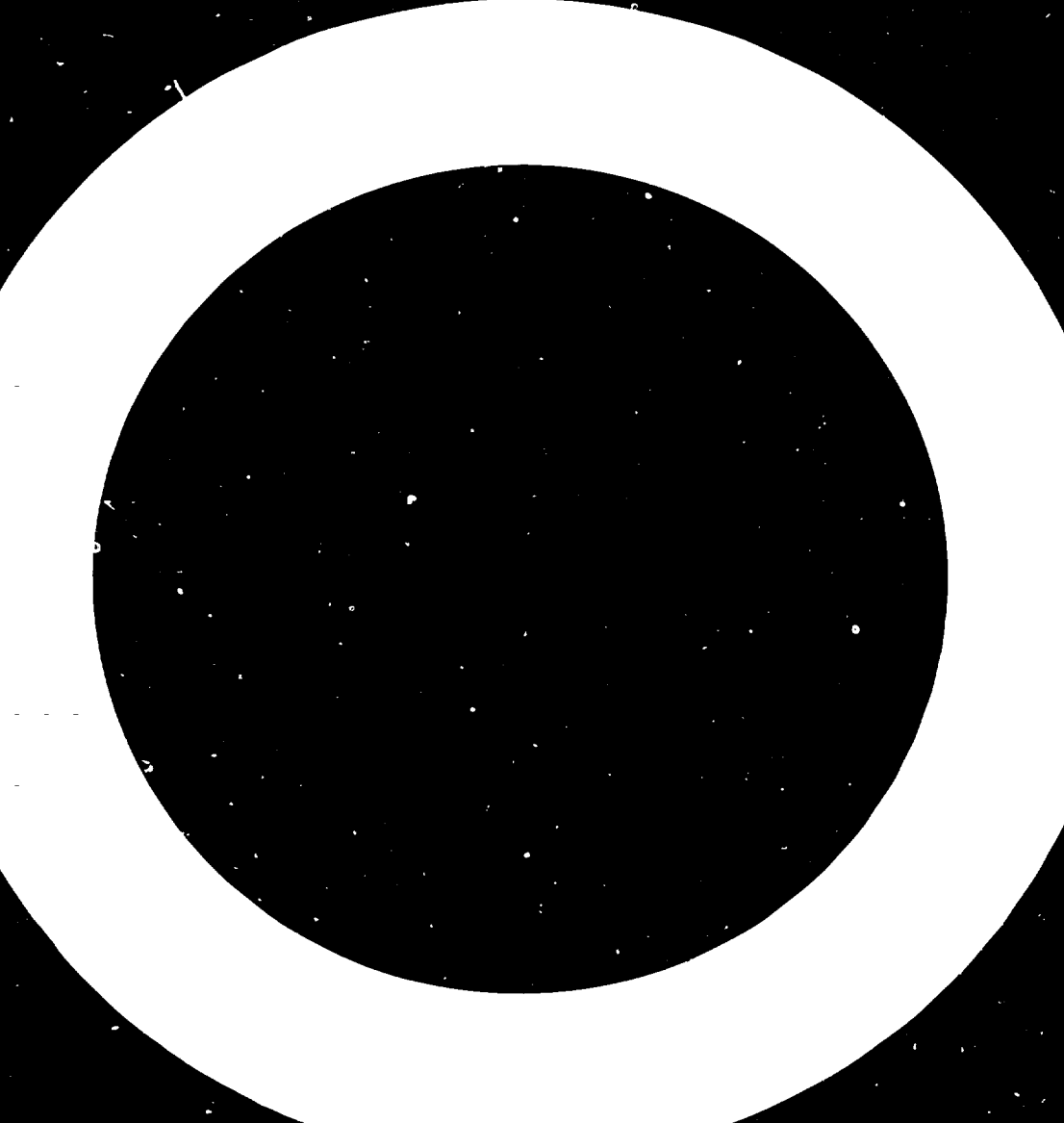
As part of the ongoing project "Leather and leather products industries development" (DP/UPT/78/010), an expert in maintenance of shoe production machinery and equipment was sent by the United Nations Industrial Development Organization (UNIDO) acting as executing agency of the United Nations Development Programme (UNDP) to the United Republic of Tanzania in order to assist the Tanzania Shoe Company Ltd. (TSC), Bora factory, in establishing a centralized maintenance system. During his mission of 15 1/2 months, which began on 22 February 1982, the expert:

- (a) Made a proposal for and supervised the establishment of a maintenance, repair and service centre;
- (b) Prepared a detailed rehabilitation programme for the entire factory, excluding the high-fashion department;
- (c) Elaborated a procedure and designed forms for the selection of new shoe models for large-scale production, based on technical, technological and economical factors;
- (d) In co-operation with counterpart staff, organized and conducted a training course in the operation, maintenance and repair of shoe production machinery;
- (e) Carried out various ad-hoc assignments.

His main recommendations to TSC are the following:

- (a) The establishment of the maintenance and repair centre should be continued according to the work schedule prepared by the expert;
- (b) A technical development section should be established;
- (c) The selection of new shoe designs for production should be based on a technical, technological and economical evaluation;
- (d) The technical staff of TSC should undergo comprehensive training, both, on-the-job and overseas; for the implementation of this training programme further assistance from UNIDO should be sought.

The expert also recommends to TLAI to establish a centralized technical department for the development of the leather and leather products industries and to organize and co-ordinate seminars on topics related to production technology and maintenance of shoe machinery.



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INTRODUCTION

As part of the ongoing project "Leather and leather products industries development" (DP/URT/78/010), an expert in maintenance of shoe production machinery and equipment was sent by the United Nations Industrial Development Organization (UNIDO) acting as executing agency of the United Nations Development Programme (UNDP) to the United Republic of Tanzania in order to assist the Tanzania Shoe Company Ltd. (TSC), Bora factory, in establishing a centralized maintenance system. The expert's job description is given in annex I.

During his mission of 15 1/2 months, which began on 22 February 1982, the expert submitted a proposal for the establishment of a maintenance, repair and service centre, which involved the construction of storage sheds, the relocation of the chemicals store and the elaboration of specifications for the machinery and equipment required for the new central shop. Details about the execution of the project are contained in chapter II.

