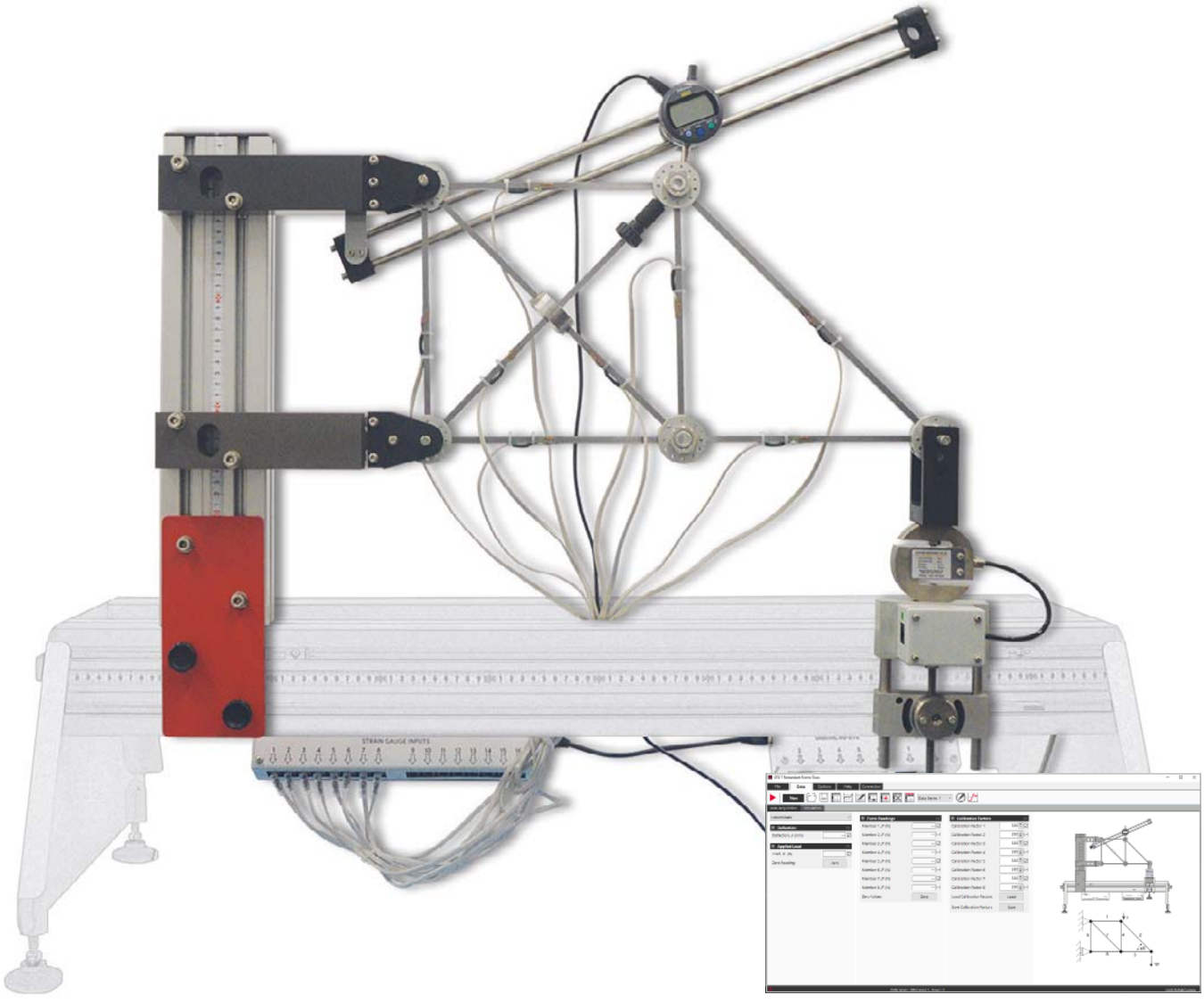
REDUNDANT TRUSS

VDAS® ONBOARD STS17

Experiment for the study of determinate and indeterminate truss structures. Mounts on the Structures platform and connects to the Structures automatic data acquisition unit and software (VDAS® Onboard).



SCREENSHOT OF THE VDAS® SOFTWARE

KEY FEATURES

- One of a range of experiment modules that teach structures principles
- Fits to the Structures platform for ergonomic use and space-saving storage
- Excellent introduction to statically indeterminate structures
- Strain gauge amplifier and multiple strain gauges for measurement of force in each member of the truss
- Simple thumbscrew adjustment for easy engagement of the redundant member
- Supplied with a storage tray to keep smaller items safe
- Works with user-friendly software (VDAS®)

TECQUIPMENT LTD, BONSALL STREET, LONG EATON, NOTTINGHAM NG10 2AN, UK
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VDAS® ONBOARD STS17

DESCRIPTION

One of a range of experiment modules that fit to the Structures platform (STS1, available separately), this product helps students to understand the analysis of statically determinate and indeterminate truss structures made from a number of 'members' held together by joints at their ends. Two supports hold the truss. One support allows rotation only and the other allows rotation and translation. Students apply a load to the truss at the free end Joint Boss. Strain gauges on each truss member measure the forces due to the load. A precision indicator measures the framework deflection due to the load. A hand-operated load cell assembly applies and measures the load. A simple thumbscrew engages and disengages an extra 'redundant' member.

