

1.	Lab Name	Precision Engg & Manufacturing Laboratory
2.	In-charge	Lab In charge: Dr. D G Thakur
3.	Associated Members to the Lab: RAs, PhD Scholars/ Technical Staff	RA – Nil PhD- 01 Lab officer:Prajith P. Lab Assistant: Mr. Bhushan Lokhande
4.	Contact Details	02024304195(Lab. In-charge)
5.	Infrastructure Specs (H/W, S/W)	Nil
6.	Area in sq units (optional)	576 sq.ft.
7.	Lab Facilities	1. Micro-hardness Tester (Knoop & Vickers) 2. Pin on Disc (Wear & Friction test rig) 3. Tools Maker’s Microscope 4. Aluminium Stir Casting Furnace. 5. Salt Spray (Fog test) Chamber 6. Surface Roughness Tester 7. Coating Thickness Gauge 8. Laboratory Muffle Furnace. 9. Profile Projector
8.	Consultancy / Services Offered	Nil
9.	Complete & On-going Projects (Details)	01 (Completed) 02 (Ongoing)
10.	Collaborations (with DRDO lab, IISER, TATA, TCS, etc)	NA
11.	Intellectual Outcome: publications/ patents/ etc..	Total 155 International Journal (SCI and Scopus Indexed): 55 International Conference: 100
12.	Mentors Associated: (Like Dr. APJ Abdul Kalam, etc..)	NA
13.	Area in sq units (optional)	NA
14.	Any other relevant data	To provides an introduction to precision engineering and manufacturing <u>Specific Objectives:</u> Develop a practical understanding of basic manufacturing processes. Extend basic knowledge to solve manufacturing processes related problems. Emphasize the problem-solving process and application techniques. Analyse data from experiments to performed and reach conclusions.

Tool Maker's Microscope



Technical Specification:

- Illumination system: White for reflected illumination, Green for Transmitted illumination.
- Power Consumption: 10W.
- Stroke: 200(X)x200(Y)mm
- No of Axis: 3 Axis.
- Min resolution: 0.1 μ m.
- Measuring objective: 3X, 5X, 10X, 20X.
- Eyepiece resolution: 10X.
- Middle motorized frame.
- Maximum Measurable height: 175 mm*3, 120 mm*4

Tool makers microscope is based on the Principle of optics.

The applications of the tool room microscope are :

1. The determination of relative position of various points on work.
2. Measurement of angle by using a protractor eyepiece.
3. Comparison of thread forms with master profiles engraved in the eyepiece, measurement of pitch and effective diameter.

Profile Projector



Technical Specification: Model: SP-300

- Screen: Opaque glass screen with 90° cross line Fitted with graduated rotary ring (0-360°) operated by knob, L.C. 1min
- Screen Size: 300mm
- Light Axis: Vertical
- Optics: 10x, 20X, 50X, 100X
- Workstage Size: 160mm X 160mm / 260mm X 260mm
- Linear Measurement: Built-in Glass Scale
- Resolution: 1 μ m/0.5 μ m/0.1 μ m.
- Measuring System: Micrometers / PC based Software
- Projection Accuracy: $\pm 0.05\%$ (Contour / Surface)
- Illumination: 24V/150W halogen lamp, illumination control with condenser unit provide light as per lens
- Optional Hardware: Profile Charts, Rotary Table, V-block, Centre Holding Device Opto Edge Sensor, Rotary Encoder

➤ Description:

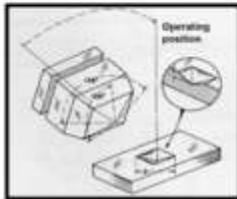
A Profile Projector also called as Optical Comparator or a Shadowgraph Projector is a specialized measuring system which is broadly classified under the category Industrial Metrology Systems. It is a versatile and indispensable measuring system in the manufacturing sector where small parts two dimensional measurements are required in the R&D, Production or Quality control departments. Automotive parts, plastic and rubber parts, wire and cable, biomedical equipment are some of the manufacturing industries which extensively use profile projectors for day to day measurements. Projection Accuracy

Wilson Hardness Tester (Knoop & Vickers)



Technical Specification:

- Hardness Scales HV & HK
- XY testing Table: Size 100 X 100 mm, Travelling dist: 25 X 25 mm,
- Travelling Precision: 0.01mm, Max height: 125 mm .
- Light source : LED
- Eye piece: 10X digital eyepiece.
- Objectives: 5X, 10X, 50X Objectives for available selection.
- M/C Dimensions: 520 X 230 X 520 mm.
- Power Consumption: 25 W.



Vickers Hardness:

- Used for defining the Hardness of the Material.
- The Vickers micro hardness indenter is made of diamond in the form of a square-base pyramid having an angle of 136° between faces .
- The Vickers indenter generates a square impression .



Knoop Hardness:

- Used for defining the Hardness of the Material.
- The Knoop micro hardness indenter is made of diamond in the form of pyramid that has an included longitudinal angle of $172^\circ 30'$ and an included transverse angle of 130° .
- Knoop indenter creates an elongated impression.

