

- ◆ Materials Science Laboratory established during 1987 at cost of 196 lakhs covering an area of 1010 square meter, located at K.G.F about 100 kms from Bangalore.
- ◆ The main objectives are :
 - a). To provide sophisticated material test facilities.
 - b). To conduct necessary tests for introduction / suggestion of alternative material.
 - c). Identification of materials and processes for specific applications & value engineering.
 - d). Selection of material for new products.

TEST FACILITIES

- ◆ **Mechanical Testing**
- ◆ **Metallography & Failure Analysis**
- ◆ **Quantitative Analytical Testing**
- ◆ **Environmental Testing**
- ◆ **Oil Testing**

MECHANICAL TESTING

UNIVERSAL TESTING MACHINE



- ◆ **Make** : Germany
- ◆ **Capacity** : 110 Ton
- ◆ Tensile test, Compression test and Bending tests can be performed on metal samples.

UNIVERSAL TESTING MACHINE



- ◆ **Make** : M/s. Zwick, Germany
- ◆ **Capacity** : 1 Ton
- ◆ Tensile test can be performed on non-metallic materials like Rubbers, O-rings, Gaskets, etc.
- ◆ Tensile and Compression test can be performed on springs.

BRINNEL HARDNESS TESTER



- ◆ **Make** : Germany
- ◆ **Range** : 500 to 3000 kg
- ◆ Brinell Hardness of ferrous & non-ferrous metals at 500,1000 & 3000 kg load can be determined.

BRINNEL / VICKERS HARDNESS TESTER



- ◆ **Make** : Germany
- ◆ **Range** : 1). **Brinell** : At 187.5 & 250 kg
 2). **Vickers** : At 5,10,15,20,30, 40, 50,60,100,& 120 kg
- ◆ Brinell / Vickers Hardness of ferrous & non-ferrous metals can be determined.

ROCKWELL HARDNESS TESTER



- ◆ **Make** : Switzerland
- ◆ **Scale** : HR_B (100 kg), HR_C (150 kg) and Superficial-Rockwell 15T & 30T
- ◆ Hardness of ferrous & non-ferrous metals can be determined.

IMPACT TESTING MACHINE



- ◆ **Make** : India
- ◆ **Range** : 0 to 300 Joules - Charpy
 0 to 164 Joules - Izod
- ◆ Impact strength of metal sample at different temperatures can be determined.

TENSOMETER



- ◆ **Make** : India
- ◆ **Range** : 0 to 2000 kg
- ◆ To determine Tensile strength, Yield strength, Elongation & Reduction in area for sub-sized metallic samples.

RUBBER HARDNESS TESTER



- ◆ **Make** : M/s. Instrument & Mfg. Co., U.S.A
- ◆ **Type** : Durometer – Type 'M'
- ◆ **Range** : 0 to 2000 kg
- ◆ To determine shore 'A' hardness of non-metallic materials (O-rings)

METALLOGRAPHY

OPTIPHOT MICROSCOPE



- ◆ **Make** : Nikon, Japan
- ◆ **Range** : 50X to 1000X
- ◆ To determine microstructure, inclusion rating & grain size measurement and micro-photography.

MICRO HARDNESS TESTER



- ◆ **Make** : HMV-2000, Shimadzu Japan
- ◆ **Range** : 5 to 2000 g
- ◆ To determine Micro hardness and Case depth measurement by hardness survey method.

STEREOSCOPE



- ◆ **Make** : WILD HeerBrugg, Switzerland
- ◆ **Range** : Upto 40X & working distance 100 to 2000 mm
- ◆ Used for Macro examination & Fracture study.

QUENCH MASTER



- ◆ **Make** : Drayton – UK
- ◆ **Range** : Up to 1200°C
- ◆ To determine cooling characteristics of quenching oils.

ANALYTICAL TESTING

BAIRD SPECTROMETER



Direct Reading Optical Emission Spectrometer

- ◆ **Make :** USA
- ◆ **Accuracy :** As per ASTM E1009
- ◆ Analyse 22 main elements in metal samples.

LECO C&S DETERMINATOR



Automatic Carbon & Sulphur Determinator

- ◆ **Make :** USA
- ◆ **Range:** 0 to 99.99%
- ◆ **Accuracy:** C(<0.1%)±0.0002, C(>0.1%)±0.001,
S(<0.1%)±0,0002 & S(>0.1%)±0.001
- ◆ To determine Carbon & Sulphur in Ferrous & Sintered materials.

SPECTROPHOTOMETER



Visible SpectroPhotometer

- ◆ **Make :** USA
- ◆ **Accuracy :** ± 1% A
- ◆ To determine Nickel, Molybdenum, Manganese & Chromium in ferrous samples.

ELECTRO ANALYSER



- ◆ **Make :** India
- ◆ To determine Copper & Lead elements in copper based alloys.



Wet Method

- ◆ Determination of alloying elements in ferrous & non-ferrous metal samples by volumetric & gravimetric methods.

ENVIRONMENTAL TESTING

SALT SPRAY CHAMBER



- ◆ **Make :** Germany
- ◆ **Range:** Tempt. range Ambient to +55°C
- ◆ To determine corrosion resistance of various coatings & primer / paint on ferrous based metal.

LOW TEMPERATURE TEST CABINET



- ◆ **Make :** Germany
- ◆ **Range :** - 80°C to + 80°C
- ◆ To determine pour point of an Oil, Impact properties of metal, electronic components testing and sub-zero treatment.

OIL TESTING

VISCOMETER BATH



- ◆ **Make :** INDIA
- ◆ **Range :** Viscometers ASTM Size No.150, 200 & 300.
- ◆ To determine kinematic viscosity of an Oil at 40 & 100°C.

FLASH POINT APPARATUS



- Cleveland Open Cup & Abel Closed Cup Tester**
- ◆ **Make :** India
 - ◆ **Accuracy :** 0.1°C
 - ◆ To find out the flash point of different Oils.

R&D is looking forward to provide quality testing & services to the industry. Interested parties may please approach : General Manager, R&D Division, BEML Limited
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