Students apply loads to the truss initially without the extra 'redundant' member engaged. This frame is stable and statically determinate (can be solved by static equilibrium). They then engage an extra 'redundant' member, making the frame statically indeterminate, requiring a more advanced analysis such as the strain-energy method. Students may measure the deflection of the frame for both cases and compare.

Students use textbook equations and methods to predict the forces in each 'member', comparing them with the measured results. This helps confirm the reliability of the textbook equations and the accuracy of the experiment results.

The strain gauges connect to a strain gauge amplifier, which connects (with the load cell) to the interface hub of the Structures platform for computer display and data acquisition (VDAS® Onboard).

STANDARD FEATURES

- Supplied with comprehensive user guide
- Five-year warranty
- Made in accordance with the latest European Union directives
- ISO9001 certified manufacturer

LEARNING OUTCOMES

- Strain gauges as instruments
- Forces within and deflections of a truss structure that is statically:
  - determinate
  - indeterminate
- Member forces by the method of joints and method of sections
- Member forces by the use of the strain/energy method
- Advantages and disadvantages of both versions of the truss

ESSENTIAL ANCILLARY

- Structures Platform (STS1)

SOFTWARE

TecQuipment has created data acquisition applications (VDAS® Onboard) for each experiment module, with additional simulated experiments.

The simulated experiments allow students to simulate the hands-on laboratory experiments, verifying their results. They also allow simulation of alternative setups, such as frame members of different cross-section and material, extending the learning experience beyond the practical laboratory session.

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

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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.

DIMENSIONS AND WEIGHT:

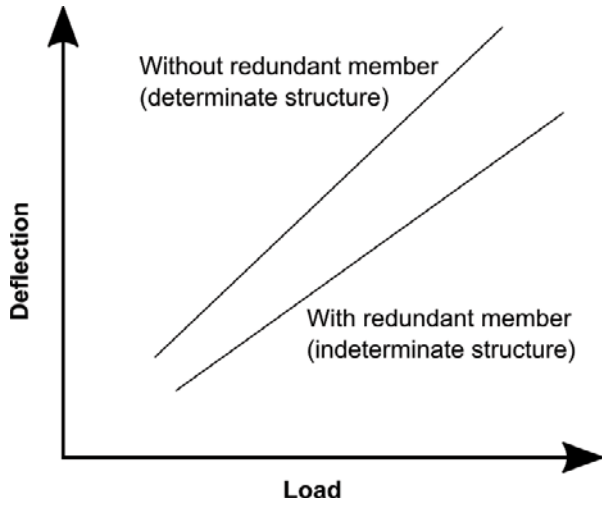
- Nett (assembled): 760 mm long x 130 mm front to back and 760 mm high and 15 kg
- Approximate primary packed (with storage tray): 0.06 m^3 and 17 kg

SPACE NEEDED:

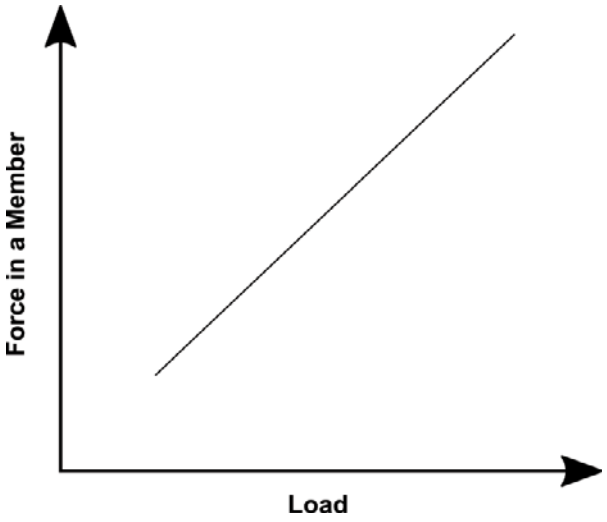
- 1500 mm x 600 mm, level bench or desk

ITEMS INCLUDED:

- Strain gauge amplifier, 16 input
- Pinned and roller supports
- Additional upright
- Trammel arm with digital indicator of resolution 0.001 mm
- Load cell of maximum capacity 650 N
- Pre-assembled truss of five joint bosses and eight square-section members
- Three cables
- Inclinometer
- Hexagon tools for fixings
- Storage tray
- Comprehensive user guide



TYPICAL RESULTS COMPARING DEFLECTION WITH AND WITHOUT THE REDUNDANT MEMBER



TYPICAL RESULTS COMPARING FORCE IN A FRAME MEMBER WITH LOAD

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