The expert was further responsible for the preparatory work for a rehabilitation programme which affected the entire factory, except the high-fashion department. After a careful study of local conditions and the situation in TSC, and based on an inventory of all existing machines, he made a proposal for a new plant layout and the replacement of old equipment (see chapter III). Most of the rehabilitation programme was completed during his assignment. These technical and technological changes also had consequences for the organizational structure of TSC and the expert accordingly suggested some changes.

He was further more concerned about the fact that the selection of new shoe models for large-scale production was not based on rational decision-making. He therefore designed a procedure and a set of forms (annex II) which will introduce technical, technological and economical considerations in the selection process.

In co-operation with counterpart staff he organized and conducted a training course in the operation, maintenance and repair of shoe production machinery (chapter V) and completed various other tasks not foreseen in his job description and which are detailed in chapter VI.

RECOMMENDATIONS

To TSC (Bora)

1. A central maintenance and repair system according to the expert's detailed recommendations, should be established.
2. A technical development section, the functions of which are described in the report, should be established.
3. The selection of new shoe designs for production should be based on a technical, technological and economical evaluation.
4. The production line of the high-fashion factory should, as a part of main shoe production, be managed by a shoe-production manager; this measure should contribute to increase production capacity.
5. In order to overcome the maintenance and repair problems mentioned in the report, the following training is recommended for the technical personnel:

(a) Overseas

One technician (R. Mwakalukwa) - six months
Subject: technical-technological preparation and production of upper and bottom cutting knives including textile cutting knives;

One engineer (J. Nkondo) - nine months
Subject: new production techniques, shoe machinery and production equipment (for new technical-development section);

Two engineers (one mechanical - C. Madaya) - six months
(one electrical - W. Rwiza) - six months
Subject: industrial training in shoe machinery maintenance and repair;

One engineer (A. Makalle) - two years
Subject: higher studies in shoe engineering; technological questions in shoe production and maintenance and repair (for higher management post in technical development of shoe industry);

(b) Locally

On-the-job training by experts from shoe machinery suppliers and producers for mechanics and operators;

Sewing section - one month
Subject: adjusting, servicing and maintenance of sewing machines;

Direct vulcanizing section - three weeks
Subject: training in vulcanizing process, adjusting of vulcanizing parameters, machines and moulds and their maintenance and repair;

Injection moulding section - three weeks
Subject: adjusting of injection parameters, machines and moulds and their maintenance and repair.

6. Some of the problems in maintenance, supply of spare parts and raw materials, production rate etc. are due to an inefficient management. The General Manager should take measures to ensure that he can rely on an effectively operating management team.

7. Costs could be considerably lowered by reducing the amount of leather waste. To this end it is recommended to make better use of leather by proper designing, cutting and producing shoes of a simple type, and by initiating the manufacture of different types of leather products out of waste.

8. After realization of the rehabilitation programme production for the export market of one or two types of shoes - for example safari boots, canvas sports shoes etc. - should be envisaged.

To TLAI

9. It is recommended to establish a centralized technical department for the development of the leather and leather products industry which would be responsible for technical and technological development and the co-ordination of a strategy for industrial growth. For example, the department should co-ordinate type and quantity of production, including products for the export market, between TSC (Bora) and Morogoro Shoe Company, and the relations between tanneries and shoe producers.

10. Furthermore, TLAI should organize and co-ordinate training seminars (production, maintenance) by transferring skills available in TSC (Bora) to Morogoro Shoe Company through foreign experts and Bora experts.

To UNIDO

11. It is recommended to increase generally the quality and length of the technical assistance to the shoe industry, because the level of technical know-how of local experts in this field is still low.

12. Specifically, the assistance of UNIDO should be sought in order to implement the training recommended under no. 5.

I. FINDINGS

The Tanzania Shoe Company Ltd. (TSC) (Bora) has taken over the organizational structure of the former Bata shoe factory, i.e. it is based on mass production of a few designs and lasts over a long period of time. Since the nationalization of the Company in 1967 up to now there was some technical development and an increase of production, but the basic system of mass production is still maintained because it suits local conditions.

The Company has problems with old machines and equipment, inadequate maintenance and lack of spare parts.

The main production is split into the following areas:

- (a) Shoe factory for the production of:
 - (i) Men's, ladies' and children's PU or rubber soles, rubber-canvas shoes, PVC beach sandals and other rubber and PVC footwear. It is located in the main hall;
 - (ii) Leather shoes with leather soles, situated in the "high-fashion factory";
- (b) Rubber factory for the production of non-vulcanized rubber material, rubber sheets, pre-finished rubber soles and bicycle tyres and tubes;
- (c) PU plant producing pre-finished PU soles;
- (d) Engineering workshop for the production of various spare parts and cutting knives as well as for repairs;
- (e) Laboratory, compressors, boilers, water cooling, garage etc.

A technical development section does not exist in TSC. Such a section would normally be responsible for planning and supervising the technical aspects of production and for technical documentation, also relating to the production of spare parts, equipment, their modification, repair and maintenance. The section would co-ordinate the relations between the technical shoe designing, the production and the purchasing sections and soles department, and plan and encourage the technological development within the Company. As far as research and development in the shoe industry is concerned, the expert noted that it is not satisfactory throughout the United Republic of Tanzania which is deplorable because the conditions for an expansion of this industry are very good.

The engineering workshop, although it has low-quality and obsolete machines and equipment, produces relatively good work, because the mechanics and supervisors are well qualified.

A wood-working section is practically non-existent; it is equipped only with circular saws; all other work is done by hand.

About 50% of the technical personnel of the engineering section is quite well qualified and competent to perform good maintenance and repair work. However, maintenance and repair is not planned but performed on an ad hoc basis. Maintenance, repairs and partial overhaul of machines and equipment are carried out once a year during the annual maintenance. The storage of spare parts is managed by the purchasing department, which gives rise to co-ordination problems between purchasing and utilization of spare parts.

The electrical installation of buildings and machines is poor due to lack of electrical hardware and spare parts, and so is the quantity and quality of production as a result of low-quality and obsolete machines and equipment, a semi-mechanized production system and the management style exercised. Transportation between the sewing and lasting sections is by tote boxes, and the production area is crowded with push-trolleys.

In spite of these problems, there is a good basis for a self-contained unit. In developing countries it is difficult to realize sub-delivery systems, i.e., the supply of some components of shoes (counters, prefinished soles, lasting insoles, plastic heels etc.) to specialized companies. In addition to economical and technical difficulties, the questions of transportation, delivery delays, usability and conformability of specialized production are serious. The best solution under such conditions is the model of self-contained mass production or a narrowly-specialized production unit.

