UNIT –I

LIST OF PLANT & MACHINERIES AND QUALITY CONTROL FACILITIES

ADDRESS:-

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OVERVIEW:

TOTAL PLANT AREA ... 150,000 sq m
COVERED AREA ... 40,000 sq m

MANUFACTURING UNITS

- **FOUNDRY SHOPS**
- **FABRICATION SHOP**
- **MACHINE SHOP**
- **ASSEMBLY AND TESTING SHOP**
- **QUALITY CONTROL**

1.0 **FOUNDRY SHOPS**

AN ISO : 9001 ACCREDITED COMPANY BY LRQA, UK.

1.1 **Capacity :**

Steel/Alloy Steel Castings — 1000 Tons/Month
Weight of Single Piece : 12-13 Tonnes

1.2 **Handling Facilities :**

DESCRIPTION	QTY NOS..	MAXIMUM CAPACITY
EOT Cranes	10	5-25 Tons
Crane	2	10 Tons
Crane	8	08 Tons
Crane	1	40 Tons
Crane TATA 320	1	15 Tons
Crane TATA 1055 BLC	1	100 Tons
Crane TATA 955 ALC	1	75 Tons
Trucks	6	
Tractor	4	
Trolley	2	
Payloader JCB	1	

1.3 **Melting :**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	TECHNICAL DATA
1.	Direct Arc Furnace	HBB Make	2	8 MT each
2.	Coreless MF Induction Furnace	GEC Make	1	2.5 T

1.4 **Mechanised Moulding :**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	TECHNICAL DATA	Box Size (mm)
1.	Jolt. Squeeze Roll Over Moulding Machine.	KUNKEL WAGNER, GERMANY	1	Jolt Load 5000 Kg. 30 Moulds/Shift	3000x1000
2.	Moulding Machine with Jolt Squeeze	DISA, BANGALORE	1	33 Moulds/shift	1280x980
3.	3m x 3m Compaction table of cap. 15 MT	Electro Magnetic Industries, Baroda	3	Cap. 15 T	Table Size 3000 x 3000

1.5 **Sand Preparation :**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	TECHNICAL DATA
1.	Mechanised Sand Conditioning Plant with two high-speed Mullers		1	500 Kg./Batch
2.	Continuous Mixer	ECOMIX	2	5 T/Hr.
3.	Sand Mixer		2	400 Kg/Batch
4.	Sand Mixer		1	200/Kg/Batch
5	No Bake Sand System (Phenolic) with continuous mixer & reclamation plant.	OMEGA Fdy. Machinery Ltd United Kingdom	1	Continuous mixer of 30T/H. Recla mation unit of 6 TPH cap. Sand storage silo of 60 T capacity

1.6 **Sand Test Laboratory :**

Testing facilities for Compression, Moisture, Dryness, Permeability, etc..

1	Mechanical Shieve Shaker with Timer (ASTM)	2 Nos.
2	Speedy Moisture teller	5 Nos.
3	Universal Sand Strength Machine including all accessories	2 Nos.
4	Moldability Tester	1 No.
5	Permeability Tester with Mold Permeability test facility	3 Nos.
6	Clay Tester Wtih stirrer	1 No.
7	Sutter Index Tester	1 No.
8	Standardisation Kit	1 set
9	Core Scratch Hardness Tester	1 No.
10	Mold Harness tester 'C' Scale & 'B' Scale	4 Nos.
11	Mold Strength tester	1 No.
12	Gas Determinator	1 set
13	Friability Tester	1 No.

Testing facilities for Compression, Moisture, Dryness, Permeability, etc..

