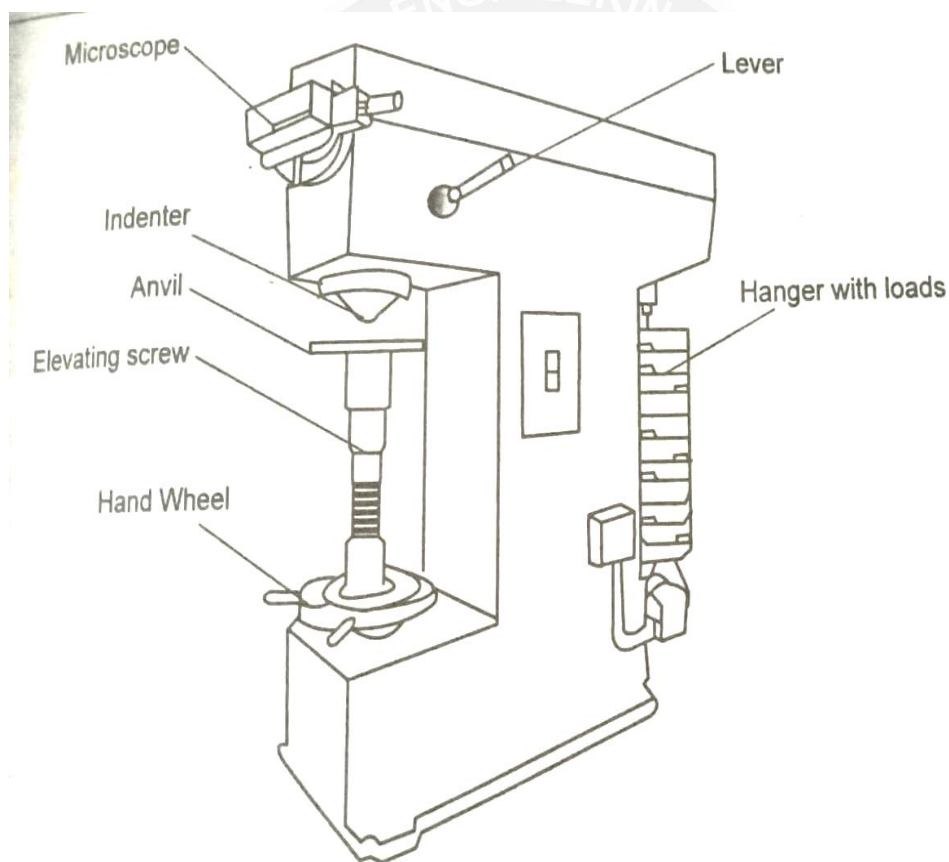


2.3 BRINELL HARDNESS TEST

- ❖ The Brinell Hardness Test method is the most commonly used hardness measurement technique in the industry. In the Brinell Hardness Testing, the hardness of a metal is determined by measuring the permanent indentation size produced by an indenter.
- ❖ Harder materials will generate shallow indentations while softer materials will produce deeper indentations. This test method was first proposed by Swedish engineer Johan August Brinell in 1900 and according to his name, the test is popular as Brinell Hardness Test.



1. PRINCIPLE

- ❖ An indenter (hard metal ball with diameter) is forced into the surface of a test piece and the diameter of indentation, 'd' left in the surface after removal of the surface, 'F' is measured under a definite static load applied for a standard period of time.

- ❖ The standard brinell hardness tester operates usually under hydraulic pressure that applies force.

2. MAJOR COMPONENTS

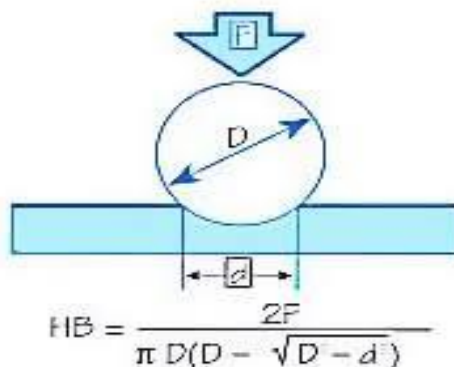
- Brinell Hardness Testing Machine
- Indenter Sphere, and
- Brinell microscope to measure the generated impression
- Anvil

3. INDENTERS

- ❖ The diameter of spherical steel ball indenters used in the standard Brinell hardness test are either 5 or 10 mm. The ball indenter normally used is made from heat treated hard high carbon steel, known as 'Hultgren ball'.

4. WORKING

- ❖ The Brinell Hardness test is performed in a Brinell hardness test unit.
- ❖ In this test method, a predetermined force (F) is applied to a tungsten carbide ball of fixed diameter (D) and held for a predetermined time period, and then removed.
- ❖ The spherical indenter creates an impression (permanent deformation) on the test metal piece.
- ❖ This indentation is measured across two or more diameters and then averaged to get the indentation diameter (d).
- ❖ Using this indentation size (d) Brinell Hardness Number (BHN) is found using a chart or calculated using the Brinell hardness test formula.



5. ADVANTAGES

- ❖ The hardness of rough samples can be measured which is difficult with other methods.
- ❖ Application of high test load (up to 3,000 Kg) is possible.
- ❖ Wide measuring range due to availability of a range of indenter sizes and loads
- ❖ A Brinell hardness tester can determine the hardness of all types of metals.
- ❖ Provides reliable results.

6. DISADVANTAGES

- ❖ There could be measuring errors due to using of optical instruments.
- ❖ Surface imperfections can interfere with the test result if the surface is not prepared thoroughly.
- ❖ The requirement of a flat surface makes this test redundant for cylindrical surfaces.