It is of course necessary that all company operations be co-ordinated by a well-qualified management. Because changes in production (designs, lasts, models) are not frequent (maximally once a year or every two years), production planning and supply can be very simple. Such planning would minimize changes of machines and equipment, simplify production and the training of personnel and also increase the quality and quantity of production in a relatively short time.

TSC uses only a few types of lasts which cannot be procured locally and therefore often changes in designs or new designs are not possible. The designing department prepares every year some new designs, which later are not produced on a large scale. It is not reasonable to produce by hand samples of new attractive models, which cannot be put into production.

On the other hand is the selection of new designs for mass production up to now based on visual attractiveness and not on technical-economical calculations, although it should be a condition to prepare for each new model detailed specifications of necessary materials, machines and equipment as well as an economical evaluation. It can be summarized by saying that the designing department should be production-oriented.

In view of the above situation it was agreed to start the realization of the rehabilitation programme and an innovation and modernization of production aimed at increasing the quantity and quality of production with minimum expenses of hard currency.

Accordingly the experts programme of work during the last year concentrated on the activities described in the following chapters.

II. MAINTENANCE AND REPAIR

A. General

A proper maintenance system is not confined to shop-floor activities such as the tightening of nuts, lubrication of bearings, cleaning, lubricating or repairing of a broken machine part, nor is it concerned only with engineering and technical problems. It is basically a combination of different aspects. While the principles of maintenance are generally the same, different approaches and techniques are used to suit specific conditions in a given factory. To plan and implement a well-functioning maintenance system, adequate data and technical information must be made available, including mainly economic, engineering, managerial and organizational aspects.

B. Local conditions and present situation in TSC

The whole production, mostly of shoes, is divided into nine different sections. The Director of the Engineering Department manages also the maintenance department assisted by a mechanical and an electrical engineer. The mechanical engineering section is decentralized and the maintenance personnel is assigned to the various production areas. The maintenance staff comprises approximately 170 people.

Several attempts were made to establish a proper maintenance system, but due to various reasons there is at present only an ad-hoc repair system without adequate planning in use. These ad-hoc repairs are carried out mainly by the operators of production machines, foremen, and maintenance inspectors. A technical development section with the functions outlined in the preceding chapter, does not exist. The central workshop includes a small unit for the production of cutting knives. The technical level of machines is poor, but there is a fairly well-qualified team of workers who can produce a considerable quantity of spare parts, do repairs and simple renovation of machines and equipment.

Preventive maintenance exists partly; it includes only lubrication of the machines by a grease boy. Since in shoe production different equipment is used for different types of lasts, shoes and material, it is necessary to continuously check and adjust many of the machines to suit varying conditions. These tasks are realized sporadically by the mechanics when the machines do not work. Generally operators do not perform any adjustment and maintenance of machines.

C. Proposal for a maintenance, repair and service centre

While it is possible to perform all maintenance work on the production line, this is not the best method. Considering that concentration is required to solve a technical problem, the best way is to do it in solitude, i.e. away from the production line. It is also not always possible to move all tools and equipment necessary for the maintenance job and furthermore the maintenance worker disturbs and is disturbed by the other operators next to the broken machine.

After a thorough study and analysis of the prevailing conditions and following discussions with the managers concerned, the expert has prepared the following proposal for a centralized shoe machinery maintenance, repair and service shop. Such a centre, if established in TSC, would not only perform all maintenance work (preventive care, service etc.) but also repairs and overhauls of shoe production equipment.

The proposal includes two steps:

(a) Establishment of a centralized chemicals store behind the raw materials store, which is currently only 10% utilized for the storage of chemicals and lubricants, with a view to improve the control, organization, inventory system and security of all chemicals;

(b) Establishment of a shoe machinery maintenance, repair and service centre in the present flammable chemicals store.

The cost of modification for both is assumed to be minimal as the job can easily be undertaken by the Company, and the time for its realization is expected to be short since the extent of work involved is not too big, especially if the suggestions given below are followed.

Centralized store for chemicals

For the establishment of a separate storage of chemicals with subsequent transfer of the chemicals it is necessary:

(a) To clear all waste from the area earmarked for the central chemicals store;

(b) To build a shaded area for storage of all chemicals that would be damaged by rain or sunshine;

(c) To build a small and simple office for the staff who will be responsible for receiving and issuing the chemicals;

(d) To install fire-extinguishers with shades;

(e) To renovate and reduce the number of gates to the storage area;

(f) To colour-code the storage space and transport ways on the floor;

(g) To arrange the different types of chemicals in the store in such a way that an easy survey, safety of storage and work, and an efficient handling of chemicals during their receipt and issuing is ensured.

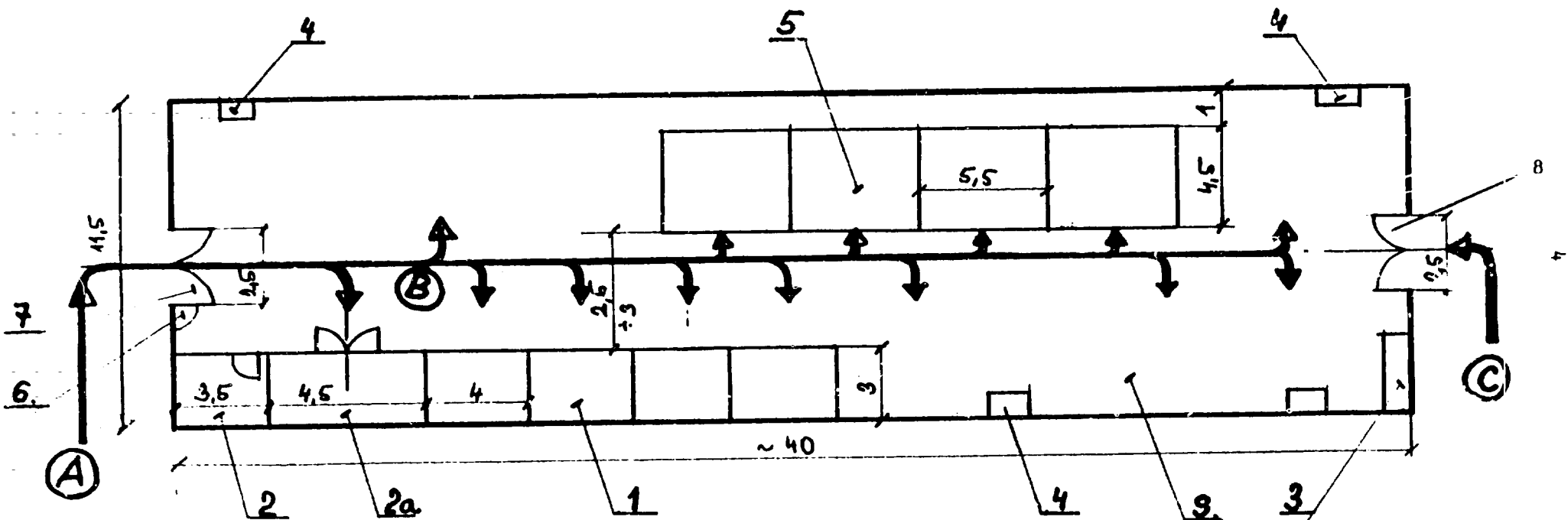
The layout of the central chemicals store is given in figure I.