1.7 **Mould Drier :**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	TECHNICAL DATA
1.	Mould Drier		1	45KW
2.	Mould Drier		1	60KW

1.8 **Pattern Shop :**

Covered area for Pattern Making/Storage - 2 Sheds

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.
1.	Wood Working Lathe		1
2.	Band Saw Machine	Norton	1
3.	Band Saw Machine	Bharath Mech. Works	1
4.	Thickness Planner	Sandeep	1
5.	Thickness Planner	Norton	1
6.	Surface Planner	Norton	1
7.	Pedestal Sander	Norton	1
8.	Circular Saw	Norton	1
9.	Band Saw Blade Grinding Machine	Norton	1
10.	Thickness Planner Blade grinding machine	Norton	1
11.	Pedestal Grinder Machine	Norton	1
12.	Drill Machine upto 35 Mm		1
13.	Hand Drill Machine upto 30 mm drill with Magnet Stand	IVOLF	1
14.	Hand Drill Machine upto 1/2" drill	IVOLF	1
15.	Hand Sander Machine	IVOLF	1
16.	Over Head Crane 5 T Capacity		1

1.9 **Fettling Equipment :**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	TECHNICAL DATA	SIZE
1.	Hanger type Roto Blast Machine	VME	2		2000x4000x2000
2.	Knockout Machine	BEC	3	Max. Wt.15 MT	2000x2000

1.10 **Heat Treatment:**

SL. NO.	MACHINE	QTY. NOS.	TECHNICAL DATA	CAPACITY
1.	Rapid Quenching Furnace.	1	With Quenching Facility	16 M.T.
2.	Rapid Quenching Furnace. Size : 4200x6600x2000	1	With Quenching Facility	25 M.T.
3.	Oil Fired Heat Treatment Furnace. Size : 6300x8000x3700	1		60 M.T.
4.	Electric Heat Treatment Furnace Size : 3000x3000x1500	1	With Quenching Facility	3 M.T.

1.11 **Auxilliary Facilities:**

1.11.1 **Compressed Air:**

SL. NO.	MACHINE	QTY. NOS.	TECHNICAL DATA
1.	Air Compressor	3	125 HP - 530 CFM
2.	Air Compressor	1	75 HP - 310 CFM
3.	Air Compressor	1	45 HP - 200 CFM

1.11.2 **Weighing Scales:**

SL. NO.	MACHINE	QTY. NOS.	TECHNICAL DATA
1.	Road Weighing Bridge	1	Max. Capacity 50 MT
2.	Platform Weighing Machines	4	Max. Capacity 10 MT

2.0 **FABRICATION SHOP**

2.1 **Covered Shades with Handling Facilities:**

SL. NO.	BAY	SIZE LxW (m)	HANDLING CAPACITY (t)	HEIGHT UNDER THE HOOK (m)
1	A	140X14	50+15+10	9
2	B	104X24	63/10+63/10	10
3	C	104X24	20+20	10
4	D	104X24	10+20	10
5	E	104X10	5+5	10
6	F	75X10	5+5	7

2.2 **Other Handling Facilities:**

SL. NO.	MACHINE	CAPACITY	QTY. NOS.	HT. UNDER THE HOOK
1.	Mobile Van Crawller Mounted Crane 320	25 MT	1	
2.	Tyre Mounted Crane	40 MT	1	
3.	Mobile Crane	8 MT	3	

2.3 **Fabrication:**

SL. NO.	MACHINE	QTY. NOS.	TECHNICAL DATA (ALL DIMENSIONS IN 'MM'
1.	3 Roll Plate Bending Machine	1	Plate Max. Thick: 63 mm Maximum Plate Width : 3500 mm
2.	3 Roll Pinch cum Pyramid type Bending Machine.	1	Plate max. thick . 60 mm. max. width 2500 mm Roll min. dia 500 mm
3.	3 Roll Pinch cum Pyramid type Bending Machine	1	Plate max. thick. 10 mm max. width 1500 mm Roll min. dia 250 mm
4.	Hydraulic Iron Worker Shearing, Punching, Notching	1	1250x750x1600,

2.4 **Hydraulic Presses:**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	TECHNICAL DATA
1.	Hydraulic Presses		1	Capacity 50 MT to 500 MT