Pin on Disc (Wear & Friction Test rig)



Technical Specification:

- Pin diameter – 3mm – 12 mm.
- Pin Length – 25mm to 40mm.
- Normal load range – up to 150N.
- Frictional force range – up to 150N (with a resolution of 1N with tare facility)
- Wear measuring range - ± 2000 microns (least count 10 microns through LVDT)
- Sliding speed – up to 150m/min.
- Disc speed – 100 to 1500 rpm
- Wear disc diameter – 165 mm.
- Wear disc track diameter – 10 to 140mm.
- Pin Heating system – up to 250°C .
- Specimen Holders – Ball, Square, Rectangular.

Wear test rig is used for determination of tribological properties of different materials.

1. Ascertain the validity of law's of friction.
2. Wear characteristics of the given specimen.
3. Determination of wear constant.
4. Understand the effect of parameters.

Surface Roughness Tester



Technical Specification:

- Gauge range: 300 μ m
- Resolution: 0.01 μ m
- Pickup time: Inductive
- Stylus Tip: Diamond, radius 5 μ m
- Traverse length: 0.25-25mm(0.01-0.98in)
- Cut of Value: 0.25, 0.8, 2.5mm(0.01, 0.03, 0.1 in),
- Filter type: 2 CR or Gaussian
- Accuracy (Ra, Rz): 2% of reading +LSD μ m
- Overall Dimensions: 137 x 78 x 60mm

- Surface topography is of great importance in specifying the function of a surface. Significant proportion of component failure starts at the surface due to either an isolated manufacturing discontinuity or gradual deterioration of the surface quality.
- The most important parameter describing surface integrity is surface roughness. Therefore for measuring the surface roughness value Surface roughness tester suitable equipment.

Coating Thickness Gauge



Technical Specification:

- Display: 4 digits LCD, backlit
- Range: 0-1250 μ m/0-50mm
- Resolution: 0.1 μ m(0-99.9 μ m), 1 μ m (over 100 μ m).
- Accuracy: \pm 1-3% or 2.5 μ m or 0.1 mm (whichever is greater)
- PC interface: with RS-232C interface.
- Power supply: 2 \times 1.5 AAA.
- Operating condition: Temp.0-55 $^{\circ}$ c, Humidity<95%.
- Size: 126 \times 65 \times 35 mm / 5.0 \times 2.6 \times 1.6 inch
- Weight: approx 81g

1. Eddy current principle is used for measuring the coating thickness for non-destructive measurements of the coating thickness on non-magnetic basis metals
2. The F probes measure the thickness of non-magnetic (e.g. paint, plastic, porcelain enamel, copper, zinc, aluminium, chrome etc.) on magnetic materials (e.g. iron, nickel etc.). Often used to measure the thickness of galvanizing layers, lacquer layers, porcelain enamel layers, phosphate layers, copper tiles, aluminium tiles, some alloy tiles, paper etc.
3. The N probes measure the thickness of non-magnetic coatings on non-magnetic metals. It can be used on anodizing, varnish, paint, enamel, plastic coatings, power, etc. Applied to aluminium, brass, non-magnetic stainless steel, etc.

Aluminium Stir Casting



Technical Specification:

- Operating Voltage : 400/440v,3-phase,A.C50Hz
- Power Consumption: 15KW
- Capacity: 2kg of Aluminium
- Dimension of Retort: 100-200mm(id Depth)
- Maximum Temperature: 900°C
- Pouring: Motorized control with remote switch
- Skin Temperature: Not more than 75 °C.
- Temperature control: Digital Display by PID temperature indicator & controller
- Thermocouple: K Type

It comprises of high temperature electric furnace, stirrer arrangement, stainless steel pot for melting with bottom pouring, squeeze casting and vacuum casting arrangements. The furnace is rectangular in shape, with cylindrical stainless steel pot, stirrer arrangement, bottom pouring arrangement and provision for mixing and pouring of added agent from the top.

Laboratory Muffle Furnace



- Light weight with ceramic wool insulation (instead of Brick insulation).
- Heating elements are made of Kanthal A-1 wire and backed by high temperature cerwool insulation, which avoids loss of energy.
- The temperature control unit consists of Energy regulator, fitted in front of the furnace with two pilot lamps. The apparatus is complete with one pyrometer, thermocouple, silver thermal fuse, and main lead with power plug. To work on 220/230Volts AC or 400/440 Volts AC.
- Maximum Temperature is 1130°C
- Dimension : (12" X 6" X 6")

Salt Spray (Fog test) Chamber



Technical Specification:

- Chamber Capacity: 920 X 920 X 500 (LWH) mm, (423 L)
- Fog creation: 1 to 2 ml/hour.
- Temp range: Above ambient 5 deg to 45 deg C.
- Resolution: 0.1 deg C.
- Accuracy: ± 1 deg C.
- Timer range: 999hrs.
- Resolution: 0.1 hr.
- Power: 1.5Kw.

- This test equipment is for checking the corrosion resistant of products (specimen) under long time corrosion after treatment like anodize, rustproof oil, chemical
- Salt Water Spray Chamber is for testing the rust resistance grade of surface treatment of Electro-Plating, Paint Coating and Anodizing.
- Salt water spray tester is used for testing rust-proof treatment of material, such as metal surface that after painting, coating, electro-plating, anodizing, films of organic and non-organic...etc