Shoe machinery maintenance, repair and service centre

To establish the shoe machinery maintenance, repair and service centre in one hall it is necessary:

(a) To transfer the chemicals to the centralized chemicals store;

Figure I. Layout of centralized store for chemicals



- | | | | |
|----------------|---|--|-------------------------------------|
| Legend: | 1 Shaded storage area | 6 Passage | A Main entrance |
| | 2 Small office | 7 Main doorway | B Main path of access to the stores |
| | 2a Air-conditioned area for liquified gaseous chemicals | 8 Security gate | C Secondary entrance |
| | 3-4 Shaded area for fire extinguishers | 9 Unsheltered storage area for various chemicals | |
| | 5 Shaded storage area for inflammable chemicals | | |

(b) To adapt the hall for maintenance and repair work with 415 V electrical current, 220 V for working lights, air pressure, air-exhaust for painting box etc.;

(c) To build three small offices, one for the manager, one for the mechanical and electrical engineers and for storage of technical documentation and a third for the storage of hand tools, equipment and electrical parts;

(d) To order and install the necessary machines, accessories, equipment and hand tools.

Figure II shows the layout for the centre.

Organizational structure

The creation of a centralized maintenance system within the engineering department calls for a change in the organizational structure. In view of the facts that TSC as a manufacturing industry is geared towards expansion; that the lack of imported spares entails reliance on local workshops and suggests an expansion of the Company's own workshop; that there is a continuous change in technology, production methods and products of which TSC has to keep track; and that new and improved tools of production need new approaches to maintenance; it is suggested that the engineering department be divided into three main sections with the following functional responsibilities:

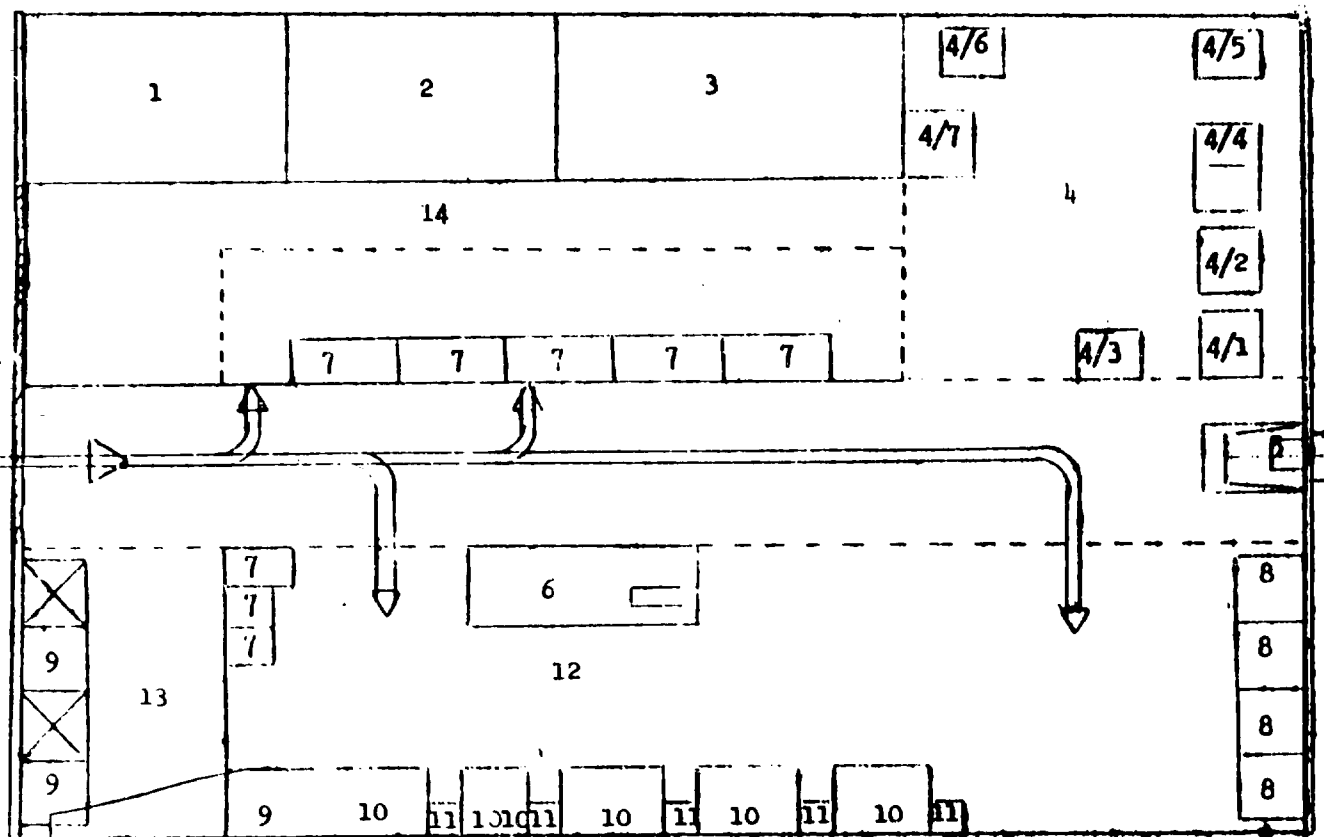
- (a) Maintenance and repair;
- (b) Engineering workshop for the production of some spares, equipment, moulds, and, after a modernization of the engineering workshop, also for simple types of machinery;
- (c) Technical development and later research in technical and technological problem areas.