2.5 **Sawing Device:**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	TECHNICAL DATA ALL DIMENSIONS IN 'MM'
1.	Sawing Device High Speed, heavy duty Bandsaw	BEHRINGER HBP-340	2	Max. dia 300 mm

2.6 **Welding Machine:**

SL. NO.	MACHINE	QTY. NOS.	TECHNICAL DATA
1.	Column and Boom Welding Machine – Mora Cosmic Pvt. Ltd.	1	Vertical Stroke of 6 mtrs. Horizontal Stroke of 6 mtrs. Welding Rotator load upto 100 MT.
2.	Welding Machine	Lot	TIG, SAW, MIG_2 Manual Arc Welding (Revetting Gun, Grinders, Electrode Drying Oven) SAW-04 Nos., MIG-26 Nos., TIG-01 No., ARC-14 Nos. (In Railway Shop)
3.	SAW/GMAW/FCAW Plants & Gas Cylinder with Control Valve for Gas Flow Regulation Mogra 1200	Lot	6MX5M

2.7 **Robotic Welding Machine (procured)**

SL. NO.	MACHINE	QTY. NOS.	TECHNICAL DATA
1.	Robotic Welding Make:- EWAC Alloys Limited	1	Arc welding software package including seam finding, arc tracking & multi-layers welding functions. Welding fixture with track to accommodate 3m to 6 m long Jobs,

2.8 **Thermal Cutting:**

SL. NO.	MACHINE	QTY. NOS.	TECHNICAL DATA ALL DIMENSIONS IN 'MM'
1.	Thermal Cutting	Lot	CNC Flame Cutting, Plasma Cutting, Pug Gas Cutting Machines, Gas Cutting Torch (Automatic Cutting length 250 x 2500 x 8000)

2.9 **Hydraulic Shearing Machine:**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	TECHNICAL DATA
1.	Hydraulic Plate shearing Machine	Indore Hydraulics	1	Capacity 2500 mm X 13 mm

2.10 **Pipe Bending Machine:**

SL. NO.	MACHINE	QTY. NOS.	TECHNICAL DATA (ALL DIMENSIONS IN 'MM'
1.	Pipe BendingMachine	1	Max. inside/outside dia 30 mm to 40 mm.
2.	Pipe Bending Machine	1	Bending Capacity: OD 25 mm to 114.7 x 7 mm thk Bending Radius: 40 to 500 mm Min. Bending Radius: 1.5D Bending Angle: 5° to 180° Bending Accuary : ± 0.25°

2.11 **Hydro Test:**

SL. NO.	MACHINE	QTY. NOS.	CAPACITY
1.	Portable Hydro Test Pump	1 No.	Maximum Pressure: 500 Kg/cm2

2.12 **CNC Press Break:**

SL No.	Machine	Qty	Make	Capacity
1.	CNC Press Break	1 No.	Jakshine	400T X 3100M

3.0 **MACHINE SHOP**

Covered Area : 19300 sq m

3.1 **Handling Facilities:**

SL. NO.	MACHINE	CAPACITY	QTY. NOS.	HT. UNDER THE HOOK
1.	EOT Crane	30 MT	1	11.50M
2.	EOT Crane	15 MT	1	7.00M
3.	EOT Crane	10 MT	1	7.00M
4.	EOT Crane	5 MT	2	7.00M

3.2 **CNC Milling and Boring Machine :**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	WORK HOLDING TABLE	TRAVERSING DISTANCE (mm)	SPINDLE DIAMETER (MM)
1.	HMC–800 CNC	HMT	1 No.	800x800	1300 (X Axis) 1000 (Y Axis) 1000 (Z Axis)	120
2.	Horizontal Boring, & Milling Machine	FEMCO, TAIWAN	1 No.	1440X1600	3000 (X Axis) 2100 (Y Axis) 1500 (Z Axis)	110
3.	Horizontal Boring, Drilling & Milling Machine	SCHIESS Model OFBW 180	1 No.	2400x2800	Ram Dia - 380 Taper in Spindle ISO 60 7000x2500x1400	180

