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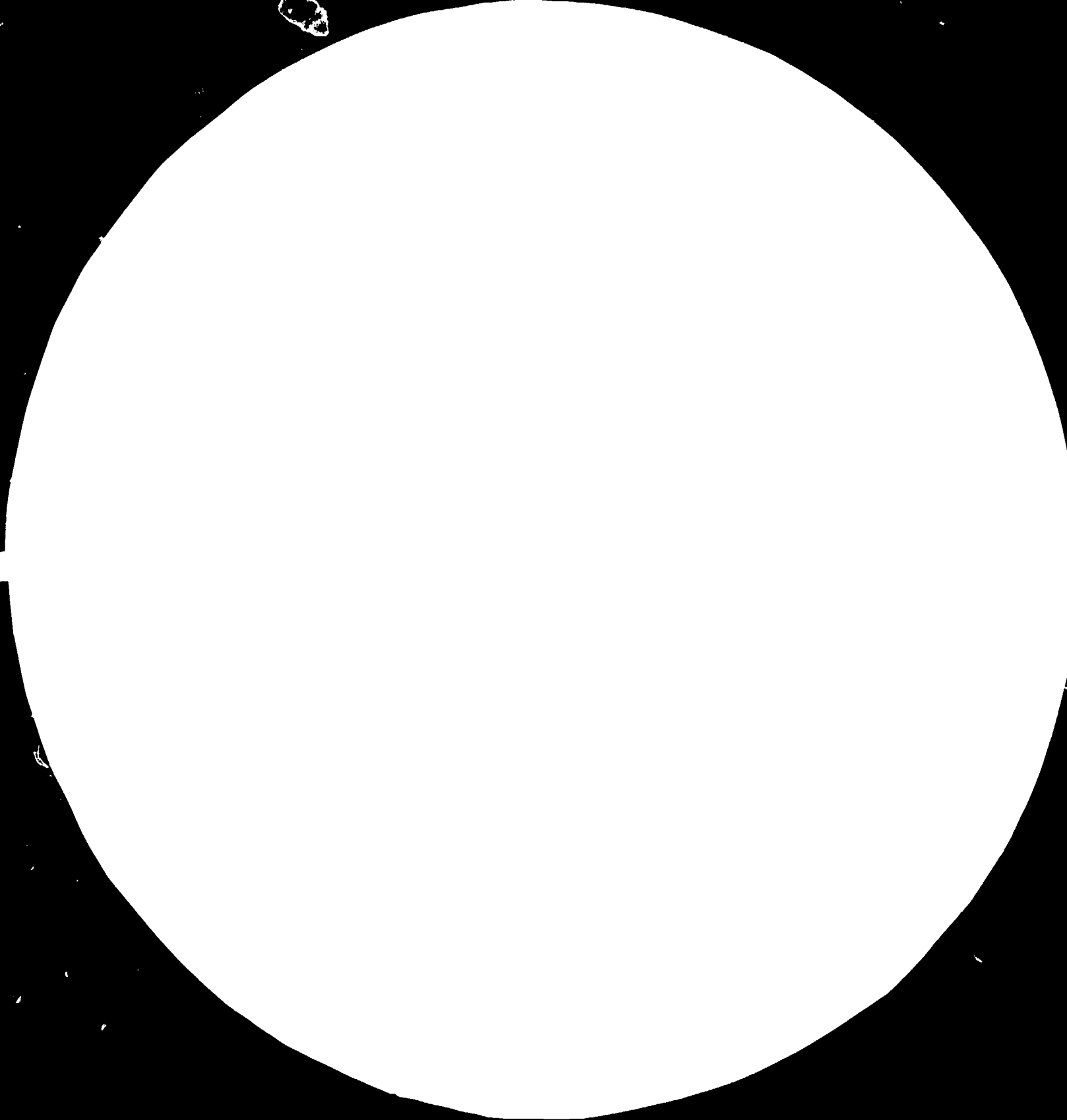