An organigram outlining the suggested organizational structure is given in figure III.

The responsibilities of the three sections are given in detail below:

(a) Repair and maintenance section: It will carry out all types of maintenance (preventive, repair, service and overhauls). Maintenance problems will be co-ordinated with the technical research and development section and their advice sought. For the manufacture of spares required for maintenance the technical research and development section will prepare the necessary drawings. To increase the efficiency of maintenance activities, mechanical and electrical maintenance will be done separately. i.e. there will be two subsections, as shown on the organization chart. The head of the section will be responsible for the planning of all maintenance, repair and overhauls. For their execution mechanics will be oriented to all types of maintenance, with emphasis on preventive maintenance.

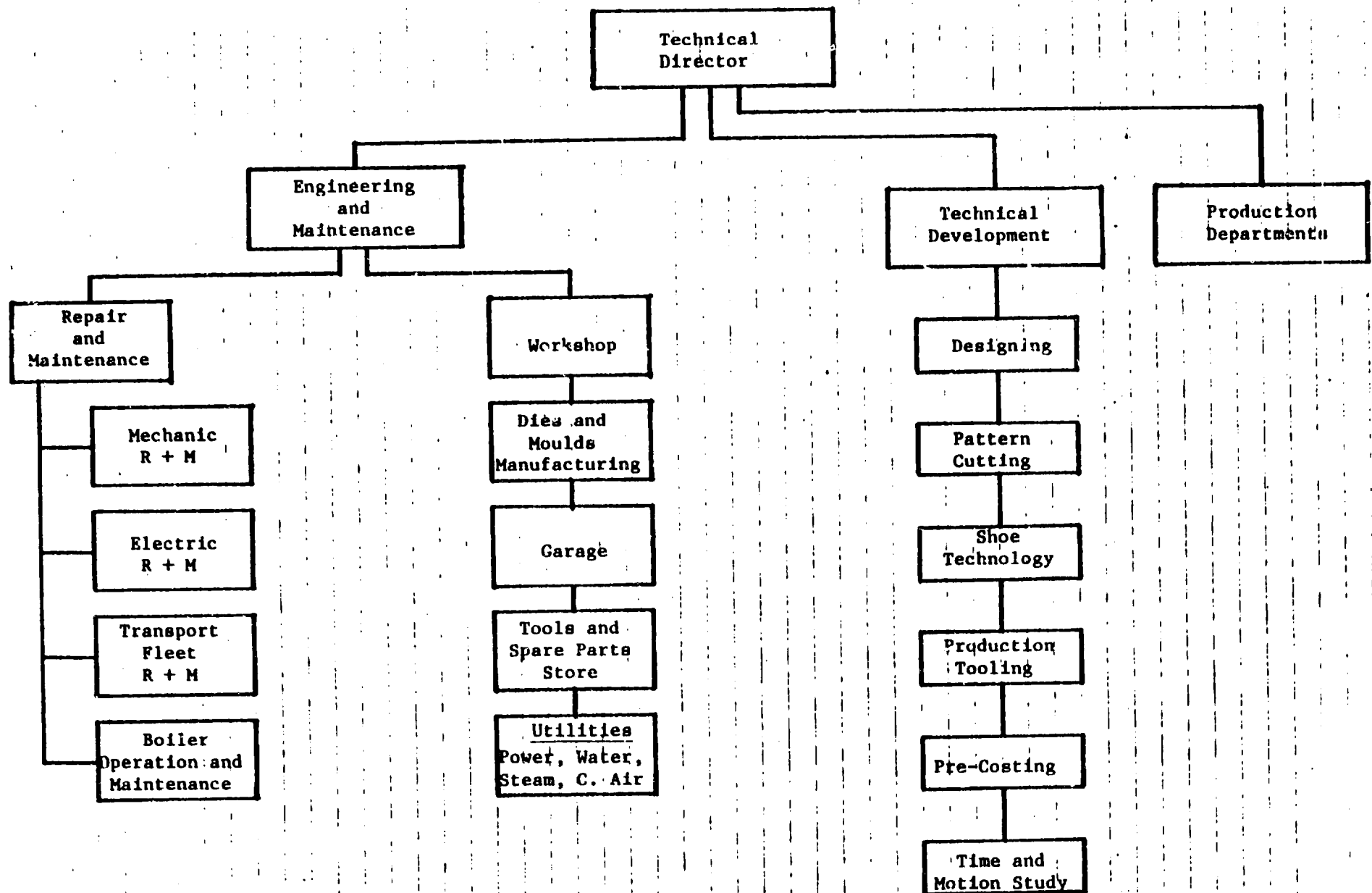
Figure II. Layout of shoe machinery maintenance repair and service centre



Legend:

- 1 Office for manager of maintenance and repair centre and secretary
- 2 Office for mechanical engineer, electrical engineer and storage of technical documentation
- 3 Store for hand tools, equipment, electrical parts
- 4 Mechanical section
 - 4/1 Hand press
 - 4/2 Drilling machine (pillar)
 - 4/3 Forging stand (anvill)
 - 4/4 Two-disc grinding machine for tools
 - 4/5 Two-disc polishing machine
 - 4/6 Point welding machine
 - 4/7 Filing table with vice
- 5 Painting booth
- 6 Steel table with magnetic seaming set
- 7 Rolling racks
- 8 Painting tables
- 9 Working tables with vice and lockers for electrical section
- 10 Working tables with vice for mechanical section
- 11 Lockers
- 12 Repair and assembly area for mechanical section
- 13 Repair and assembly area for electrical section
- 14 Handling platform of finished machines and rolling racks

Figure III. Suggested organizational structure for technical departments



It is normal practice to have the spare parts under the control of the engineering and maintenance department. The spare parts store should therefore be a subsection of the engineering section. Some of the benefits which will be derived from this change are:

- (i) Easy planning of maintenance, repair and overhauls;
- (ii) Better control over spares (quantities ordered and used);
- (iii) Speedy execution of maintenance activities because a required spare is immediately available;
- (iv) Concentration of all spare parts, whether imported or made locally;
- (v) Minimization of administrative problems.