3.3 **Lathes:**

SL. NO	MACHINE	MANUFACTURER	QTY. NOS.	TECHNICAL DATA (ALL DIMENSIONS IN MM')		ACCURACY
				SWING OVER BED	ADMIT BETWEEN CENTRE	
1.	Heavy HMT Lathe	HMT NH 26	2	260	2000	.01-.02MM
2.	HMT Lathe	HMT NH 26	1	260	1000	.01-.02MM
3.	Bombay Lathe	KIRLOSKAR	1	340	3800	.01-.02MM
4.	Shimoga Lathe	Shimoga	1	275	1500	.01-.02MM
5.	Conventional Lathe	Shenyang Machine Tools co., LTD.	1	630	1500	.01-.02MM
6.	Conventional Lathe	Shenyang Machine Tools co., LTD.,	1	630	3000	.01-.02MM
7.	CNC Lathe Machine	Pinacho India, Model – Smart Turn 5/310	01	400	3500	

3.4 **CNC Plano Miller (procured):**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	TRAVELLING DISTANCE mm)	MAX. LOAD CAPACITY ON TABLE
1.	Bridge Type Milling Machine	Nicolas Correa Spain Model – FPV 70	1 No.	7000 (X Axis) 4500 (Y Axis) 1500 (Z Axis)	30 MT

3.5 **Heavy Duty Lathe:**

S.NO.	MACHINE	MANUFACTURER	QTY.	ALL DIMENSIONS IN 'MM'	
				SWING OVER BED	ADMIT BETWEEN CENTRE
1.	Heavy Duty BECO Lathe	HD 80	1 No.	800	3000
2.	BECO Lathe	SB-65	1 No.	650	1000
3.	Heavy Duty Lathe	German	1 No.	500	8000
4.	L & L Lathe	Taiwan	1 No.	1100	5000
5.	Lathe -5	China	1 No.	630	1500
6.	Lathe -6	China	1 No.	630	3000

3.6 **Axial Boring Machine:**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	TABLE SIZE(IN MM)
1.	Axial Boring Machine	England	2	1000x1000
2.	Axial Boring Machine	BEC	1	1000x1000

3.7 **Turn Table:**

SL. NO.	MACHINE	QTY. NOS.	DIMENSION (IN MM)	SIZE
1.	Turn Table	4	2000x2000	Turn Table 360 deg.

3.7 **Vertical Boring Lathe:**

SL. NO.	MACHINE	MANUFACTURER	QTY.	TABLE DIA (IN MM)	CLEAR HEIGHT (IN MM)
			NOS.		
1.	Vertical Boring Machine	KIRLOSKAR Dynacut	1 No.	1250	1100
2.	Double Column	Model KY 487F1 RUSSIAN	1 No.	4000	2000
3.	Vertical Boring Machine	RUSSIA	1 No.	1000	1200
4.	Vertical Boring Machine	PUNJSTAR	2 No.	3500	2200

3.8 **Horizontal Boring Machines:**

SL. NO.	MACHINE	MFG.	QTY (NOS).	WORK HOLDING TABLE (IN MM)	TRAVERSING DISTANCE(IN MM)	SPINDLE DIA-METRE (IN MM)	ACCURACY
1.	Horizontal Boring Machine	Karam	2	1000x1000	1000x1500	100	
2.	Table Type Horizontal Boring Machine	SAGAR	1	1000x1000	1000x1500	80	.02-.03MM
3.	Floor type Horizontal Boring Machine	Model 2A Rus-sian	1	4500x4200	3150x2000x 1250	165	.02-.03MM
4.	Floor Type Horizontal Milling cum Boring M/c.	SKODA Model WD-200	1	5000x10000	11000x3150x 2000	200	.02-.03MM
6.	Horizontal Boring & Mill-ing Machine	SANCO-SHM1400 TAIWAN	1	1100x800	1200 (X Axis) 1200 (Y Axis) 800 (Z Axis)	128	.01-.02MM
7	FLOOR TYPE CNC mill-ing machine With movable column on independent bed	TOS KURIM	1	2000X2000	8000 (X Axis) 1500 (Z Axis) 4000 (Y Axis)	180	.01-.02

