ASTR15 Plastic Bending of Beams
橫樑之塑性彎曲

Features:

- Introduces students to plastic theory and limit state design
- High-quality structures teaching module for students of mechanical, civil and structural engineering
- Allows safe and practical experiments into plastic bending of beams
- Realistic and verifiable experiment results
- Optional AII Structures Software package for extra, 'virtual' experiments, that simulate and confirm the results from your hardware and allow extended experiments
- One of many interchangeable experiment modules from AII modern, flexible and cost-effective structures teaching system
- Ideal for classroom demonstrations, or students working in pairs or small groups

- Optional ASTR2000 unit with AII Structures Software package for automatic data acquisition and virtual experiments

Description:

The experiment hardware fits onto a Structures Test Frame (ASTR1, available separately). Students fix a specimen beam in chucks at both ends of a backboard. The chucks can either clamp the beam (encastré fixing), or hold it on a knife-edge. The students then load the beam using a screw mechanism and electronic load cell.

The load cell connects to a Digital Force Display (ASTR1a, available separately) which displays the load as the beam deforms. A long-travel digital deflection indicator on the backboard measures specimen deformation. To

compensate for the specimen shortening as it deforms, one of the chucks moves along the backboard, relative to the deformation.

Students continue to apply a load until the specimen beam is in the fully plastic condition, that is, the beam has undergone plastic collapse. They then compare the beam behaviour with theoretical predictions based on traditional yield stress theory.

The lecturer guide provides details of the equipment including sample experiment results. The student guide describes how to use the equipment and gives experiment procedures.

For extra 'virtual' experiments, AII can supply the optional AII Structures Software (ASTRS), for use on a suitable computer. The virtual experiments simulate the tests you can perform with the hardware. They also extend the choice of tests beyond that available using only the hardware, for example: higher loads, uniform loads or different test specimens. This extends the student's learning experience.

For automatic data acquisition of your experiment results, AII can supply the optional Automatic Data Acquisition Unit (ASTR2000). Supplied as standard with the ASTR2000 is AII Structures Software that displays and logs your experiment results and gives the extra virtual experiments.

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Specification:

- Standard Features
  - Supplied with Lecturer Guide and Student Guide
  - Two-year warranty
  - Made in accordance with the latest European Union directives

- Essential Ancillaries
  - Structures Test Frame (ASTR1)
  - Digital Force Display (ASTR1a)

- Experiments
  - Relationship between load and deflection for beams loaded to the plastic condition
  - Introduction to form factor
  - Introduction to limit state design
  - Relationship between maximum loading and plastic hinge formation for a simply supported beam, a propped cantilever and a fixed beam

- Recommended Ancillaries
  - Specimen Beams Pack (ASTR15A) Structures Software (ASTRS) for virtual experiments **or**
  - Automatic Data Acquisition Unit (ASTR2000) for automatic data acquisition and virtual experiments

- Operating Conditions
  - Operating environment: Laboratory environment
  - Storage temperature range: –25°C to +55°C (when packed for transport)
  - Operating temperature range: +5°C to +40°C
  - Operating relative humidity range: 80% at temperatures < 31 °C decreasing linearly to 50% at 40°C

- Specifications
  - Nett dimensions and weight: 880 mm x 190 mm x 70 mm and 9.5 kg
  - Packed dimensions and weight: Approximately 0.12 m3 and 11.5 kg
  - Specimen beams: Three (8 mm x 8 mm x 860 mm)
  - Specimen beam material: Fully annealed mild steel
  - Load application: 500 N electronic ring load cell
  - Accessories: Vernier, rule, lead to connect to a Digital Force Display