The engineering and maintenance department will quarterly or half-yearly prepare stock levels of all spares, issue lists of spares which should be ordered, and submit the orders to the purchasing and supplies department for implementation;

(b) Engineering workshop: As the name suggests, it will be responsible for the manufacture of equipment, tools and some simple types of machinery according to specifications supplied by the technical development section. It is hoped that the workshop will be satisfactorily equipped and staffed so that it will be self-sufficient in spares and in a position to manufacture simple prototype machinery and equipment;

(c) Technical development section: This section is essential for the efficient operation of the factory as regards all shoe engineering aspects including design, patternmaking, shoe technology, production tooling, pre-costing and time and motion study. It will co-ordinate its work with the marketing and the production departments; the chief shoe designer has a decisive role in the functioning of this section. It is envisaged that later, when there will be pronounced industrial growth in the United Republic of Tanzania, the section will be responsible for the design and development of some simple shoe machinery and equipment. It will also have to liaise with other departments such as finance (for costs and budgets), purchasing and production.

After approval of these suggestions by the General Manager it should be possible to start immediately with the construction of the central maintenance and repair hall and the chemicals store. The estimated cost of adaptation of both, excluding equipment, will be approximately TSh 35,000.

D. Solutions to ad-hoc maintenance problems, repairs and renovation of machinery and equipment

A good deal of the expert's time has been devoted to find solutions in the case of ad-hoc repairs, machine adjustments, their renovation, and eventually to the preparation of technical documentation and procedures, followed by instruction and training of the managers and workers concerned. Some of these efforts lead to considerable savings; e.g. the modification of the moulds for a PU sole will result in savings of about TSh 17.8 million.

Once the planned maintenance system will be implemented, the percentage of ad-hoc repairs and maintenance should be much lower.

III. REHABILITATION PROGRAMME

Before embarking on a rehabilitation or modernization project the old system with its positive and negative aspects has to be carefully evaluated and compared with the new one, considering such aspects as the technical, technological, organizational, materials, personnel and the economical.

The rehabilitation programme for TSC has therefore been studied in all details, especially since it constitutes the biggest change in the factory for the last 10 years. Besides the replacement of old machines it includes a change of the existing organization of production and thus should contribute to an improvement of both quantity and quality. Efforts were concentrated on those production areas where the highest gain can be expected.

Specifically, the expert completed the following tasks:

- (a) Prepared an inventory of all existing machines and equipment, specifying their quality and usability;
- (b) Established a work schedule for the finishing of the new hall;
- (c) Elaborated a production layout for the new hall, the main factory, the rubber factory and the engineering workshop, including the central maintenance hall;
- (d) Made up detailed specifications of machines and a layout for the installation of all new lasting conveyors as well as for the new and old vulcanizing presses;
- (e) Prepared a work schedule for all modifications and changes of production lines in the new hall and the main factory. This work was completed during the six-week annual maintenance (January/February 1983);
- (f) Maintained contact with suppliers and conducted all necessary technical discussions;
- (g) Prepared a work plan for the immediate realization of changes in production following the delivery of new machines and equipment;
- (h) Prepared a technical description for each type of shoe to be produced on each lasting conveyor.

The change of the plant layout and the rehabilitation programme were carried out concurrently, but implementation took place step by step. It was of great importance to create such conditions that all machines and equipment supplied during the first and second quarter of 1983 could be installed without delay and without disturbing the rest of the production.

All technical details had been discussed before with the suppliers during the expert's trip to Europe and the necessary documentation for the production of certain special equipment (irons, wipers, embossing dies, PVC and rubber shoe moulds etc.) had been sent to them. According to the purchase contract all machines are supplied with spare parts for two years

of production together with special maintenance tools. Furthermore the contract includes the training of TSC's personnel in the operation and maintenance of the new machines, this training to be carried out during the installation of the machines in question. Finally, all machines are to be adjusted in the suppliers' factories for the production of specific types of shoes, thus guaranteeing optimal results immediately after their installation.

The rehabilitation programme affects the whole factory except the high-fashion workshop, which has a relatively new and modern production line: there will be an increase of production in the sewing section and two new programmable sewing conveyors installed; the combining of two old lasting conveyors to one and the addition of a new one will give, together with 22 new shoe machines ordered, a better continuous production flow in the main factory; a new line of vulcanizing presses and one universal injection-moulding machine for new types of football shoes and jogging sport shoes will increase the total output considerably; changes in the rubber section will affect tyre and tube production; and in the engineering workshop a new production unit for upper cutting knives is foreseen.

IV. TECHNICAL DOCUMENTATION AND ECONOMICAL EVALUATION

An important issue is the proper preparation of new designs and models for production, including the technical and economical aspects. At present the practice in TSC is to approve new models and designs for production on a visual basis rather than on a technological-cost/price basis.

The expert therefore prepared a procedure based on a set of forms, which are given in annex II and include the following items:

- (a) Technical description and material specification;
- (b) Technological description of production process including direct labour rates.

These forms should serve as basic documents for:

- (a) Evaluation selection and approval of new models;
- (b) Marketing, ordering of materials and technical preparation of production;
- (c) Pre-costing.

V. TRAINING COURSE IN THE OPERATION, MAINTENANCE AND REPAIR OF SHOE PRODUCTION MACHINERY

As mentioned before, TSC does not offer any training courses for its supervisors, operators and mechanics. Most of them have the minimum knowledge required for the technical and technological problems encountered in their work. Therefore the expert organized a training course which was held from 7 June to 19 July 1982, with three sessions of two hours each per week. Twenty participants were selected from among engineering supervisors and mechanics and production supervisors and mechanics.

The main topics dealt with in the course were:

- (a) General view on maintenance, repair and overhauling of shoe machinery;
- (b) Application of modern technological processes, machines, equipment and material;
- (c) Co-ordination of work between model room, production and engineering department; technical-technological preparation of production;
- (d) Central maintenance and repair system in TSC;
- (e) Technical documentation and its use;
- (f) Practical training in the maintenance and repair of machines in different production sections.

The main objectives of the course were:

- (a) To improve technical and technological know-how;
- (b) To improve methods of production and maintenance;
- (c) To familiarize participants with a central maintenance and repair system and to facilitate its application to TSC's conditions;
- (d) To install in the workers confidence in their work.

The training course was concluded by a progress test. The list of participants is given in annex III.

VI. OTHER TASKS COMPLETED BY THE EXPERT

In addition to the activities specified in his job description, the expert has been requested to perform or assist in the execution of the following tasks.

