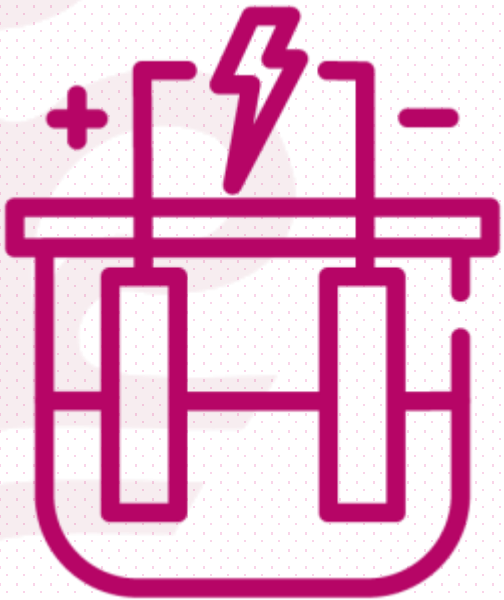
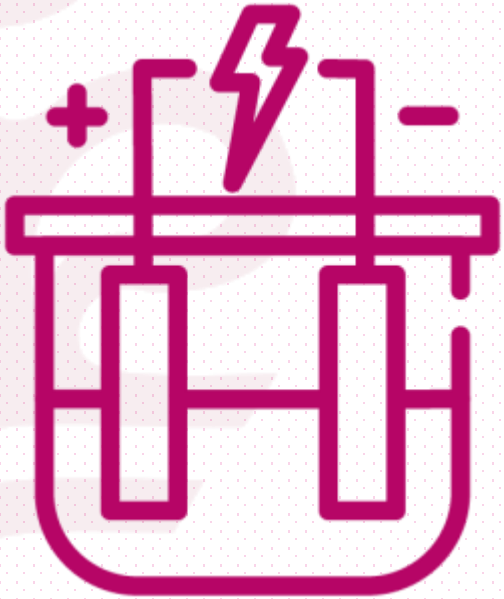
SURFACE METALLURGY AND COATINGS LABORATORY

Analytical and non-analytical instruments



Shiraz University, Department of Materials Science and Engineering

ANALYTICAL INSTRUMENTS

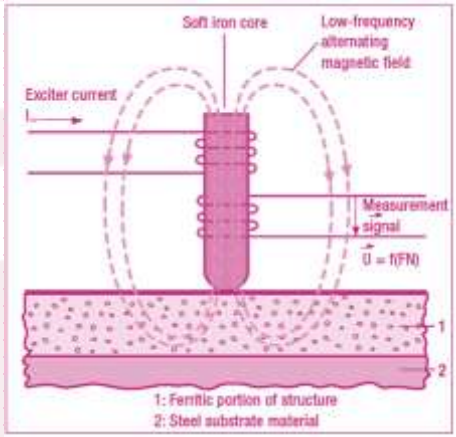


Shiraz University, Department of Materials Science and Engineering

Device: Feritscope

Manufacturer: *FISCHER TECHNOLOGY*

Different parts in chemical, energy and processing plants are often subject to heat, aggressive media and high pressure. These circumstances demand steel components with high corrosion resistance and strength at high temperatures. If the δ −ferrite content in steel is too low, then the welded material is susceptible to hot-cracking. On the other hand if it is too high, the toughness, ductility as well as the corrosion resistance of the steel would be reduced. A **feritscope** measures ferrite content of the specimen based on magnetic induction phenomenon. A magnetic field generated by the first coil interacts with the specimen. The changes in the magnetic field induce a voltage in the second coil proportional to the specimens ferrite content. This voltage is then evaluated to estimate ferrite content of specimen.



Working principal of feritscope

Device: Feritscope

Manufacturer: *FISCHER TECHNOLOGY*

This lab is equipped with a feritscope with the following specifications capable of both measurement of ferrite content and ferrite number.

