

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
Department of Metallurgical & Materials Engineering
Physical Metallurgy Laboratory



For slot booking of any equipment of in this laboratory, may contact PIC of Physical Metallurgy laboratory (or) HOD, MME during office hours.

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Trinocular Metallurgical Microscope

TRINOCULAR METALLURGICAL MICROSCOPE

Specifications

The length of the microscope is 1000 mm.

1. To observe the microstructure of the specimen.

2. To study the metallographic features and provide a detailed description.

Specifications

Type	Resolution	Field of View	Depth of Field
100x	100	1.8	0.1
200x	200	0.9	0.05
400x	400	0.45	0.025
1000x	1000	0.18	0.01

2. Operation

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1. Focus the specimen on the microscope.

2. Rotate the stage to observe different parts of the specimen.

3. Adjust the focus knob to get a clear image.

4. Draw the micrograph of the specimen.

5. Clean the microscope after use.

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PLEASE MAKE SURE
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TRINOCULAR METALLURGICAL MICROSCOPE

Application

To observe the microstructural characteristics of materials

- To study the different phases and porosity or defects etc.,

Specifications

1. Eyepieces

Type	Magnification	Focus(mm)	Field(mm)	Remark
Wide field eyepiece	10X	25	φ 18	
Plan eyepiece	16X	15.6	Φ 11	Select



2. Objectives

Type	Magnification	N.A	W.D(mm)	Remark
Plan Achromatic	5X	0.12	18.3	
	10X	0.25	8.9	
	20X	0.40	8.7	Select
	40X	0.65	3.7	
	80X	0.80	0.96	

3. Total magnification

Total Magnification Objective Eyepieces	5X	10X	20X	40X	80X
10X	50X	100X	200X	400X	800X
16X	80X	160X	320X	640X	1280X

- Vertical Illuminator : 6V/20W halogen lamp
- Power supply : AC operated 220V 50Hz / 110v 60Hz
- Stage cross level : Longitudinal 50mm , Transverse 75mm
- Least count of fine focusing knob : 0.002mm

UPRIGHT METALLURGICAL MICROSCOPE

Application

To observe the surface properties of materials

1. To study the different phases and porosity or defects etc.,
2. Quantitative Metallography



Specifications

1. Nosepiece : 6 fold
2. Stage : XY- stage for industry with stage bracket
3. Trinocular Tube : 30 degree Trinocular Tube
4. Adapter : C-mount adapter 0.55x for 1/2 inch
5. Eyepieces : 10X,20X magnification
6. Objectives :

Type	Magnification	N.A	W.D(mm)	Remarks
HI Plan EPI	5X	0.12	11.7	
	10X	0.25	12.0	
	20X	0.40	1.15	Select
	50X	0.75	0.37	
	100X	0.85	0.33	

7. Total magnification

Total Magnification Objective Eyepieces	5X	10X	20X	50X	100X
10X	50X	100X	200X	400X	800X
20X	100X	200X	400X	1000X	2000X

8. Microscope camera : Digital camera with CMOS sensor, HD image 1920X1080 p
9. Software : Grain size measurement, Decarburisation depth, Cast iron nodularity, Coating thickness, Dendrite spacing.

MUFFLE FURNACE ($\leq 1000^{\circ}\text{C}$)

Application

This furnace is used for :

1. To change the properties of metals with the help Heat Treatment cycles design with this furnace
2. To develop surface coatings on materials etc.,



Specifications

1. Furnace chamber size : 200mm x 200mm x300mm
2. Furnace temperature : Maximum temperature 1000°C.
3. Furnace body : Strong angle M.S sheath body with power coated painting.
4. Heating element : Kanthal A1 heating coil.
5. Insulation : First insulation hot face HFI bricks and second layer fiber ceramic board and last air insulation.
6. Controller : Digital PID ON/OFF controller.
7. Thermocouple : 'K' type thermocouple.
8. Power : 3 KW (approx.) single phase.

HIGH TEMPERATURE MUFFLE FURNACE ($\leq 1600^{\circ}\text{C}$)

Application

This Furnace is used for :

1. Heat treatment of high temperature materials
2. To develop surface coatings on materials

Specifications

1. Furnace chamber size : 300mm x 250mm x 250mm
2. Heating elements : Super Kanthal heating elements (6 nos.)
3. Thermal insulation: High density refractory as hot insulation & low thermal mass layer fiber ceramic boards & at last air insulation.
4. Working temperature : 1600°C
5. Temperature controller : Microprocessor based '16' segment PID programmable.
6. Safety controller : Make max. thermo-Honeywell.
7. Thyristor – power drive : 440V/AC, 3 phase 50 amp.
8. Thermocouple : 'B' type ,10 inch long.
9. Furnace casing : Two detachable rack made from SS 304.
10. Power supply : 440 V/AC, 3 phase



ABRASIVE CUTTING MACHINE

Application

This cutting machine is used for :

1. Cut the required sample with required size.
2. Cut the selected portion of the component for metallographic specimen.

Specifications

1. Body : Floor model cutter with rust proof steel construction.
2. Motor : 3HP (2.2 k.w), 3 phase motor.
3. Cutting capacity : Up to 60 mm for standard steels (may not be applicable to all the materials).
4. Spindle speed : 2800rpm
5. Cut-off wheel diameter : 10”(250mm)
6. Simple Control Panel : 4 switches (Start, Stop, Coolant, Tube light) and Emergency stop button with Key and Safety switch.
7. Ergonomic cutting handle.
8. For optimum cooling : Two water jets.
9. Coolant pump : 1/3 HP
10. For long jobs : Small opening in the side walls.
11. Safe and clear illumination : Fluorescent light.
12. T slot bed : 60mm x 190mm with 8mm T-slot.
13. Voltage : 415V/50 Hz
14. Machine size : 850mm x 750mm x 1550mm (LxDxH)



Polishing Machine

Application

This polishing machine is used for :

1. To remove the fine scratches on the specimen surface.
2. To get the mirror finished surface for specimens for microstructural study



Specifications

1. Machine : 8" Double disc polisher with individual drive
2. Body : Rigid table top corrosion proof FRP cabinet.
3. Variable speed – 50-1000 RPM.
4. Individual motor – 0.5HP high torque.
5. Water jet – flexible with control valve.
6. Disc – Aluminium disc 8"dia (interchangeable).
7. Power supply – 230 V/ 50 Hz(1+N+E)
8. Machine size – 710x660x310 mm
9. Front control panel – Feather touch buttons.

Hydraulic Mounting Press

Application

The mounting operation accomplishes three important functions

1. It protects the specimen edge and maintains the integrity of a materials surface features
2. Fills voids in porous materials and
3. Improves handling of irregular shaped samples, especially for automated specimen preparation.



Specifications

1. Body : Steel cabinet , pneumatic system
2. Temperature indicator : Digital
3. Timer : Digital with LCD display
4. Water cooling system : Automatic
5. Mould heater : 1600 watts
6. Cooling cycles : Buzzer indicated
7. Mould sizes : 1^{1/4}'' (standard) , 1^{1/2}'' , 2''
8. Power supply : 230v / 550Hz
9. Ram operation : automatic