WEAR TEST IN PIN-ON DISC MACHINE

- **Aim of Experiment:**
  To determine wear of steel and Brass specimen

- **Apparatus Required:** Pin-on Disc Machine (Model TR-20), Digital balance, steel and Brass specimen pins.

- **Theory:** One material is taken in the form of a pin and other one in the form of a disc. The disc rotates and the pin is loaded against the disc. A load sensor measures the frictional force and a displacement sensor measures the wear. Wear is also measured by loss of weight of the pin. Wear is plotted against load to characterize the material property. Both adhesive and abrasive wear can be estimated theoritically using Archard's law

$$\boxed{Q = \frac{KWL}{H}}$$ where

Q – Volume of material lost from softer body (m^3)
L – Total sliding distance (m)
W – Applied load (N)
H – Hardness of softer body (N/m^2)
K – Wear constant of Archard's wear coefficient.

Observation:

Material 1: Steel **Time:** 60s at each load **Initial weight:** 16.7845

SL. No.	LOAD (kg)	RPM	FRICTIONAL FORCE (N)	WEAR (GM)
1	0.5	300	4.5	0.0016
2.	1	300	7.8	0.0031
3	1.5	300	9.5	0.0045
4	2	300	9.6	0.0062

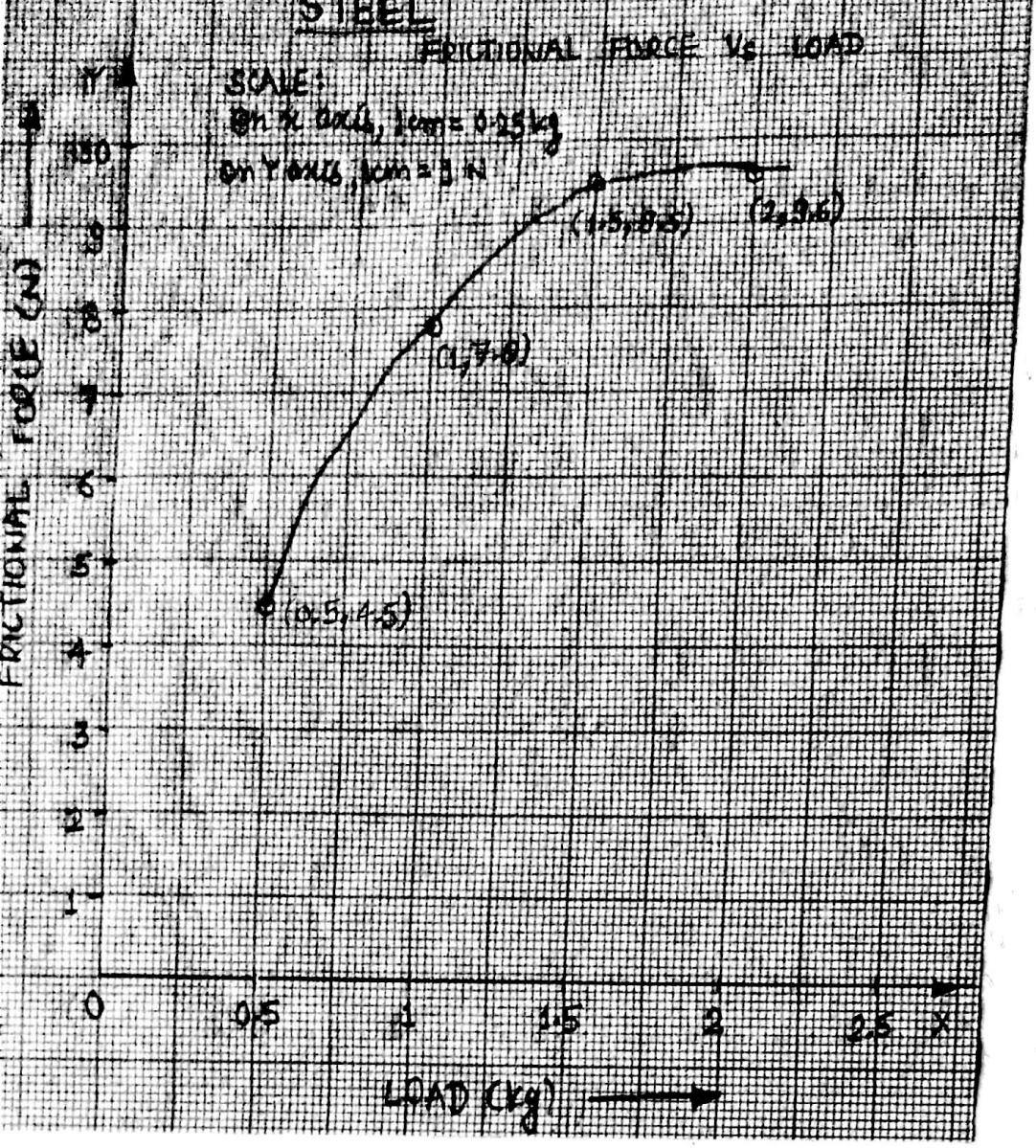
Material 2: Brass **Time:** 60s at each load **Initial weight:** 31.1873gm