A. Establishment of the Tanzania Institute of Leather Technology (TILT)

The expert's contribution to the establishment of the above Institute was solicited in the following areas:

- (a) Preparation of a layout for the training sections in the various processes of shoe production, tanning and laboratory testing;
- (b) Drafting of specifications for machinery and equipment for the various sections;
- (c) Preparation of layouts for machinery and equipment, including the required electrical installations.

The expert has submitted a separate report outlining his findings and recommendations.

B. Technical trip to Europe

Upon request of TSC and the General Manager of TLAI, and after confirmation by UNDP and UNIDO, the expert accompanied the General Manager of TSC (Bora), Mr. Y.J. Mvailolo, on a technical trip to Europe. The main objectives were to visit the Semaine du cuir at Paris, in order to discuss with shoe machinery suppliers and producers technical and technological questions concerning the selection of machines for the rehabilitation programme, and to visit producers and suppliers of shoe-making machinery in Austria, Federal Republic of Germany, France, Italy and the United Kingdom.

The results of that trip have been very useful in the preparation of the rehabilitation project, the selection and specification of machines and equipment and their ordering.

C. Commissioning of the equipment at Morogoro Shoe Company

Upon request of TLAI the expert took part in the commissioning of the equipment at Morogoro Shoe Company, which took place from 5 to 7 October 1982. He submitted a detailed report on the results of this commissioning exercise on 17 October 1982.

Annex I

JOB DESCRIPTION

Post title: Shoe machinery maintenance engineer

Purpose of the project: To enhance the capabilities of Tanzania Leather Associated Industries Corporation (TLAI) to discharge the responsibilities entrusted to it in further developing and strengthening the leather and leather products sector of the economy. It will aim to the best possible utilization of the valuable raw materials, hides and skins, abundantly available in the country.

Duties: The expert will be attached to TLAJ, which administratively falls under the Ministry of Industries. Specifically the expert will advise on well functioning centralized maintenance, a mechanical as well as electrical workshop for the shoe sector, including planning, identification and assistance in the purchase of machinery and equipment for the workshop.

The expert will also be involved in demonstrating the maintenance and overhauling of machinery and equipment, and carry out training courses for the counterparts. He will also be expected to:

(a) Organize the training of maintenance personnel needed by the shoe factories as well as recommend their specific training needs both in the country and abroad;

(b) Prepare a plan and recommend action required for the implementation of a maintenance service centre for the footwear manufacturing industry, including a plan for the local manufacture of spare parts;

(c) Prepare job manuals and train counterpart personnel on the machinery and equipment for shoe production;

(d) Recommend a system and schedules for preventive maintenance and overhaul as well as an effective ad-hoc repair system;

(e) Provide training on specific shoe machinery and methods, such as injection moulding machines, adjustment of moulds, preparation of cutting knives etc., and prepare a long-term programme for the maintenance and up-keep of the machinery and equipment.

The expert will further be expected to prepare a final report, setting out the findings of his mission and his recommendations to the Government on further actions which should be taken.

Annex II

PROCEDURE AND FORMS FOR THE EVALUATION AND SELECTION
OF NEW MODELS FOR PRODUCTION

A. Technical description and material specification

The technical development department should prepare detailed specifications for all models that are being produced as well as for new ones. In accordance with sample form 1 this specification should contain a complete description of the shoe, including a sketch of upper and lining construction, description of each pattern piece of the model, number of pieces of patterns per pair, the material description and quantity needed for each pattern piece.

B. Technological description of production process and direct labour rates

According to sample form 2 the technical development department should prepare the complete workflow list for each model in production and for all new models to be designed. The work operation list is divided department by department into single work operations which are described by name and give the machine, equipment or method for the work to be performed. The time for 100 pairs production as well as the rate for the operation is included in the form. (The times are to be set by time study or from experience and, of course, negotiated with and approved by the Union.)

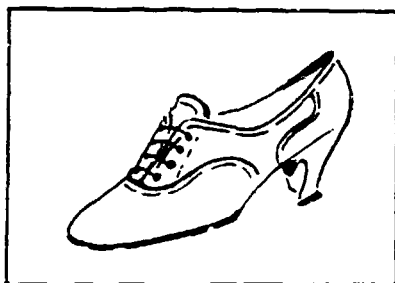
C. Pre-costing

Based on the information obtained from the previous forms 1 and 2, as well as information to be obtained from the accounts department concerning manufacturing and administrative overheads, form 3 can be prepared by the technical development department.

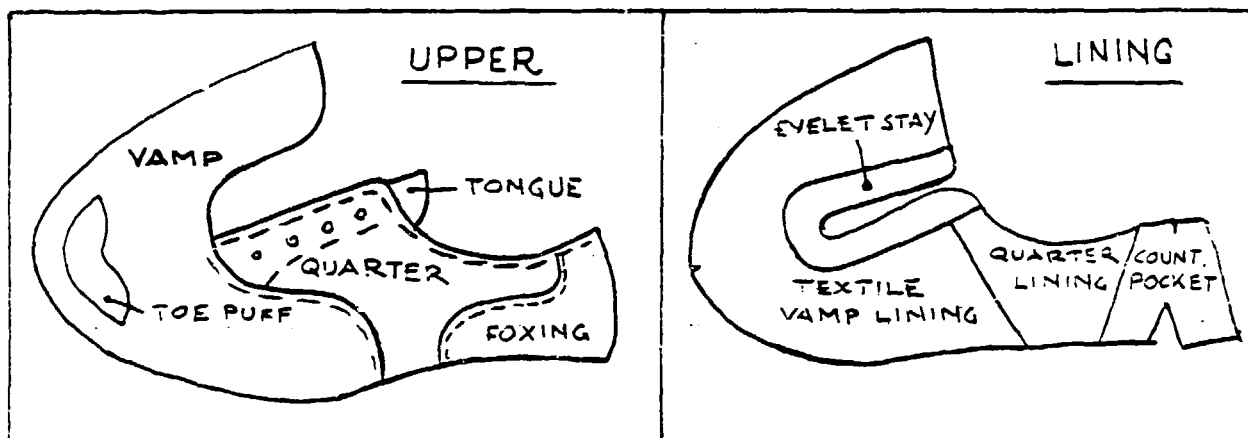
It is important that all new models which are being prepared for the co-ordinating committee's selection and approval are accompanied by these forms in order to give the committee full facts on the model to be taken into production.