3.10 **Plano-Millers:**

SL. NO.	MACHINE	QTY. NOS.	STROKE LENGTH(IN MM)	TECHNICAL DATA(IN MM)
1.	Plano-Millers	3	8000 mm stroke	Distance between housing varying from 1500 to 3500. Maximum height from the top of the table to the cross slide 1000 to 2400

3.11 **Milling Machines:**

SL. NO.	MACHINE	MANUFACTURER	QTY NOS.	SIZE(IN MM)	ACCURACY
1.	Universal Milling Machine	Heller	1 No.	1250x500x500	.02-.03MM
2.	Universal Milling Machine	WMW Heckert	1	1000x300x250	.02-.03MM
3.	CNC Milling Machine	SHW Germany Model – UFZ-42	1	900X500X500	.02-.03MM

3.12 **Drilling Machine:**

SL. NO.	MACHINE	MANUFACTURER	QTY. NOS.	CAPACITY	ACCURACY
1.	Radial Drill Machine	HMT RM-63	3	Max. Drilling capacity dia 80 mm	.02-.03MM
2.	Universal Radial Drilling Machine	COLLET	2	Max. Drilling capacity dia 60 Mm	.02-.03MM
3.	Radial Drilling Machine	SMTCL,CHINA	2	Max. Drilling capacity dia 40-50 mm	.02-.03MM

3.13 **Shaping Machines:**

SL. NO.	MACHINE	QTY. NOS.	STROKE LENGTH
1.	Shaping Machine	1	Stroke length varying from 400 to 500 mm.

3.14 **Slotting Machines:**

SL. NO.	MACHINE	QTY. NOS.	STROKE LENGTH
1.	Slotting Machine	1	Stroke length varying from 225 to 400 mm.

3.15 **Heat Treatment Furnaces in Machine Shop:**

SL. NO.	MACHINE	QTY. NOS.	SIZE(IN MM)
1.	Electrically heated with water/oil quenching facility and stress relieving/ normalising furnace.	1 No.	1200x1200x750

3.16 **CMM:**

SL. NO.	MACHINE	Make	QTY. NOS.	SIZE(IN MM)
1.	CMM Machine	Coord3 Industries	1 No.	X-6000, Y-3000, Z-2000

4.0 **ASSEMBLY SHOP**

Equipped to assemble fabrication based assemblies up to 800 MT per month.

5.0 **QUALITY CONTROL**

5.1 **Non-Destructive Testing Section :**

This Section is fully equipped with all latest Instruments to exercise NDT methods to detect internal flaws/sub- surface/ surface (minute) defects generally not visible to the eye.

Following are the equipments available and this facility is available with all production Units of BEC:

SL. NO.	DESCRIPTION	QTY.
1.	Ultrasonic Flaw Detector with IIW reference block & St.beam angle probes, Single as well as double crystal with1.25 to 5.0 MHZ frequency – EEC make Microscan PX 20, PX 10	2 Nos.
2.	ASTM & ASME Reference Block for calibration of above machines.	5 Nos.
3.	Electronic “D” Meter of PULSE ECHO SYSTEM, Bombay (MODSONIC)	1 No.
4.	EEC Make Ultrasonic Flaw Detector with accessories ESM-2M	2 Nos.
5.	EECOSCAN Ultrasonic Flow Detector (EEC Make)	1 No.
6.	Electronic Hardness Tester for precision parts (Japanese make)	1 No.
7.	"NDT Appliance 1000 Magnetic Flaw Detector: with half wave current - "NDT Appliance Make"	2 No.
8.	Dye Penetration Test Kit of Flaw Check, Bombay	Lot
9.	Yoke System for Detecting Crack	2
10	Magnetic Flaw Detector	2

