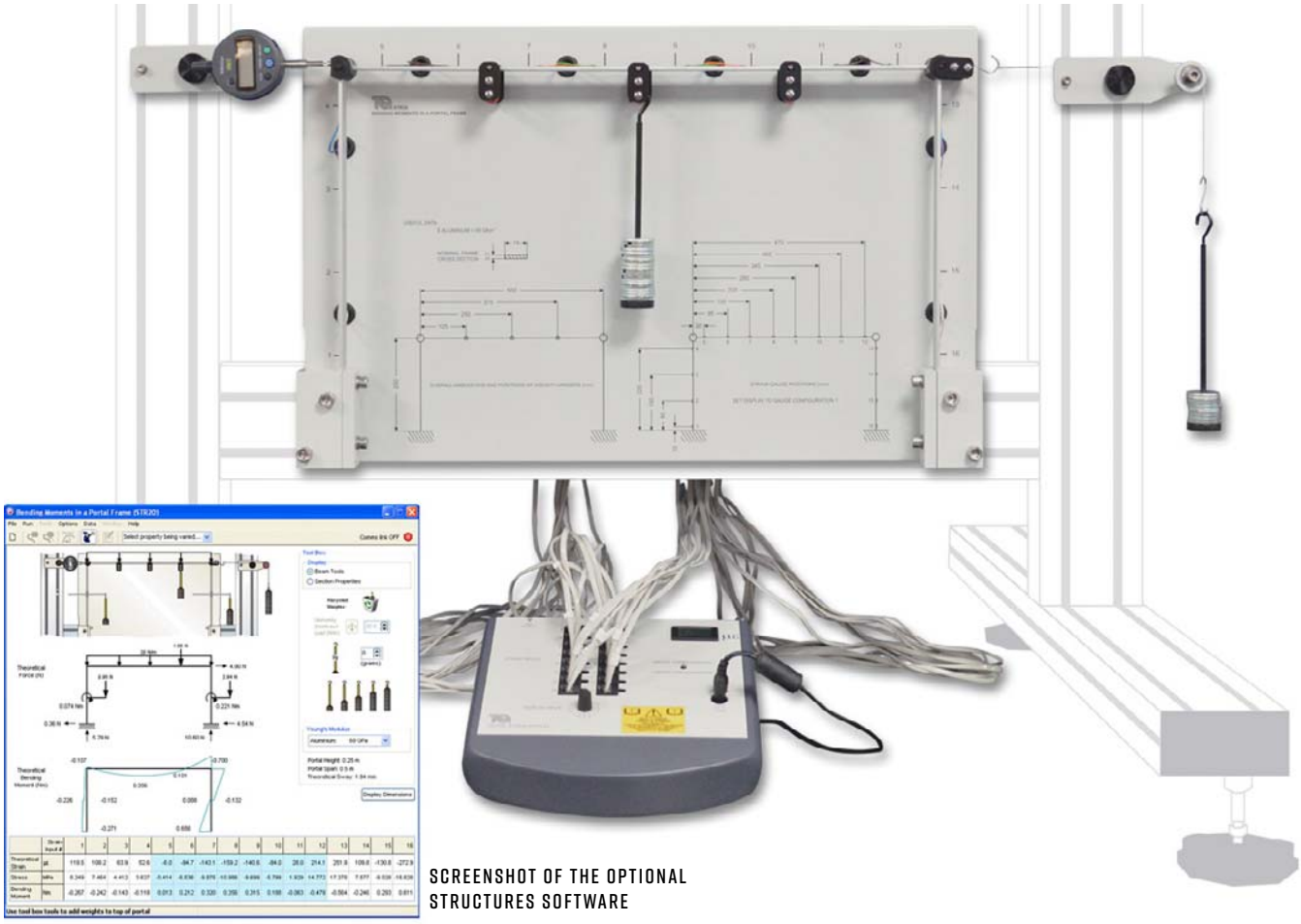
STR20

BENDING MOMENTS IN A PORTAL FRAME

Experiment for the study of bending moments and sway in portal frames. Mounts on the Structures test frame and connects to the Structures automatic data acquisition unit and software.



SCREENSHOT OF THE OPTIONAL STRUCTURES SOFTWARE

KEY FEATURES

- Allows safe and practical experiments into bending moments of a portal frame
- Realistic and verifiable experiment results
- Optional TecQuipment's Structures Software package for extra, 'virtual' experiments, that simulate and confirm the results from your hardware and allow extended experiments
- Optional STR2000 unit with TecQuipment's Structures Software package for automatic data acquisition and virtual experiments
- One of many interchangeable experiment modules from TecQuipment's modern, flexible and cost-effective structures teaching system

LEARNING OUTCOMES

- Strain gauge linearity
- Using strain measurement to find the bending moment
- Bending moments and sway for vertical and horizontal loads
- Bending moments for internal and external moments on vertical members
- Comparison of ideal and non-ideal structures

KEY SPECIFICATIONS

- Five weight hangers and 150 x 10 g masses
- Aluminium portal frame

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DESCRIPTION

The experiment hardware fits onto the Structures Test Frame (STR1, available separately). Students use masses on weight hangers to apply various loads to a portal frame.

