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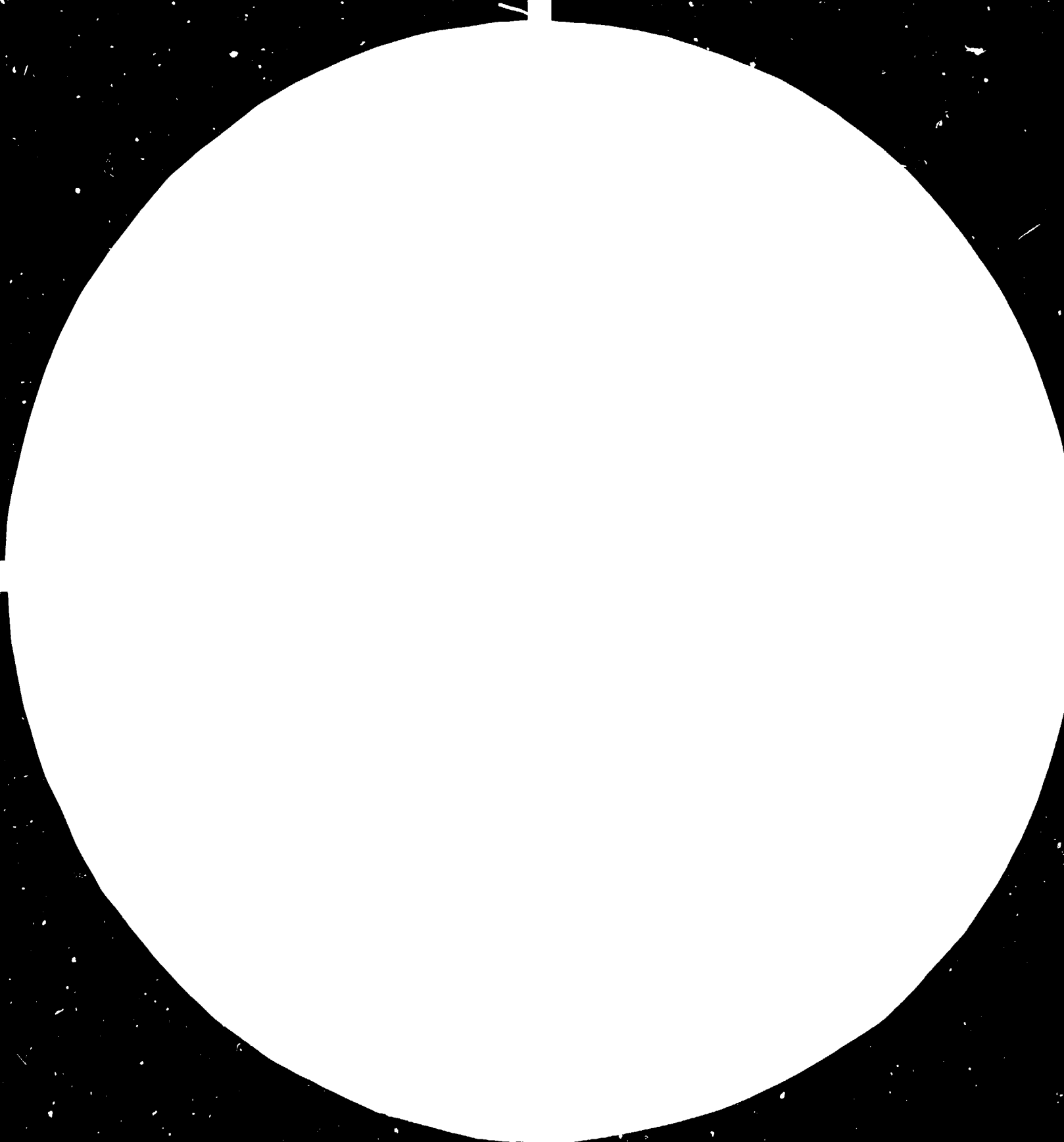
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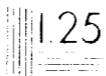
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21 February 1983

Somalia

FOUNDRY AND MECHANICAL WORKSHOP

DP/SOM/73/004

SOMALIA

Terminal Report

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

Based on the work of S.B. Snitt
adviser on pattern making

United Nations Industrial Development Organization
Vienna

This report has not been cleared with the United Nations Industrial Organization which does not, therefore, necessarily share the views presented.