5.2 **Inspection Cell :**

Each processing Unit, i.e. Steel Foundry, Machine Shop and Equipment Fabrication Shop has its own In-spection Cell where all modern measuring instruments like micrometers, dial type vernier callipers, optical height gauges, marking blocks 'S' Callipers, granite surface table, inside and outside Callipers, Scales, Steel measuring tapes as standard measuring instruments, are available for day to day inspection. We have 3 D Marking , Measuring & Layout machine with DRO(Table – 2m x 2.5m x 1m).

5.3 **Raw Materials Inspection & Development Section :**

This Section with the help of different laboratories and inspection cells, monitors quality of raw materials being used in our production units according to relevant standard specifications.

5.4 **Chemical Laboratories :**

SL. NO.	DESCRIPTION	QTY.
1.	Strohlein's Carbon Apparatus with Accessories - 'TOSHINWAL'	2 Nos.
2.	Photochemical Balance (200 g), 'KEROY' Calcutta	2 Nos.
3.	Single Pan Balance	1 No.
4.	Chemical Balance (200 g) 'KEROY' Calcutta	4 Nos.
5.	Infra Red Lamp	1 No.
6.	Physical Sample Balance (1 kg max) 'Kilburn', Calcutta	1 No.
7.	Water Distillation Apparatus (2.5 ltr/hr) 'Kilburn' Calcutta	1 No.
8.	Muffle Furnace (1200 Degree C) 'METACO', Bombay	2 Nos.
9.	Hot Plate (3 KW), Thaslic Co, Bombay	2 Nos.
10.	Fortin's Barometer, 'Thaslic Co', Bombay	2 Nos.
11.	-80 deg. to + 80 deg. C Thermometer	2 Nos.
12.	Drilling Machines, 'Thaslic Co', Bombay	2 Nos.
13.	Baume Meter	1 No.
14.	PH Meter	1 No.
15.	Vol. Titration Apparatus	10 Nos.
16.	Other Glassware and Pt and Ni Crucibles are also available as part of standard Chemical Laboratory apparatus, along with certified Standard Samples.	

5.5 **Computerised Vacuum Spectrometer Section :**

BEC is equipped with an ARL-3460 Vacuum Spectrometer (HIREP 400 Hz) with 24 Analytical Channels and SPECT-80 Software made and supplied by Applied Research Laboratories, Switzerland. It is programmed to analyse the complete range of ferrous base elements, with a provision of 11 slits for Copper Base (Non-ferrous) elements.

Supported by sample cutting and polishing machines from UNIMAT, the Spectrometer sparks steel and C.I. samples within 40 seconds and the results are instantly available on video display and as printouts.

5.6 **Physical and Metallurgical Laboratory :**

Installed in the Steel Foundry, this facility is available to all Production Shops. The equipment and apparatus include the following:

SL. NO.	DESCRIPTION	APPLICATION	QTY.
1.	Universal Tensile Testing Machine 40 T Capacity/Z Test	For all tension & compression tests.	1
2.	Brinell Hardness Testing Machine, 3000 kg capacity	Hardness in Briness Numbers	1
3.	Rockwell Hardness Testing Machine (A,B,C Scales)	Hardness in Rockwell Numbers	1
4.	Impact Testing Machine (30 kg metres)	Izod & Charpy Impact Tests	1
5.	Impact Test Notch Cutting Machine	Izod & Charpy Impact Tests	1
6.	Metallurgical Microscope x 450 magnification with microphoto-graphy attachment	Microstructure Studies	1
7.	Grinding & Polishing Machine	Preparation of metallography samples	1
8.	Sand, Belt & Polishing Machine	Preparation of metallography samples	1
9.	Profile Projector	Projection of profile of U&V Notches	1
10.	Jointing End Quench Hardenability Apparatus	Hardenability Tests/Jominy Test	1
11.	Portable Vickers Hardness Tester	Hardness Tests	1
12.	'Pin-Brino' Hardness Tester	Hardness Tests	1
13.	'Scheloroscope' Shore Hardness Tester	Hardness Tests	1
14.	Nil Ductility Test equipment as per ASTM E 208	Ductility	1
15	Impact Bend Test Equipment	Bend Test for Manganese Steel	1

