Bending and deflections of beam test

Object:

To study the deflection of the beam and the parameters' effect on the deflection.

Theory:

Types of beam study:

1. Simply supported beam
2. Cantilever beam

Simple supported beam:

Simply supported beam shown in fig. (1) in equilibrium

$\Sigma M_A=0$ ..... (1)

$R_B * L - mg * (L/2) = 0$

$\Sigma f_y = 0$ ..... (2)

$R_A + mg/2 - mg = 0$

$R_A = mg/2$

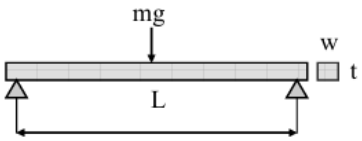

Fig. (1)

Cantilever beam:

Built or welded on one support and free on the other support shown in fig. (2) in equilibrium

$\Sigma f_y = 0$

$A_y = mg$

$\Sigma M_A = 0$ .....(3)

$M - mg * L = 0$

$M = mg\ L$

$\Sigma f_x = 0$ ..... (4)

$A_X = 0$

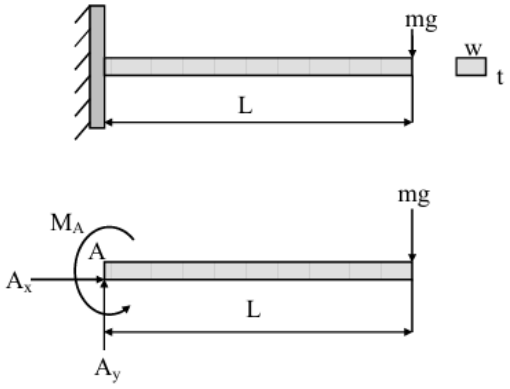

Fig. (2)

Test procedure:

1. Fix the beam in simple supported beam shown in figure (1) that the distance between the support (L).
2. Fix the dial gauge in the mid point.
3. Apply the load as (100g, 200g and 300g).

Apparatus used:

1 beam
2 guage
3 support
4 weight

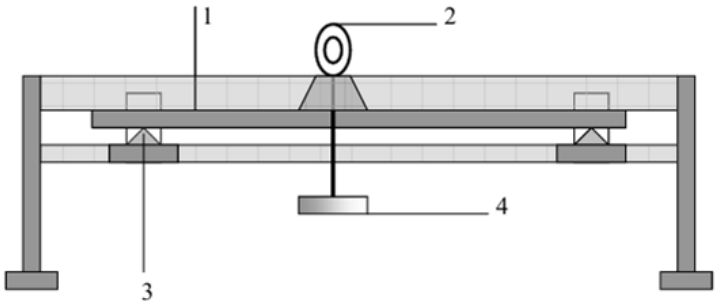

Fig. (3)

Calculation:

The main parameter effect on the deflection as length of the beam and cross sectional area

- **Test (1)** for simple supported beam (L = 0.8 m), (w =12 mm) and (t = 6 mm) then calculate table (1).

M (Kg)	δ(mm)	F(N)

- **Test (2)** for simple support beam as shown in fig. (1) (L=0.6m), (w =12 mm) and (t = 6 mm) then calculate table (2).

M (Kg)	δ(mm)	F(N)

- **Test (3)** for simple support beam as shown in fig. (1) (L=0.8m), (w =24 mm) and (t = 6 mm) then calculate table (3).

M (Kg)	δ(mm)	F(N)

- **Test (4)** for cantilever beam as shown in fig. (2) (L=0.4m), (w =24 mm) and (t = 6 mm) then calculate table (3).

M (Kg)	δ(mm)	F(N)

Discussion:

1. Plot the relationship between the force and the deflection for tests (1), (2), (3), and (4), then find the slope.

2. Compare the relationship between the force and the deflection for tests (1) and (2) for the effect of the length of the beam.

3. Compare the relationship between the force and the deflection for tests (1) and (3) for the effect of the cross-sectional area of the beam.

4. Compare the relationship between the force and the deflection for tests (1) and (4) for the effect of the type of the beam.