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Introduction

The Foundry and Mechanical Workshop Project, FMW, of the Somali Democratic Republic, was approved in 1974, with assistance from voluntary contributions from Yugoslavia/UNIDO providing over-all planning and basic machinery. The Government of Somalia provided land, buildings, machinery and equipment, totalling about Somali Shillings: 31,000.000.- Country Programme Funds, UNDP/UNIDO, totalling about US\$ 1,100.000.-

A. Objectives and logic of Project.

The objectives and logic of the project was to establish an industrial pilot plant, which could manufacture agricultural implements, various engineering products required by the local market, castings, mainly replacement and spare parts for the surrounding industries, as well as act as a centre for industrial training of local personnel and to provide technical information and services for local industries.

The FMW was provided with the following annual capacities:

		Production 1982
Grey iron castings per year	250 tons	160 tons
Non-ferrous castings	50 tons	40 tons
Mechined parts	100 tons	50 tons
Steel-structure	130 tons	100 tons

B. Activities carried out and Out puts Produced

In the end of 1975 the Foundry and Mechanical Workshop, FMW, started with a limited production with one office and a foundry building. In 1978, a separate building for a mechanical shop was ready to be utilized. And in 1980 a building for steel-structure was ready.

Foundry Section

The production of the foundry section is mainly made from job orders, such as replacement and spare parts like gearings, bushings, sugar crusher, dies etc. Advanced castings like impellers and centrifugal pumps have also been produced for the replacement of worn-out ones. Charcoal stoves, saddles and manhole covers are produced on a limited serial production basis.

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The production in tons of cast iron is at present totalling 160 tons and copper alloy totals about 40 tons. It was fore-cast that the production of castings in grey iron in 1982 should be about 250 tons. It must be noted, however, that the 160 tons produced at FMW, consist entirely of piece works with an average weight of around 100 kg. only. For the melting of cast iron, the foundry is furnished with two cupola furnaces, which operate with locally produced charcoal in stead of coke, thus eliminating the import of expensive coke.

The one ton cupola, which can produce castings up to about 700 kg. has been in operation since 1975. The installation of the two ton cupola, in 1979, raised the capacity to produce castings, weighing about 2 tons. A holding furnace with a capacity of 5 tons is under construction. The installation of the over-head crane raised the production possibilities of heavier castings as well as permitted an easier handling of, for example, big moulding flasks.

The moulds are mainly made from natural bonded sand, which is available within the vicinity of the project.

The introduction and use of chemical binders, mainly for delicate core-making, made it possible to produce more sophisticated castings, like closed impellers.

The installation of pressurized air in 1980 made it possible to utilize the moulding machines, air ranners and other air related equipment.

The production of moulds in the moulding machine is however limited to the 20 peices moulding flasks available, which fit the moulding plate.

Pattern shop

The production and the result of mould and core-making depends to a great extent on how the patterns and core boxes are manufactured in the Pattern shop. Patterns for plate and sweep moulding, as well as the making of plastic patterns increased the efficiency and the possibilities of mould making considerably. The pattern shop is fairly well equipped with

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machines and tools and with the pattern-maker which is trained in the field for 4½ years by UNIDO expertise, the shop may run fairly well if not too sophisticated patterns are required to be made. The pattern-shop has as all other sections within the project suffered the loss of trained personnel.

Mechanical steel-structure

Main production in the mechanical steel-structure section are water and fuel tanks, water trailers, anchors, agricultural implements, sanitary utensils, spades and rakes etc. The production in ton of steel-structure is at present 100 tons per year and for machined parts 60 tons to be compared with the forecast 130 and 100 respectively.

The steel-structure section is furnished with cutting and bending machines with a capacity of 6 mm as well as welding and forging facilities.

The machine shop has turning, milling, shaping, grinding, sowing, drilling and pressing facilities.