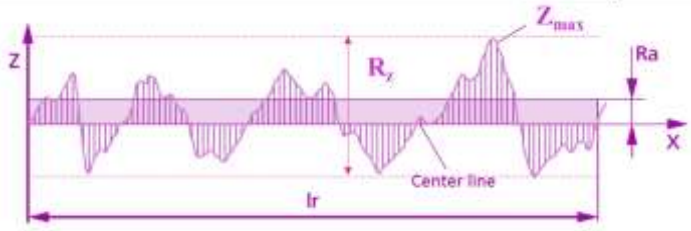
Technical specifications

Ferrite detection range	**0.1-80%**
Ferrite number range	**0.1-110**

Device: Portable surface roughness tester

Manufacturer: *MITUTOYO*

Surface roughness is defined as the geometrical (often microscopic) irregularities on the surface of materials. It is quantified by the deviations in the direction of the normal vector of a real surface from its ideal form. If these deviations are large, the surface is rough; if they are small, the surface is smooth. Surface roughness plays an important role in determining how an object will interact with its environment. Roughness is a good indicator of the potential performance of components, since irregularities on the surface may form nucleation sites for cracks or corrosion. Moreover, rough surfaces usually wear more quickly and may have higher friction coefficients than smooth surfaces. For some applications, appropriate roughness values may be desired to promote adhesion for cosmetic finish coatings such as paints and enamels on metallic substrates.



Schematic of surface roughness profile

Device: Portable surface roughness tester

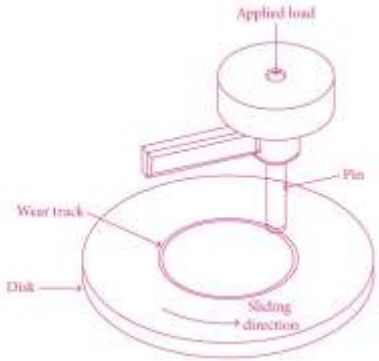
Manufacturer: *MITUTOYO*

This lab is equipped with a portable surface roughness tester capable of measurement of both R_a and R_z values. Additionally, this device may be used to give the surface roughness profile.

Device: Pin-on-disk wear test machine

Manufacturer: *FARAGIR SANAT MEHR BIN*

The **pin-on-disk wear test machine**, consists of a flat, pin, or sphere which is attached to a stiff elastic arm that is weighted down onto a test sample with a precisely known force. The sample is rotated at a selected speed. The elastic arm ensures a nearly fixed contact point and a stable position in the wear track formed by the pin on the sample. The kinetic friction coefficient is determined during the test by measuring the deflection of the elastic arm, or by direct measurement of the change in torque by a sensor located at the pivot point of the arm. Wear rates for the pin and the disk are calculated from the respective change in the volume or weight of the material during the test. Normally, the wear track and wear debris could be seen on a test plaque. With this machine one can control test parameters such as speed, contact pressure (hence PV), and time. With the right environmental chamber one can also control and measure the effect of humidity, temperature, and atmospheric conditions on tribological properties of specimens.



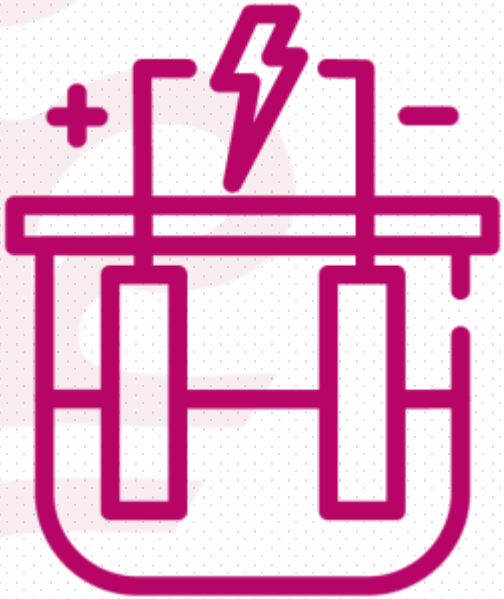
Schematic presentation of pin-on-disk operation

Device: Pin-on-disk tribometer

Manufacturer: *FARAGIR SANAT MEHR BIN*

The surface and coatings metallurgy lab. is equipped with two pin-on-disc wear test machines capable of displaying, and recording real time, force, tracked distance, and coefficient of friction during the test.

NON-ANALYTICAL INSTRUMENTS



Device: Digital oven

Manufacturer: *MEMMERT*

Technical specifications

Maximum temperature	**300 °C**
Temperature control	**up to 100 °C: ±0.1 °C, from 100 °C and above: ±0.5 °C**

*** Equipped with a fan for better temperature homogeneity**

Device: Ultrasonic bath

Manufacturer: *ELMA/P series*

Technical specifications

Operation frequencies	**80 kHz (gentle) / 37 kHz (strong)**
Operation modes	**Pulse / Sweep / Degas**
Temperature range	**30 – 80 °C**

Device: Ultrasonic homogenizer

Manufacturer: *FAPAN*

Technical specifications

Power	**300 w**
Power adjustment	**0.1-110**
Processing capacity	**20-1000 ml**

*** Pulse time adjustment**

*** Equipped with thermocouple**