5.7 **Radiography Section :**

This Section is a vital 'eye' of our Quality Control Organisation, with an infrastructure for checking internal flaws in 'proof' - on radiographic films that can be stored for years together for reference or for education. The facility is available to all production shops at the Bhilai Works and is equipped with :

SL. NO.	DESCRIPTION	APPLICATION	QTY.
1.	Airconditioned Dark Room	Processing of exposed films	1
2.	Radiography Camera ROLI-1 with Iridium 192 source upto 10 ci of BARC make	Radiographic Testing	2
3.	Radiation Survey Meter 'ECIL'	To measure radiation	3
4.	Film Badges 'BARC'	To monitor radiation	6
5.	Densitometer	To measure density of Radiograph	1
6.	ASTM/ASME Penetrameters & DIN Wire Type Penetrameters	To measure film quality (Source)	Complete set of 40
7.	High Power Film Viewer (500 W)	For film viewing	2
8.	Film Processing Unit (complete with water circulation)	For development of films	1 set
9.	Radiography Drying Unit	For drying films	1
10.	Cassette Lead Screens, Numbers and Hangers	For taking exposures	Complete set.

5.8 **New Hi-Tech Testing Facility commissioned for 27,000LBS Drop Testing (Tup Hammer) for Railway Draft Gear (Shock Absorber)**

Railways use Draft Gears as a load-cushioning device i.e. to serve as a Shock Absorber in the manufacturing of the freight cars to avoid derailment in individual collission of wagons in normal running condition.

Indian Railways have specified vide their Specification No.49-BD-94 the actual requirement of the Draft Gears (Shock Absorber) as a minimum capacity of 36,000 FtLbs. which is in line with the Specification of High Capacity Draft Gear No. M901E of Association of Amercian Railways, U.S.A.

The system of testing of the Draft Gears (Shock Absorber) is as follows :

1 Dead weight of 27,000 Lbs (w) is allowed to be dropped from various pre-determined heights (h) through guides on the subjected Draft Gear (Shock Absorber) for obtaining the actual capacity.

2 The subject Draft Gear is placed on a platform supported on 4 Nos. of Load Cells at four corners for measuing the impact load transferred to the Draft Gear (Shock Absorber) on the fall of the Dead Weight of 27,000 Lbs. Immediately on drop, the impact load is transferred into the Recorder / Amplifier which is connected with the Load Cells through Transducer for measurement the travel i.e. the distance (length - l) the Draft Gear (Shock Absorber) has been squeezed on the impact of the Dead Weight of 27,000 Lbs from a given weight.

Now, the capacity of the Draft Gear (Shock Absorber) is calculated in the following manner:

Dead Weight of the Tup (w) x (the height from which the dead weight is allowed to be dropped (h) + the travel (l) / the length the Draft Gear (Shock Absorber) has been squeezed on the impact of the dead weight of 27,000 Lbs i.e. the capacity of the Draft Gear (Shock Absorber) = Dead Weight x total length of travel of the Dead Weight including squeezing of the Shock Absorber i.e. the capacity of the Draft Gear (Shock Absorber) is calculated capacity = w x (h+l) FtLbs.

The acceptable capacity of the Draft Gear (Shock Absorber) tested in this system should be minimum 36,000 Ft. Lbs for use in the Railway freight cars for heavy haulage.

The total instrumentation of this **TUP HAMMER TESTING FACILITIES** has been imported from Germany & is of the highest quality standard with all automatic recording controls to obtain perfect results without any chance of human errors.