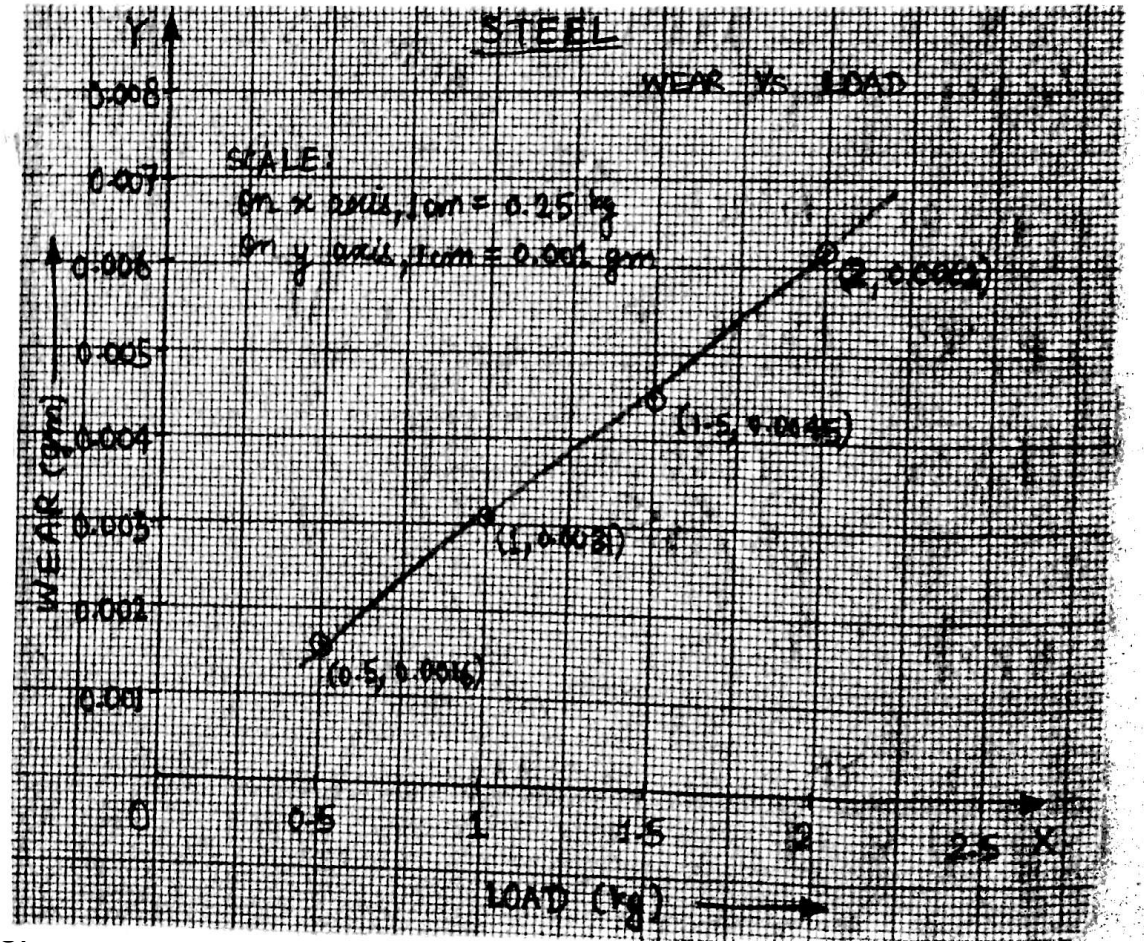
SL. NO.	LOAD (kg)	RPM	FRICTIONAL FORCE (N)	WEAR (GM)
1.	0.5	300	1.46	0.0198
2.	1	300	1.55	0.0426
3.	1.5	300	2.75	0.0930
4.	2	300	3.70	0.1432
5.	2.5	300	4.40	0.1958

• DISCUSSIONS:

- Wear in case of steel is less as compared to Brass.
- Wear in both the cases of steel and Brass increases with increase in load. This may be due to increasing smoothness of surface.
- There are 5 main types of wear:
  1) Abrasive
  2) Impact
  3) Adhesive
  4) High Temperature
  5) Corrosive
- Wear is inversely proportional to hardness of material. Therefore from observations, it can be concluded that Brass is softer than steel.

Relevant Graphs on Next Page


STEEL
FRICTIONAL FORCE Vs LOAD
SCALE:
On x axis, 1cm = 0.25 kg
On Y axis, 1cm = 1 N
Y
X
FRICTIONAL FORCE (N)
LOAD (kg)
(1.5, 8.5)
(2, 9.6)
(1, 7.8)
(0.5, 4.5)
0
0.5
1
1.5
2
2.5
1
2
3
4
5
6
7
8
9


STEEL
WEAR Vs LOAD
SCALE:
On x axis, 1cm = 0.25 kg
On y axis, 1cm = 0.001 gm
Y
X
WEAR (gm)
LOAD (kg)
(2, 0.0062)
(1.5, 0.0045)
(1, 0.0028)
(0.5, 0.0016)
0
0.5
1
1.5
2
2.5
0.001
0.002
0.003
0.004
0.005
0.006
0.007
0.008