For both sections some complimentary equipment is required, specially machine tools.

Expertise in mechanical, steel-structure and foundry were recruited through sub-contract UNIDO/BISCO and started their service in November 1981. Under their technical guidance the mechanical, steel-structure and foundry sections have improved their production with qualitative and quantitative. A more efficient utilisation of equipment as well as shop improvement have been implemented. For further development further assistance is highly required.

C. Achievement of immediate Objectives

In general the Foundry Mechanical Workshop has steadily raised its production and quality of products. A gradual increase of still and a more effective use of equipment has also been achieved through technical advice. A wider and a more sophisticated range of products has been produced as well as a better quality with regards to accuracy. From the metallurgical point of view the castings are still in adequate. Guidance

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and proper interest in the metal composition when melting is lacking. A closer cooperation foundry - laboratory must be established for the analyzing of metal. The use of casting records as well as the carbon equivalent meter etc require an experienced metalling for corrective measures.

In the steel-structure section, the construction and welding technology in general have improved. The mechanical section has upgraded the manufacturing conditions as well as improved the accuracy.

D. Utilization of Project Results

The Foundry and Mechanical Workshop is a jobbing workshop, which means that many different products are manufactured. The training is therefore conducted on the spot through technical guidance. Theoretical lessons in drawing reading, pattern making, foundry matters and mechanical engineering is conducted partly through interpretators and partly through local staff members.

The engineering experience and the manufacturing capability of the FMW are utilized by the Committee for Alternative Energy established by the Government. Samples of windmills for water pumping and units for solar heating and bio-gas have been made for further development. For the production of spades, the design and making of dies to be used in the hydraulic press, the production rate of spades increased from a few pieces a day to 300-350 pieces a day. All in all, about 2000 spades have been manufactured in the last year.

E. Findings

The high personnel turnover of key staffs, mainly technicians, and qualified workers, has hampered the development of the project. Manufacturing is often started with an inadequate planning and can be considered not feasible with regards to materials as well as production possibilities. The management should put more emphasis on training, planning, quality and the improvement of workshops. In order to achieve good work discipline, proper handling and use of machines and tools, utilization of existing equipment, amintenance and repair, as well as perventive

maintenance, technical guidance on long term basis is required. This will result in higher quality workmanship and technical know-how. There is no doubt that FMW is playing and will in the future play an even greater roll for industrial development in Somalia as the demand of engineering products in Somalia is steadily growing. Old factories, like Jowhar sugar factory used replacement parts, which are no longer available abroad. Those parts can be and are now manufactured at FMW. Noteworthy is also, that the worn-out parts are being utilized by FMW as material for remelting. The market is there if the FMW can meet the required quality standard.

F. Recommendations

The further development it is essential to implement and finalize the shop improvements outlined for the project, which will result in a more efficient production as well as raise the general image of the project. The quality of castings depends to a great deal on the corrective information provided by the laboratory. For the utilization of the well equipped laboratory, a qualified laboratory technician, metalling is required.

A mechanical engineer, with two well qualified technicians, should be appointed for the designing section. The same personnel might also at an initial stage act as a quality control unit. The planning, procurement and storing of raw material as well as consumable materials are not adequate. Proper records should be kept, so as to avoid the un-availability of such materials, which are too frequently out of stock and hampering the project.

