



# **ENGINEERING METALLURGY LABORATORY**

## **COURSE OBJECTIVES**

- To acquaint students with basic concept of metal structure.
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- To impart a fundamental knowledge of ferrous and non ferrous metal processing
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- Selection and application of different metals and alloys.
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- To know fundamentals of metallography

## **COURSE OUTCOMES**

- Students will be able to identify & estimate different parameters of system such as phases, variables, component, grains, grain boundary, and degree of freedom
- Students will be able to analyze macrostructure & microstructure of steel & Cast Iron using optical microscope.
- Students will be able to analyze effect of heat treatment on properties of steels
- Student will be able to select appropriate materials for various applications.

**METALLURGY IS A DOMAIN OF MATERIALS SCIENCE AND ENGINEERING THAT STUDIES THE PHYSICAL AND CHEMICAL BEHAVIOR OF METALLIC ELEMENTS, THEIR INTER-METALLIC COMPOUNDS, AND THEIR MIXTURES, WHICH ARE CALLED ALLOYS. METALLURGY ENCOMPASSES BOTH THE SCIENCE AND THE TECHNOLOGY OF METALS**

# PREREQUISITES

MATHEMATICS

CALCULUS

CHEMISTRY

PHYSICS



## METALLURGY APPLICATION AREAS

### Materials Processing

- Composite materials
- Nano materials
- Smart materials

### Materials Testing

- Destructive testing
- Non destructive Testing

### Material Characterization

- Scanning Electron Microscopy
- Transmission electron microscopy
- X-ray Diffraction



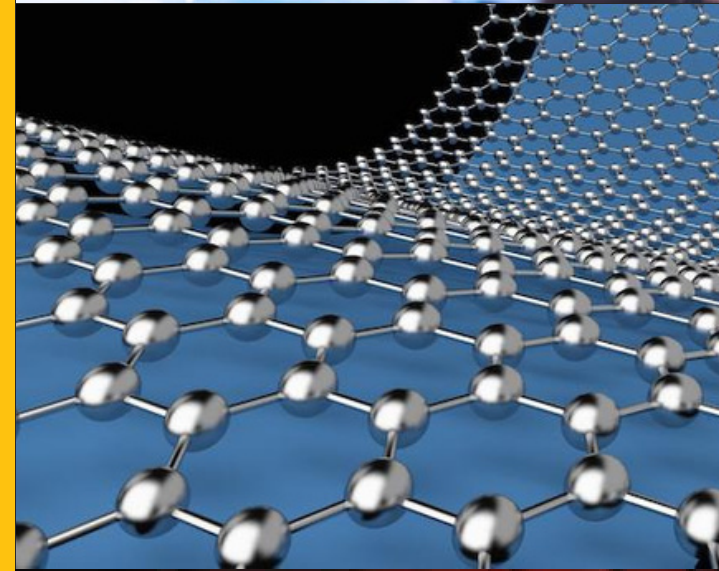
# METALLURGY ENGINEERING INDUSTRIES

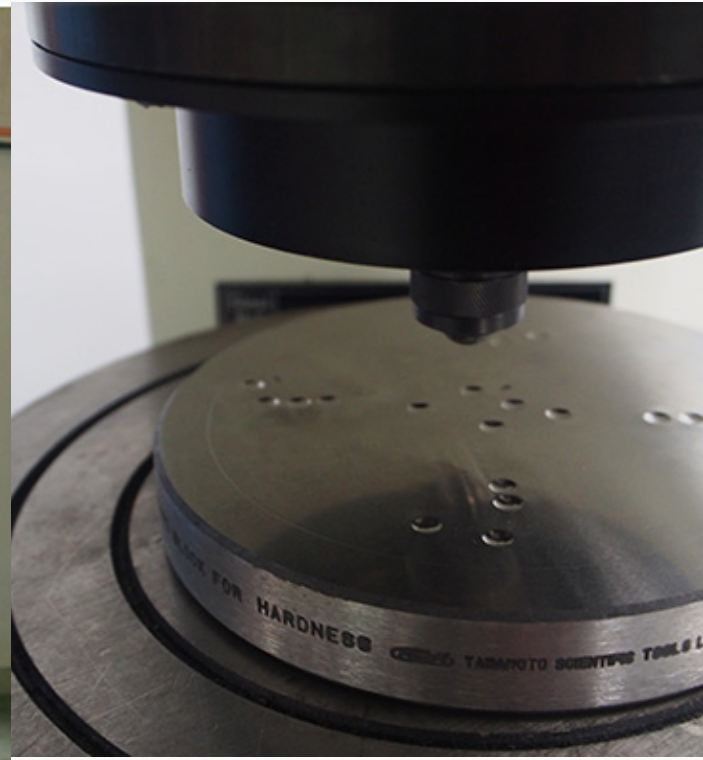




## ENGINEERING METALLURGY

- Mechanical Testing
- Hardness Testing
- Hardenability Testing
- Ultrasonic inspections of materials
- Characterization





