

Experiment No:-1

Brinell Hardness Test

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Div:- D

Batch:-2

Roll No:-40

Aim:- To determine indentation hardness of

1. Mild Steel Specimen
2. Cast Iron Specimen
3. Brass Specimen
4. Aluminium Specimen

Apparatus:- Brinell Hardness Testing Machine.

Theory:- Brinell hardness test is most commonly used to test materials that have a structure that is too rough or too coarse to be tested using other test methods, e.g., castings and forgings. In brinell testing machine the load is applied by a lever mounted on knife edges and carrying a hanger for suspending the required load. The supporting table for spacing the specimen can be raised or lowered by a steel screw by operating a large hand wheel. When testing, the load is applied and removed by hydraulic power controlled by a hand lever. The indenter used is a hardened steel ball which will have a diameter of 10mm, 5mm or 2.5mm. The reading microscopic has a 25-fold magnification. The gap between successive graduations of the scale is 0.5mm and a micrometer is arranged sideways, the eye piece of the reading microscope may be turned up by 90 degree so that the impressions of the ball can be measured in two perpendicular directions.

Procedure:-

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1. When you click on a brinell test file, a new window will open as shown below.
2. Click on the NEXT button at the bottom right corner to move to the next step.
3. Click on the material to select the required specimens and the load to be applied on that is shown, and then click on NEXT button.
4. The load to be applied on the selected specimen is displayed here, click NEXT button to mount the specimen on setup.
5. Click on hand wheel then move mouse pointer over the hand wheel to rotate it in clockwise direction till the specimen is in position, after adjusting the specimen in specified position then move to the next step by clicking on NEXT button.
6. Switch on the machine and click on hand lever to apply load, again click on unload after applying load of 10 to 15 sec for ferrous material and up to 30sec for nonferrous material.
7. Scroll mouse over the microscope adjusting screw to view the indentation, adjust the indentation corner to zero.
8. Click on hand lever again to stop the loading process.
9. The observation of trial 1 is given; repeat the same steps for other trials.
10. The final average hardness value from different trials is given here.

Observations:-

1. **Cast Iron:**

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Observations:

Trial	Material	Diameter of indenter D (mm)	Load P (kg)	Average diameter d_i (mm)	HBW (kg/mm ²)	Average HBW (kg/mm ²)
1	Cast Iron	10	3000	5.9	99.21	96.84
2				6.03	94.47	

2. Mild Steel :

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Observations:

Trial	Material	Diameter of indenter D (mm)	Load P (kg)	Average diameter d_i (mm)	HBW (kg/mm ²)	Average HBW (kg/mm ²)
1	Mild Steel	10	3000	4.7	162.85	161.39
2				4.74	159.94	

3. Brass:

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Observations:

Trial	Material	Diameter of indenter D (mm)	Load P (kg)	Average diameter d_i (mm)	HBW (kg/mm ²)	Average HBW (kg/mm ²)
1	Brass	10	1000	3.46	103.12	100.74
2				3.54	98.36	

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4. Aluminium:

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Observations:

Trial	Material	Diameter of indenter D (mm)	Load P (kg)	Average diameter d_i (mm)	HBW (kg/mm ²)	Average HBW (kg/mm ²)
1	Aluminium	10	500	2.81	79.04	79.62
2				2.79	80.2	

Result:-

The Mild steel is harder than Aluminium , Brass & cast Iron as its average HBW is high than other materials. Brass and Cast Iron has the same hardness. The least hard material is Aluminium.