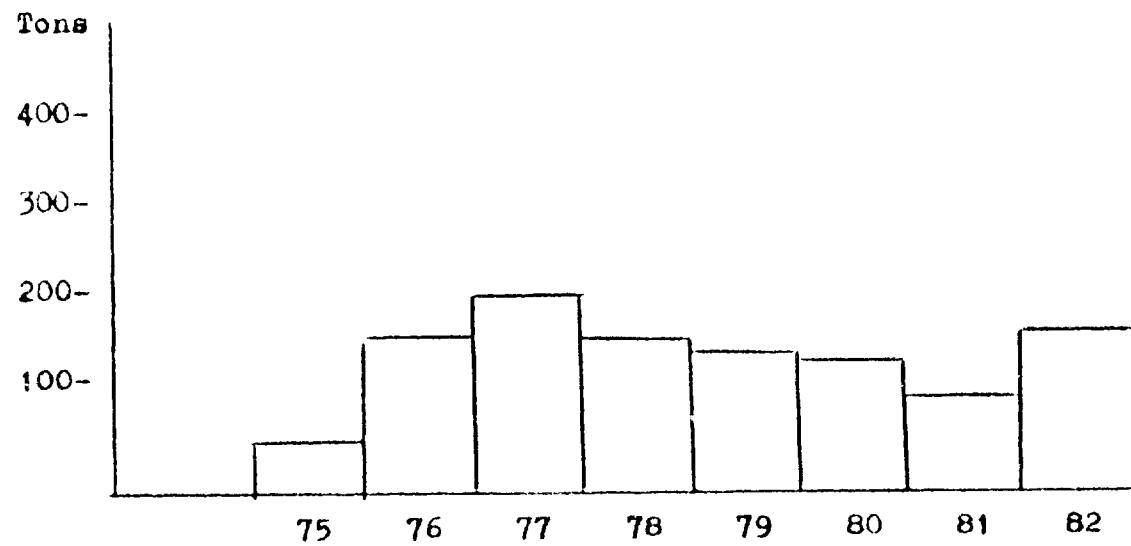
Electric cut-offs are from time to time jeopardizing the production, especially when melting. A diesel generator, to stand by at times of cut-offs, is highly required. Small items like charcoal stoves, spades and rakes used by local people, should be easier to buy. A small shop, situated preferably at the gate, for easy purchasing, would avoid the present complicated administrative procedures.

The most urgent shop improvements to implement are that the foundry should receive concrete flooring, with casting lines (roller conveyor), as well as finalize the installation of the iron crusher. In order to achieve

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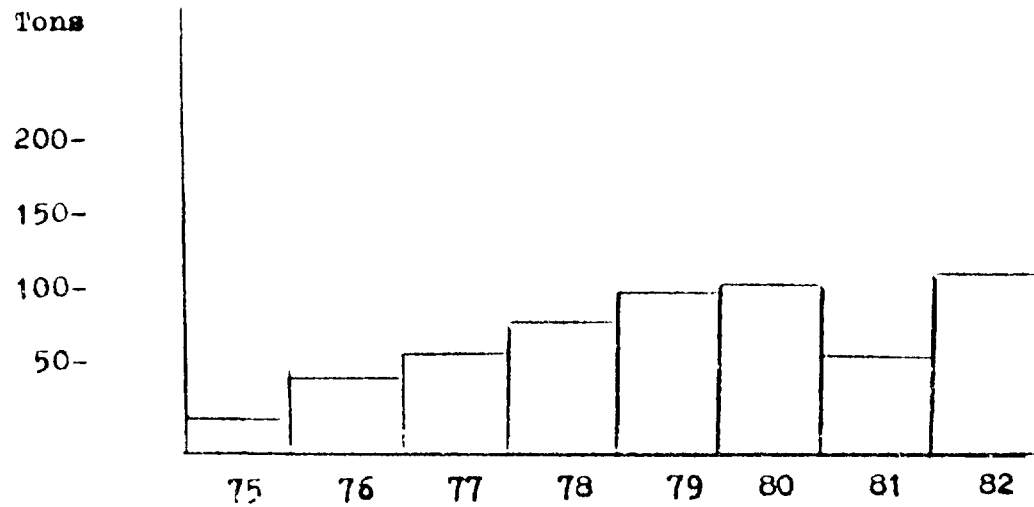
technical know-how of local personnel, as well as implement efficiency of workshops, further assistance on long term basis is required.

Grey iron production in tons



It must be noted, that the production up to 1978, consisted mainly of blanks. The production from 1978 and onwards consisted of piece work.