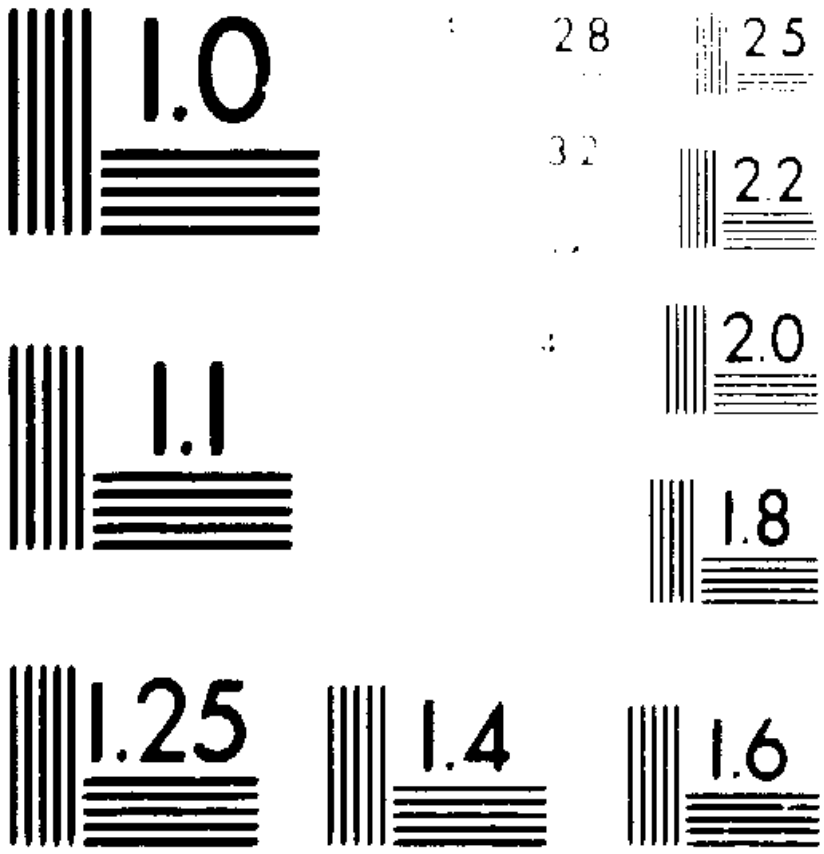

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United Nations Industrial Development Organization

Bangladesh. Textile Industry Development Programme.

DHAKA.

BGD/73/049-BGD/82/006 DP/BGD/82/006

BANGLADESH

Final Report.

WORKSHOP ENGINEERING ASSIGNMENT

DECEMBER 1981 - FEBRUARY 1984

by 1984

G. F. VAN ZANTVLIET

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INTRODUCTION

This is the final report concerning the full period of my assignment in Textile Industry Development Centre (BGD/73/049 and BGD/82/005) as a Workshop Engineering Adviser from 15 December, 1981 to 15 February, 1984.

Purpose of the Project

The successive studies of the country's cotton textile industry indicated the need for advice, to raise the productivity and product quality. There is also a great need for development and improvement in performance of the mills attached to the Bangladesh Textile Mill Corporation (BTMC), in terms of process techniques, balancing, modernisation of equipment, productivity and efficiency.

With the ultimate aim of increasing the productivity of the cotton textile industry, the Government of Bangladesh established, with UNIDO assistance, the present Textile Industry and Development Centre at Dhaka.

The development objectives to which this project is related as set out in the project document, are to increase the domestic production of cotton textiles in Bangladesh and to reduce the reliance upon imports of cotton cloth. By improving the quality and reducing the production costs of cotton yarn, the project is also expected to contribute to an expansion of the handloom industry, thus increasing employment opportunities in rural areas. Development of cotton textile industry by increasing production of finished cloth in the textile mills themselves and in the handloom weaving sector, certainly provides a means for reduction in the large balance of payments deficit.