A backplate holding the portal fits to the Test Frame. The portal has three members: a horizontal beam and two vertical members or 'legs' joined at two upper corners. All members are of the same material and have the same flexural rigidity (IE value). The backplate holds the bottom of the portal legs to form rigid fixings. The portal has sixteen strain gauges: eight along its horizontal member and four along each vertical member. The gauges connect to the Structures Digital Strain Display (supplied) to display their measured strain.

As students apply loads, they use the measured strain to find the bending moment at the gauge positions and plot them on a diagram. They can then check the diagram against one created from theory.

The hardware includes a digital indicator to measure horizontal deflection (sway) in the portal. It also includes a pulley bracket so students can apply horizontal loads and compare sway direction with that predicted from theory.

The hardware also includes two removable moment arms. Students may fit one or both moment arms to the frame to simulate internal or external floor supports on the sides of a portal structure. Students can find the bending moments caused by these supports and compare with 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, TecQuipment can supply the optional TecQuipment Structures Software (STRS), 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, TecQuipment can supply the optional Automatic Data Acquisition Unit (STR2000). Supplied as standard with the STR2000 is TecQuipment's Structures Software that displays and logs your experiment results and gives the extra virtual experiments.

ESSENTIAL BASE UNIT

- Structures Test Frame (STR1)

RECOMMENDED ANCILLARY

- Automatic Data Acquisition Unit (STR2000) for automatic data acquisition and virtual experiments

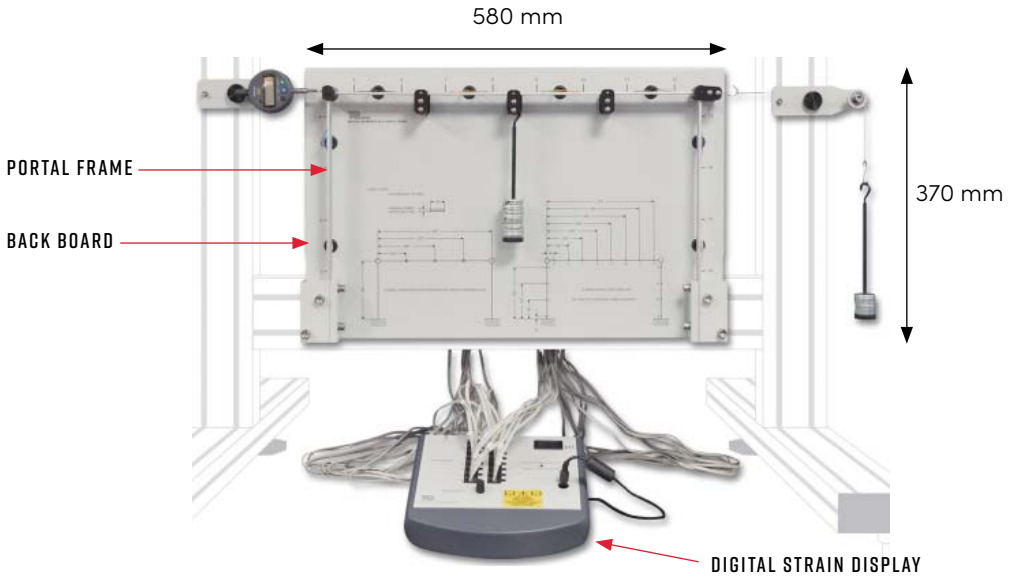
ESSENTIAL SERVICES

ELECTRICAL SUPPLY:

100 VAC to 240 VAC, 1 A, 50/60 Hz, with earth

STANDARD FEATURES

- Supplied with lecturer guide and student guide
- Five-year warranty
- Made in accordance with the latest European Union directives
- ISO9001 certified manufacturer



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OPERATING CONDITIONS

OPERATING ENVIRONMENT:

Laboratory

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

DETAILED SPECIFICATIONS

TecQuipment is committed to a programme of continuous improvement; hence we reserve the right to alter the design and product specifcation without prior notice.

NETT DIMENSIONS AND WEIGHTS:

Portal frame and back panel: 580 mm x 370 mm x 90 mm and 8 kg

Digital strain display: 230 mm x 230 mm x 50 mm and 1.25 kg

Loads: 1.5 kg

Accessories: 0.5 kg

PACKED DIMENSIONS AND WEIGHT:

Approximately 0.07 m^3 and 15 kg

LOADS:

5 weight hangers and 150 x 10 g masses

PORTAL FRAME:

Aluminium 500 mm x 250 mm
Nominal member dimensions 19 mm x 3.2 mm

ACCESSORIES:

Vernier gauge, hexagon tools (Allen keys) and rule.
Horizontal loading cord with hooks.