Steel-structure production in tons



The drop in production in 1981 depends on the fact that the FMW was engaged in the repair and construction of a dam in Corioli

Government Personnel

<u>Posts</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Management	4	4	3	4	5	6	6	5
Technicians	7	5	-	-	3	4	5	5
Designers	2	3	1	2	1	1	-	-
Administrators	3	5	10	10	13	11	15	17
Foundry	13	16	19	21	25	27	30	30
Pattern-makers	2	3	4	6	5	5	4	5
Mechanical	5	7	8	8	8	8	10	10
Steel-structure	6	7	10	13	13	15	18	20
Laboratory	1	1	1	1	1	1	1	1
Others	9	10	11	12	15	17	22	24
Total =	52	61	67	77	89	95	111	117

Introduction

The Foundry Mechanical Workshop of Somali is supported by UNDP/UNIDO. The FMW supports the industry by manufacturing products which normally are difficult to obtain in the country, as well as technical advisory services and technical training.

The FMW Pattern-shop and its development

The pattern-shop is a part of the foundry section of FMW which mainly produces by hand-moulding, a few pieces of casting from the pattern. Due to the fact that there is no mass production, but piece-work, in the foundry, there is a heavy load of work in the pattern-shop.

A pattern, which may take weeks to produce, may take just hours to cast. The pattern-shop at FMW is at present fairly well equipped with machines, tools and accessories. However, some of the machines do not correspond to each other in capacity.

During my assignment the pattern-shop has gradually built up its possibilities to produce patterns, as well as its training capabilities. At the time of my arrival, in 1978, it was not even possible to make a simple pattern. Necessities, like handsaw blades and emery paper etc. were not at hand and the whole shop was in a poor state.

The most necessary equipment needed, was procured through a trip to Nairobi, Kenya at the end of 1978, enabling a limited manufacturing of patterns and core-boxes. The procurement of machines and other equipment through UNIDO, expansion through rebuilding as well as a more efficient lay-out have resulted in a pattern-shop with facilities which can produce all kinds of work patterns.

Manpower

The existing manpower is made up by one master pattern-maker, trained for 4,5 years, three pattern-makers, with only one year of training, and two apprentices. The master pattern-maker is fairly well qualified in the field and may be able to run the shop if not too sophisticated patterns are required to be made.

Training

The training has generally been conducted informally in the Workshop. As the wood-pattern is the mother of all kinds of patterns and castings, emphasis has been given to the manufacturing and construction techniques of wood patterns.

Various types of patterns have been made such as one piece, split, self-cored, patterns for plate moulding, as well as for sweep moulding. Patterns which require various cores, have also been made, like split core, cope and drag, as well as balancing core prints. Patterns have been made from samples as well as from drawings.

The making of lay-out has normally been made by me in close cooperation with the counterparts. However, the master pattern-maker is today capable to understand and make lay-out, from both drawings as well as samples, if not too complicated.

The technique of making plastic patterns has been introduced and there can today be successfully made by the pattern-makers.

Theoretical lessons have been conducted in drawing reading as well as in theory related to pattern making and foundry matters, machine, tools, as well as accessories and materials, commonly used in a pattern-shop for the manufacturing of patterns and coreboxes. Theoretical materials have been prepared as complement to the tools available at the FWW as well as a course in basic drawing reading.

The possibilities to produce castings and the efficiency of mould and core making depend entirely on the manufacturing of the patterns and core boxes. It is therefore of the greatest importance to have well qualified and experienced personnel in the pattern-shop.

During my assignment the foundry section has raised the production capability both quantitative and qualitative. A great number of patterns has been made for surrounding industries and various agencies, mainly patterns for replacement and spare parts, which otherwise should have been imported.

A number of patterns for continuous use has been made, like manhole covers, saddles, bushings, bearings etc. During my assignment I have frequently acted as advisor for mould and core making in the foundry section, and provided customers with technical advice, related to patterns and foundry matters.

Findings, Recommendations and Comments

It is essential to establish a separate pattern store, so as to keep the patterns and core-boxes in good order through records and numbering.

When comparing the capacity in the foundry, the manpower of the pattern shop is inadequate, especially with regard to trained personnel. High turnover has hampered the development of the pattern shop.

For further training a fellowship for the master pattern-maker is strongly recommended.