Duties

As a member of an international team of experts assigned to this project covering spinning, weaving, dyeing, finishing, training of all levels, spare parts and workshop engineering, my present assignment covers the workshop engineering training and operational activities. My duties were:

1) Undertake an initial survey of the Engineering Industries Limited. The present Central Workshop of BTMC, with the objective of making recommendations for machinery requirements and other necessary workshop facilities such as foundry, moulding, heat treatment and raw material usage.

2) a: Undertake a survey of BTMC Workshops in order to upgrade and modernize the equipment to manufacture the spare parts necessary for the individual requirements.

b: In the factories where no workshop facilities exists, plan, initiate and develop the requirements.

3) Develop tooling control systems

4) Increase the skill and technical know-how of workshop personnel by instructions in the following:

a) Maintenance standards and specifications

b) Provisionning of spare parts (keeping in mind the possibility of manufacturing such parts locally)

c) Preventive maintenance.

d) Development of maintenance schedules.

e) Development of repair schemes in case of emergency

f) Control of maintenance costs as a function of applied labour and degree of utilisation.

g) Job description of maintenance personnel.

h) Limitation of repair costs vs replacement

i) Machine tool and equipment rebuilding.

j) Manufacturing equipment (special adapters for unusual cases)

5. a) Prepare and present basic engineering and workshop practice courses for part of the textile fitter training programme at the BTMC training centre.

b) Assist other members of the team in developing, testing evaluating new methods, processes and products.

c) Assist in the preparation of a detailed work plan for the joint UNIDO-TIDC operation of the centre.

The Workshop Engineering Section will provide:-

1) Maximum possible assistance and guidance to the Centre in preventive maintenance, general maintenance, repair, reconditioning of machines and machine tools and rebuilding and manufacturing of spare parts.

2. Training facilities, based on a suitable prepared training programme, discussions, case - studies etc. in order to train local staff of the BTMC. The training will be primarily based on „on the job training" basis.

Work done

Visits were paid to the Engineering Industry Limited and to 26 workshop of BTMC Mills. The conditions and equipment of most of the workshops were very poor or does not exist at all and this also counts for E.I.L.

The lay out of the workshops is wrong (shaper next to a lathe, vibrations etc) It is very dark inside and the electric light is not sufficient or does not work. The machine tools are out-dated (sometimes 40-50 years old) and the precision is gone. The floors are not flat and are full of holes. The electric wiring to the machines and lights is not according to the rules and very dangerous (open connections). The moulding floor and the furnace of the mills who have these facilities, are in the workshop or attached to it (Sand goes into the machines). Very often the roof leaks (wet moulding sand, bad castings) Operators don't know how to read blue prints, vernier callipers and micrometers. They use a pair of in or outside callipers. We checked it ones and there was a difference of 0,6 mm on our vernier calliper. None of the workshops is equipped with the right tools and the tools they have are worn out. The skill of the workers is not sufficient to counter more complicated problems, a preventive maintenance scheme does not exist. Cleanliness is a big problem and housekeeping was most of the time not done.

In order to meet spare parts requirements for and to improve the existing maintenance system of all BTMC mills a schedule has been developed according to the amount of spindles and looms of the Mills:

a) Mini Workshop to be set-up upto 12,500 - 18,250 spindles.
b) Medium " " " " " " 18,751 - 37,500 spindles.
c) Composite " " " " " "over 37,500 or 12,400 spindles and 175 looms.
d) Specialized workshop.

A list has been prepared for each workshop what kind of machinery and equipment is needed, including the existing machineries after a possible reconditioning, to be sufficient for their own spare parts supply. The specialized workshop is for special spare parts for example parts which need heat treatment Special casting etc. The machines mentioned on the list of equipment for the central workshop is sufficient to supply at least 40 mills with spare parts. It has been found that of the

26 workshops there are 9-Mini Workshops, 3-Medium workshop and 14 composite workshop. An instruction manual has been prepared about workshop practice.