**Technical Specification**

**Make/Model EIE Instruments Pvt.Ltd.**

**Loads 500 to 3000 in stages of 250**

**Indenter Harden steel ball 10 mm dia.**

**Max. Testing Height mm 254**

**Depth of Throat mm 150**

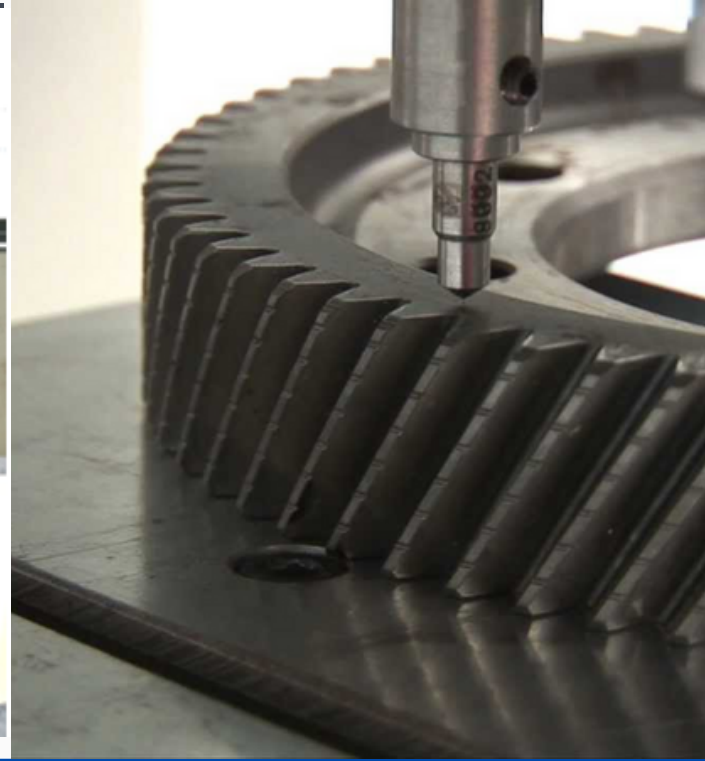
**Size of Base 255x495**

**Machine Height 860**

**Net Weight (Approx.) 210**

# METALLURGY LAB TESTING FACILITIES

## Rockwell Hardness Tester



### Technical Specification

Make EIE Instruments Pvt.Ltd.

Model ALZB250

Test Height  $550 \pm 5$ mm

Depth of Throat  $150 \pm 5$ mm

Overall Size 515 x 205 x 1020

Weight 210 KG

Automatic load selector

Automatic zero setting type dial gauge

60, 100 & 150 KG major load

# METALLURGY LAB TESTING FACILITIES

## Poldi Hardness Tester



### Technical Specification

MAKE K B M ENGINEERING CO.

MODEL PHM

LOAD MANUAL

INDENTOR STEEL BALL 10 MM DIAMETER

STANDARD BAR MATERIAL MS

BHN:179

# METALLURGY LAB TESTING FACILITIES

## Ultrasonic Detection Machine



### Technical Specification

MAKE ELECTRONIC & ENGINEERING CO.P.LTD  
MODEL DIGISCAN DS-322  
DISPLAY LED 117.2 MM X 84 MM  
PULSER / RECEIVER  
RECEIVER BANDWIDTH 0.5-6 MHZ  
GAIN VARIABLE 0-80 DB  
OPERATING MODE SINGLE PROBE,DOUBLE PROBE,T-R  
MODE  
TIME BASE 5 MM MIN. 5 MTR MAX  
MONITOR GATE 2 GATE  
MONITOR LOGIC +VE/ -VE LOGIC SELECTABLE

# Ultrasonic Thickness Gauge



## Technical Specification

**MAKE INDIA TOOLS AND INSTRUMENTS**

**MODEL ITI-16000**

**MEASURING RANGE 0.65- 500 MM**

**LOW LIMIT OF PIPE  $\varnothing$ 15 MM X 1.0 MM (7.5 MHZ,  $\varnothing$ 6 MM )**

**$\varnothing$ 10 MM X 1.2 MM (7.5 MHZ,  $\varnothing$ 6 MM )**

**DISPLAY RESOLUTION 0.01 MM/0.001 INCH**

**0.1 MM/ 0.01 INCH**

**MATERIAL VELOCITY 509-18699 M/S**

**MEASUREMENT RESOLUTION  $\pm(0.5Z5H+0.05)$ MM**

**BANDWIDTH 1 MHZ- 10 MHZ(-3DB)**

**MEASURING RATE 2-20 TIMES/SEC**

**POWER SUPPLY 3VDC(TWO AA BATTERIES)**

**SCREEN 128X64 LCD**

**SIZE 136 L X 72 W X 20 H MM**