



## ASTR18 Frame Deflections and Reactions

### 結構變形及反作用力



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

#### Features:

- For studying rectangular portals subjected to vertical loads
- High-quality structures teaching module for students of mechanical, civil and structural engineering
- Allows safe and practical experiments into frame deflections and reactions
- Realistic and verifiable experiment results
- Optional All 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 All modern, flexible and cost-effective structures teaching system
- Ideal for classroom demonstrations, or students working in pairs or small groups

### Description:

The experiment hardware fits onto a Structures Test Frame (ASTR1, available separately). The hardware includes two rectangular portal frames with the same dimensions. However, one of the frames has a constant second moment of area, while the other has one leg with a smaller second moment of area.

Students clamp each leg of one of the portal frames to supports attached to the test frame. They then load the top of the portal frame using masses on a hanger. Load cells on the supports connect to a Digital Force Display (ASTR1a, available separately). These measure the moment at one end of the portal frame and the horizontal reaction at the other. A digital deflection indicator measures sway at the top of the portal frame.

Students use the results of moments and reactions to plot bending moment diagrams. They compare the bending moment diagrams, the direction of sway (and its causes) to theoretical calculations. They then repeat the experiment using the other portal frame.

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, All can supply the optional All 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, All can supply the optional Automatic Data Acquisition Unit (ASTR2000). Supplied as standard with the ASTR2000 is All 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
- Experiments

Study and comparison of load, horizontal reactions, fixing moments, sway and shear forces in a:

  - rectangular portal with a uniform section; and
  - rectangular portal with a non-uniform section
- Essential Ancillaries
  - Structures Test Frame (ASTR1)
  - Digital Force Display (ASTR1a)
- Recommended Ancillaries
  - 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:  
700 x 610 x 60 mm and 4 kg
  - Packed dimensions and weight:  
Approximately 0.12 m<sup>3</sup> and 6 kg
  - Portal frames:  
Two, of aluminium alloy, nominally 250 mm x 500 mm, one with a uniform section, one with a non-uniform section
  - Load application:  
Five weight hangers and 150 x 10 g masses
  - Accessories:
    - Cable to connect to a Digital Force Display
    - Vernier
    - Rule