FORM 1

TECHNICAL DESCRIPTION
AND
MATERIAL SPECIFICATION



Model No.: _____
 Last: _____
 Type of Shoe: _____
 Construction: _____
 Size and Assortment: _____
 Colours and Combinations: _____



Description of Part	No. of Pcs.	Material Description	Quantity
A. UPPER:			
Vamp			
Quarter			
Tab			
Saddle			
Apron			
Toe Cap			
Tongue			
Foxing			
Eyelet Stay			
B. LINING:			
Vamp			
Quarter			
Counter Pockets			
Eyelet Stay			
C. SMALL MATERIAL FOR UPPER:			
Eyelets, Hooks			
Sewing Thread			
Binding			
Laces			
Adhesives			
Elastic Gore			

Description of Part	No. of Pcs.	Material Description	Quantity
D. REINFORCEMENTS:			
Counter			
Toe Puff			
Interlining			
Reinforc. Tapes			
E. LASTING AND MAKING MATERIAL:			
Insole			
Shank			
Bottom Filling			
Platform			
Heels			
Lasting String			
Sock			
Welt			
F. SMALL ITEMS FOR LASTING AND MAKING:			
Nails			
Screws			
Staples			
Thread			
Adhesives			
Dyes			
Waxes			
G. PACKING MATERIAL:			
Box			
Silk Paper			
Outer Carton			
Gum Tape			
Label			

Prepared by: _____

Checked by: _____

Date: _____

Date: _____

FORM 2

TECHNOLOGICAL DESCRIPTION OF PRODUCTION PROCESS
AND DIRECT LABOUR RATES

Model No. _____
 Last: _____
 Type of Shoe: _____
 Construction: _____
 Size Assortment: _____
 Colours and Combinations: _____

No.	Operation	Machine and Method	Minutes/ 100 Pairs	Rate	Notes
	<u>CUTTING</u>				
	Cut upper lining	By hand 12 pcs/pair			
	Cut lining leather	By hand 8 pcs/pair			
	Cut vamp lining	Beam cutter, 16 layers/ 2pcs/pair			
	Cut toe puff	Beam cutter, 4 layers/ 2 pcs/pair			
	Cut insole	Beam cutter, 2 layers/ 2 pcs/pair			
	Control and Bundle	Hand			
		Total time for cutting of 100 pairs			
	<u>STITCHING</u>				
	Skive upper	Fortuna skiver			
	Skive lining	Fortuna skiver			
	Join foxing to quarter	Pfaff 141			
	Stitch back seam	Union Special			
	Stitch front binding	Pfaff 191-705-59/01			
	Turn binding	USMC folder			
	Vamp	Pfaff 194			
	Join qu.lining to foxing	Pfaff 141			
	Stitch qu. lining to vamp	Pfaff 141			
	Stitch eyelet stay	Pfaff 141			
	Top stitch + trim	Pfaff 191-705-03-725			

No.	Operation	Machine and Method	Minutes/ 100 Pairs	Rate	Notes
	Bartack	Pfaff 3336			
	Eyelet	USMC Eyeletter			
	Attach toe puff	Hand			
	Control + trim	Hand			
		Total time for stitching 100 pairs			
	<u>LASTING AND MAKING</u>				
	Tack insole	USMC insole attacher			
	Trim insole	Hand			
	Insert counters	Hand			
	Backpart mould	OMIC			
	Forepart last	USMC NO. 4			
	Seat last	USMC seat laster			
	Side last	Hand			
	Rough	Roughing machine			
	Heat set				
	Cement	Hand			
	Activate	Infrared			
	Lay sole	Sole laying machine			
	Remove last	Hand			
	Inspect and repair	Hand			
		Total time for lasting and making of 100 pairs			
	<u>FINISHING AND PACKING</u>				
	Insert sock	Hand			
	Spray finish	Spray gun			
	Inspect and pack	Hand			
		Total time for packing of 100 pairs			
		GRAND TOTAL TIME FOR MANUFACTURING			

FORM 3

PRE-COSTING

Model No. _____

Last: _____

Type of Shoe: _____

Construction: _____

Size and Assortment: _____

Colours and Combinations: _____

Description of Part	Quantity	Unit Price	Price 100 Pairs	Notes
A. UPPERS:				
Vamp				
Quarter				
Tab				
Saddle				
Apron				
Toe cap				
Tongue				
Foxing				
Eyelet stay				
Total cost of 100 pairs uppers				
B. LINING:				
Vamp				
Quarter				
Counter pockets				
Eyelet stay				
Total cost of 100 pairs lining				
C. SMALL MATERIAL FOR UPPERS:				
Eyelets, hooks				
Sewing thread				
Binding				
Laces				
Adhesives				
Elastic Gore				
Total cost of 100 pairs small material				

Description of Part	Quantity	Unit Price	Price 100 Pairs	Notes
D. REINFORCEMENTS:				
Counter				
Toe puff				
Inter lining				
Reinforcement tapes				

GRAND TOTAL MATERIAL COST (A+B+C+D+E+F+G)

COST SUMMARY

A.	Material cost	_____
B.	Add % for rejects	_____
C.	Total material cost (A+B)	_____
D.	Direct labour (Form 2)	_____
E.	Manufacturing overheads (from accounts)	_____
F.	Total manufacturing cost (C+D+E)	_____
G.	Administrative overheads (from accounts)	_____
H.	Sales cost (from accounts)	_____
I.	Self cost price (F+G+H)	_____
J.	Add % mark-up	_____
K.	Sales price ex factory (I+J)	_____

Annex III

PARTICIPANTS OF TRAINING COURSE

Engineering supervisors

Dionis Saka (DSM)
Hassan Mvinyi (conveyor)
Godfrey Mzumula (sewing)
Bisematole (rubber)

Engineering mechanics

Shaban Mbegu (DESMA)
Yakubu Malufya (DESMA)
Charles Dismas (DSM)
Ahmad Saidi (conveyor)
Iddi Abdallah (conveyor)
Stanislaus Shayo (sewing)

Production supervisors

Harold Urio (design department)
S. Mwakega (production rubber)
Cassian Nyadwa (production leather GUSBI)
Handani Hamisi (production leather DMS)

Machine operators

Bakari Salum (design)
Mwaka Sagatwa (design)
S. Mbaki (production rubber)
M. Smaho (production rubber)
Mika Ochara (production leather GUSBI)
Edson Mwainunu (production leather DMS)