Contents are : 1 - Personal Safety
2 - Factory Regulations
3 - Lifting and Mechanical Handling
4 - Properties of Metals and other Materials
5 - Electricity
6 - Measuring and Marking Out
7 - Files
8 - Hand Tools
9 - Tools
10- Drilling and Reaming
11- Hand Grinding
12- Tapping and Screwing (inc. Removal of Broken Studs and Taps, Dowelling and Pinning)
13- Securing Component Parts
14- Keys and Keyways
15- Sheet Metal Work (inc. Appreciation of Soldering, Brazing and Welding)
16- Bent Shafts and Rollers
17- Limits of Fit
18- Machining Processes
19- Machines and Machined Surfaces
20- Bearings
21- Lubrication
22- Fittings and Fixtures
23- Gear, Belt and Chain Drives

Recommendations:

1. A great deal of manufacturing spare-parts can be made by using newly developed techniques like metal spraying, copy-turning and lathe-grinding.

2. Levelling of floors, more windows and placing of wash-hand basin. Most of the electric wiring has to be renewed.

3. Change the lay-out of the workshops and purchase the machines as recommended in our list of a proposed Machine Tools and Equipment to manufacture spare parts.

4. Remove the foundries and mould making places to an area which is not too close to the workshop or other departments (so completely separate), so that the sand

cannot go so easily into the machines. Repair the roofs.

5. Upgrade the skill of the workers. This can be done with the Technical Training Centre, Bangladesh/German Training Centre, Agriculture Machines Training Centre, all in Mirpur, or Bitac, Tejgaon. Special required training for Textile Machines can be given by me.

6. Equip the workshops with theright Hand Tools, a list has been prepared.

7. Much more attention has to be paid to plant organization and neatness of operations.

8. Introduction of preventive maintenance schemes.

Additional Work

A turbo - generator which was out of order for the last 22-years had to be repaired but it has to be done as cheap as possible. The trouble was that one tooth of the pinion of the turbine shaft has broken out and has damaged certain teeth of the big gear of this transmission. The cause of this breakage was fatigue. In fact both gears had to be renewed, but due to lack of money and no possibility to make this big gear locally, we only manufactured the pinion. After replacing and scraping of the bearings of the turbine we started it and it was not running too bad. Then we checked the bearings of the generator and these were too hot. We dismantled these bearings (all bearings are plain ones) and discovered that also these bearings were completely worn out. We went on with our investigation and found that the whole generator with regard to the transmission has subsided. We could have lift it but the tools for the alignment were not available. My proposal was to place a flexible coupling between the generator and transmission, let a local company replace the babbit of generator bearings and then run it again. But the management and Director Operations did not trust the local-company in doing this bearing job, so the decision was made to ask for an expert from AEG Germany(Manufacturer) and give an estimate. There has been already one AEG expert in 1970 and by that time the price was ± DM.175,000. Now it will be more than double.

Furthermore, a heating element for the stenter in Ahmed Bawany has been designed and constructed by me. The required temperature of 210°C with the existing steam heating element cannot be reached. Also the steam temperature could not be increased. The temperature is at present 140°C. My construction is a gas fired kind of furnace made of steel sheets under which there is a gasfire. The bottom of the furnace is corrugated so that the contact of air with the furnace is better. Through this furnace the air is sucked by a ventilater and blown into the stenter. It is not yet working for the gas connection is not been constructed by the gas supply company.

List of Counterparts:

1) Md. Nazrul Islam
2) Md. Hassan Shamim Hassan.

