# LW N°02: Simple Bending Test

A bending test, also known as a flexural test, is a method used to determine the behavior of materials under bending loads and their flexural strength properties.

1. Objectives

- ✓ Determination the deflection (δ)
- ✓ Determination the mechanical properties of materials by studying the relationship between the applied load (P) and the deflection (δ)

2. Test methods (Types of bending test)
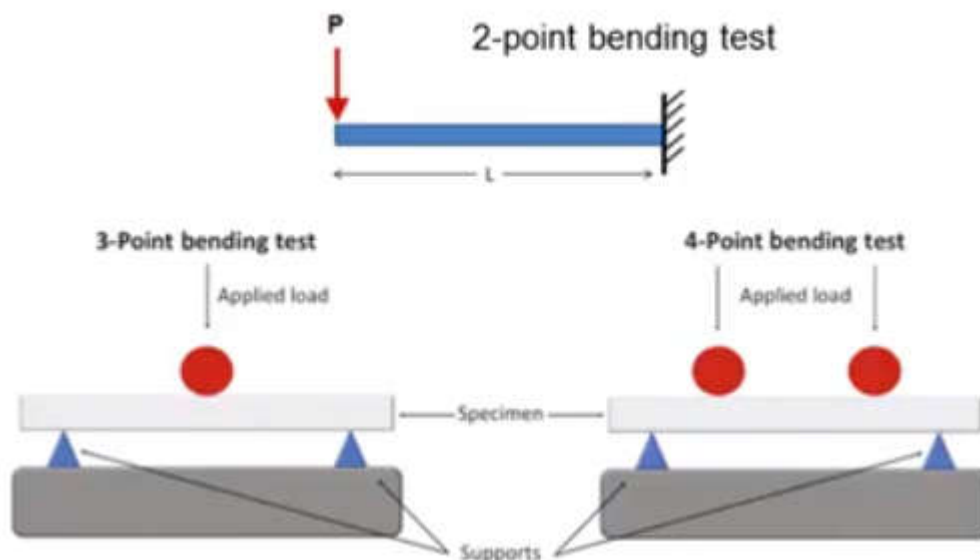
3. Laboratory Equipment Description

Bending stand (WP 100) as shown in the below figure; graduated metal ruler; dial gauge; dial gauge holder; flat steel, aluminium and copper ; weight holder for slotted weights (or disc weights); slotted weights; sliding calliper; movable supports for different attachment methods and for varying the lengths of beams to be studied.

4. Principle of the test

A flat bar resting on two simple supports. The bar is bent by a force acting at its centre. The experimental deflection is measured using a dial gauge. The modulus of elasticity is determined from the bending and geometric data of the bar.

Table 1: Modulus of elasticity (given by common tables) for various materials

Material	Steel	Aluminium	Copper
E (N/mm²)	200000	70000	125000

WP 100
Deformation of bars under bending or torsion
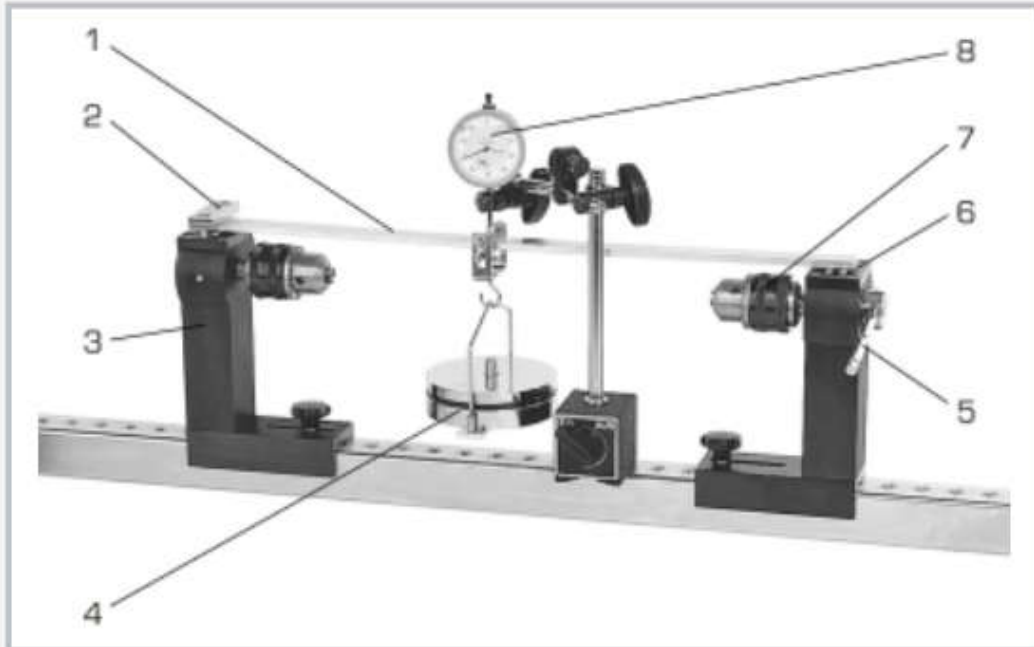
1 beam, 2 clamp fixing for bending test, 3 support block, 4 weight, 5 device to generate the twisting moment in the torsion test, 6 support for bending test, 7 clamping chuck for torsion test, 8 dial gauge

L

b

h

Compression

Fibres shorter

Fibres longer

Tension

Neutral axis N/A

$o \leq y \leq h/2$
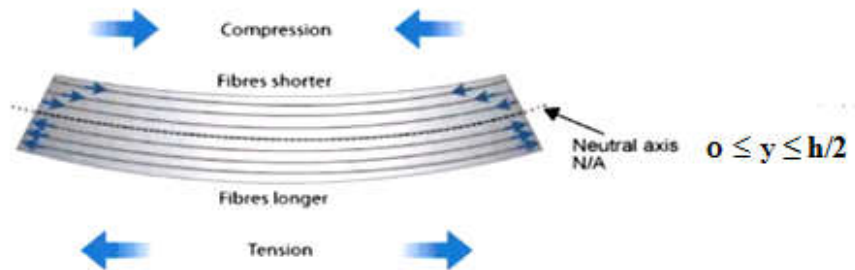
Sample of test

4. Governing Equations

Bending moment: $M = P\,L/4$

Bending stress: $\sigma = M\,y/I$

Moment of inertia: $I = b\,h^3/12$

Theoretical maximum deflection: $\delta_{\max\,(\text{th})} = P\,L^3/48\,E\,I$

References

Guerira B.2017. Polycopie de résistance des matériaux pour dexieme année tronc commun, Univrsité de Biskra

Website: https://www.gunt.de