Laboratory Brief Overview

University/Institute: NED University of Engineering and Technology

Department: Metallurgical Engineering

Lab Name: Metallography Lab

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Lab Overview

The Metallography Laboratory is equipped with abrasive cutting, grinding, and polishing machines, along with an ultrasonic cleaner, to facilitate precise preparation of metallographic specimens. The lab serves as a core facility for preparing defect-free samples used in microstructural analysis, failure investigation, and quality control studies. It supports both research and industrial applications by enabling accurate sample preparation for subsequent optical or electron microscopy, coating evaluation, and weld analysis.

Equipment

S.No	Equipment Name	Research / Teaching Applications
1.	Abrasive cutting machine	Specifications: cutting wheel-250 mm; Motor-380 V; Model METACUT-M250
2.	Micracut 201	Specifications: Wheel diameter- 200 mm; wheel speed RPM- 500-5000; Feed rate-20-1500
3.	Micracut 125	Specifications: Wheel Diameter- 125; Wheel RPM-60-600; Cutting Power-50 W
4.	Hydraulic Pneumatic mounting machine	Specifications: Power-1600 W; Heating time- 0-60
5.	Grinding machine	Specifications: Double Disc; 60-60 RPM Speed
6.	Automatic grinding-polishing machine	Specifications: Rotation speed- 150 RPM; Power- 60 W
7.	Magnetic Stirrer	Specifications: Temperature- 5-40 °C

8.	Desiccator	Specifications: Batteries 1.5V; AC/DC adopter
9.	Ultrasonic cleaner	Specifications: Maximum tank volume- 0.8 liters; Heating power- 60W
10.	Chemicals	To prepare various etchants for microscopic and macroscopic analysis of ferrous and non-ferrous metals and alloys.

Research Applications / Areas

Metallographic Sample Preparation

- Precise cutting, mounting, grinding, and polishing of metallic and alloy specimens for microscopic or analytical examination.
- Preparation of defect-free surfaces suitable for optical microscopy, SEM, or hardness testing.

Support for Microstructural and Phase Analysis

- Providing well-prepared specimens for subsequent analysis in optical or electron microscopy labs.
- Essential for accurate microstructural characterization, phase identification, and grain size measurements.

Weld and Coating Sample Preparation

- Preparation of cross-sectional samples of welded joints and coated surfaces to study layer thickness, bonding, and interface quality.

Failure and Quality Investigation Support

- Preparation of samples from failed or corroded components for detailed failure analysis.
- Enables observation of micro-cracks, inclusions, and defects after proper polishing and etching (in collaboration with microscopy lab).

Educational and Training Purposes

- Training students and researchers in metallographic techniques — cutting, polishing, and surface preparation.

Academic and Industrial Applications

Research Collaboration and Material Development Support

- Serving as a core preparation facility for research in materials development, coatings, heat treatment, and alloy studies conducted in collaboration with other labs.
- Assisting various industrial R&D labs by preparing precise and defect-free specimens for advanced microstructural, hardness, or phase analysis.