CHARACTERISTICS OF PROPOSED MECHANICAL MINI-WORKSHOP

Sl. No.	NAME OF MACHINE TOOLS	SPECIFICATION	NOS. OF MACHINES REQUIRED
1	2	3	4
1.	LATHE MACHINE WITH MOTOR STARTER	Centre type 900; 1500,(Centre to Centre) with copying attachement.	2
2.	DRILL MACHINES (a) Bench (b) Vertical	(a) 18 (b) 150	2
3.	SHAPER	Crank shaft 450 Stroke(Horizontal)	1
4.	MILLING MACHINE	Universal 265 x 1250	1
5.	POWER SAW	Job Dia = 200	1
		Total m/c.	7
6.	GRINDER (a) Hand (b) Tool	Single disc 150 Single disc 100	2
7.	WELDING (a) Electric (b) Gas Metal spraying equipment	200 AMP Oxy-Acetylene	1 Set 1 "
8.	FITTING SHOP TOOLS AND ACCESSORIES	75 to 200 Vice, others as per requirement.	6 Nos.
9.	TINSMITH, BLACKSMITH TOOLS & EQUIPMENTS (a) Blower (b) Stove (c) Soldering Iron	½ hp. 2 lbs. and table accessories	1 Set

Note: Measurements in Col.3 in mm from Sl.No.1 to 6 & 8 to 9.
mm= Milli meter, hp= Horse Power, Amp= Ampere, Oxy= Oxygen, Lbs= Pounds.

CHARACTERISTICS OF PROPOSED MEDIUM MECHANICAL WORKSHOP

SL.NO.	NAME OF MACHINE TOOLS	SPECIFICATIONS	NOS. OF MACHINES REQUIRED
1	2	3	4
1.	LATHE	Total(Bed) Length 900, 1500, 2400 - 1 Lathe with copying attachement	2 + 2 + 1 = 5
2.	SHAPER	Horizontal Crank type Stroke - 450	1
3.	MILLING	Universal Type (250 x 1200 Table)	1
4.	DRILL		
	(i) Bench type	12 Dia	
	(ii) Vertical type	37 Dia	Sub-total= $\frac{3}{10}$
	(iii) Hand type	12 Dia	
5.	GRINDER		
	(i) Pedestal	200 Dia Wheel	
	(ii) Tool	150 Dia Wheel	3
	(iii) Hand	100 Dia Wheel	
6.	POWER-SAW	Jeb Dia - 200	1
7.	WELDING		
	(i) Arc	Upto 300 AMP	1
	(ii) Gas	Oxy - Acetylne	1
	Metal Spraying equipment		1
8.	FITTING VICES, TOOLS AND ACCESSORIES	75 to 200 mm	8
9.	TINSMITH & SOLDERING EQUIPMENTS, AUXILLARY AND CUTTING TOOLS	½ hp Blower/Stove, Copper/Soldering Iron, Tin-Cutter, Scissors, Measuring Tools, Files, Tap, Die, Drill Bit	(One) Set each.

NOTE:- AMP = Ampere, Measurements from SL.NO.1 to 6 & 8 in mm (Milli-meter).

CHARACTERISTICS OF PROPOSED MECHANICAL COMPOSITE WORKSHOP

SL.NO.	NAME OF MACHINE TOOLS	SPECIFICATIONS	NOS.OF MACHINES REQUIRED
1	2	3	4
1.	LATHE (CENTRE/BENCH TYPE)	Length (1000 to 6000) Copying attachement	15
2.	MILLING MACHINE	(a) Universal 265 x 1250 (b) Horizontal (c) Vertical	1 1 1
3.	SHAPER	(a) Horizontal, Streke = 450 (b) Horizontal, Streke = 600	1 1
4.	SLOTTING MACHINE/VERTICAL SHAPER	Standard Size (100 x 300)	1
5.	DRILLING MACHINE	(a) Bench type 18(Heavy) (b) Upright/Vertical 42 (c) Light type (Hand)12	3
6.	GRINDER	(a) Pedestal (Single Disc) (b) Surface type (250 x 630) (c) Hand type 100	1*
7.	POWER SAW	Job Dia = 250	1
8.	ARC WELDING & GAS WELDING METAL SPRAYING EQUIPMENT	(a) Electric(i) 300 AMP (Transformer type)(ii) 300 AMP(Portable)(b) Gas-(Oxy-Acetylene) 1 + 1 + 1 =	3
9.	BLACKSMITH AND TINSMITH FURNACE BLOWER, TOOLS AND EQUIPMENT	Forging(Hand), Soft and Hard Soldering	1
10.	CRUCIBLE FURNACE & (MINI-FOUNDRY FACILITIES) OTHER ACCESSORIES	4 CWT Capacity	4
11.	FITTING SHOP VICES, LOOSE TOOLS, FEELER GAUGES, CUTTING TOOLS, FILES ETC.	Different Dimensions as per requirement.	1 set each.
12.	CARPENTRY SHOP TOOLS AND INSTRUMENTS	- Same as above -	1 set each.

Note :- * Surface type is a machine, other two are equipments. Serial 1 to 7 Measurements in Milli meter(mm)
AMP = Ampere.

CHARACTERISTICS OF PROPOSED CENTRAL WORKSHOP

Equipment and Machine Tools to manufacture Spare Parts.

	Number	Specifications
Lathes	2	Length of bed between centers 1000 mm Swing diameter 200mm with copying attachment
	2	" " " " " 1000 mm " " 200mm
	3	" " " " " 2000 mm " " 250mm
	1	" " " " " 4000 mm " " 500mm " " grinding
Turret	6	" " " " " 800 mm " " 320mm
Multi-Tool-Capstan	2	" " " " " 500 mm " " 360mm
	2	Sets of Metal spraying equipment
Milling -	1	Horizontal boring and Milling Table size 1100 x 1050 mm
Machines	2	Universal " " 265 x 1250 mm
	2	" Tool Milling " " 270 x 990 mm
	2	Vertical " " 315 x 1250 mm
	1	Pantograph " " 750 x 750 mm
	1	Gear Hobbing Machine M = 1-5 -
Shaper	1	Table size 400 x 300 mm
	1	Planer table size 500 x 1000mm
Drilling -	4	Bench Drill diameter 13 mm
Machines	1	Radial " " 42 mm
	2	Vertical Column " 32 mm
Grinders	1	Surface Table size 300 x 1000 mm
	1	Centreless Diameter 1-80mm
	1	Cylindrical Table size 250 x 1200 mm
	1	Surface " " 200 x 500 mm
	1	Universal Tool " " 915 x 135 mm

CHARACTERISTICS OF PROPOSED CENTRAL WORKSHOP

	Number	Specifications
Presses	1	Hydraulic 1,5 tons
	1	Hand 0,15 "
	1	Power 25 "
Saws	1	Hacksaw streke 250mm
	1	Bandsaw table size 600 x 600 mm
Shear	1	Guilletine 2500 x 5 mm
Foundry equipment		Moulding Machine, Moulding Sand Machine Chaser mill, Vibrating Screen, Core Sand Mixer Crucible, Cupola etc. Pneumatic hammer, Compresser.
Heat- treatment	1	Electric chamber furnace 800 x 550 x 1400 mm
	1	Quenching tank Water
	1	" " Oil
	2	Hardness testers Rockwell Brinell
	2	Disc Polishing Machines Diameter 500mm
Welding	2	Arc Welding 300 Amp
	1	Oxy - Acetylene
Wood-working	1	Lathe - Length of bed 1250 mm Swing Diameter 400 mm
	1	Circular saw, Table size - 1050 x 1000 mm
	1	Planer table size 2500 x 400 mm
Electroplating		Baths' and transformer
Handtools		Blacksmith, tinsmith, foundry, forging, pattern, and fitting.

CHARACTERISTICS OF PROPOSED CENTRAL WORKSHOP

Number	Specifications
	Office Equipment
	Technical Inspection Equipment
	Stores Equipment
	Transport "
	Canteen "
	Fire-Fighting "
	Overhead Crane 5-ton