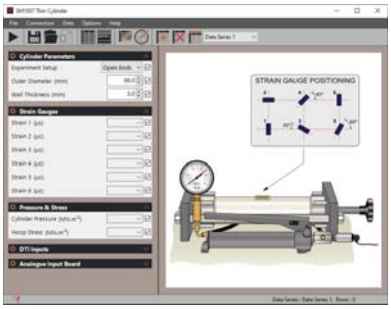
THIN CYLINDER

VDAS® SM1007

Benchtop machine to allow students to perform stress and strain tests on a thin walled cylinder. Introducing Mohr's circle and Poisson's ratio.



SCREENSHOT OF THE OPTIONAL VDAS® SOFTWARE

KEY FEATURES

- Ideal for student use and classroom demonstrations
- For comprehensive analysis of the stresses and strains in a thin-walled cylinder, under internal pressure
- Introduces stress and strain, and how to measure and analyse them
- Includes experiments to find Young's modulus and Poisson's ratio
- Closed-end and open-end conditions to allow circumferential or biaxial stress tests
- High-quality electrical-resistance precision strain gauges measure cylinder strains
- Includes built-in microprocessor-controlled display of strain measurements
- Mounted on a sturdy base, to form a compact product ideal for use on a workbench
- Self-contained, hand-operated hydraulic pressurising system for accurate pressure control
- Completely self-contained, needs no other parts

TECQUIPMENT LTD, BONSALL STREET, LONG EATON, NOTTINGHAM NG10 2AN, UK
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TECQUIPMENT

THIN CYLINDER

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DESCRIPTION

TecQuipment's Thin Cylinder apparatus allows students to perform experiments that examine stress and strain in a thin-walled cylinder. It clearly shows the principles, theories and analytical techniques, and provides effective, practical support to studies.

A sturdy base contains all parts of the Thin Cylinder apparatus. This forms a compact product, ideal for use on a workbench.

A thin-walled, oil-filled aluminium cylinder held in a robust frame so that the cylinder is free to move along its axis. The cylinder is stressed using a hydraulic handpump to pressurise the oil. Strain gauges on the cylinder surface measure strain, and a gauge and electronic sensor measure hydraulic pressure.

Students can measure strains with the cylinder in two 'end conditions':

- Open end: the cylinder has no axial load, so there is no direct axial stress.

  OR

- Closed end: the cylinder has axial loads, so there is direct axial stress.

Students use a hand-wheel on the frame to set these end conditions.

To perform experiments, students choose either closed or open-end conditions. They set the gauges to zero and use the pump to pressurise the cylinder. They take readings at several stages while they increase the pressure. The results can be taken by hand using the in-built display and pressure gauge, and results plotted by hand. Alternatively, students can use TecQuipment's optional Versatile Data Acquisition System (VDAS®) to capture the data and plot the relevant graphs and export data. They then compare their results with calculations made using stress and strain theory.

A user guide is supplied with the Thin Cylinder apparatus. The guide includes full details of the equipment, detailed experiment procedures, theory and results.

For quick and reliable tests, TecQuipment can supply VDAS® which gives accurate real-time data capture, monitoring and display, calculation and charting of all important readings on a computer (computer not included).

STANDARD FEATURES

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

LEARNING OUTCOMES

Investigations into stresses and strains in a thin cylinder, to give students an understanding of:

- Longitudinal stress, hoop (or circumferential) stress, radial stress and biaxial stress
- The behaviour of the cylinder under both open and closed-end conditions
- The use of strain gauges
- The stress strain relationship and value of Young's modulus for the cylinder material
- Indirect strain and stress
- The value of Poisson's ratio for the cylinder material
- The use of Mohr's circle to calculate the shear strain at any position in the cylinder
- The use of the 'superposition method' to find the principal strains
- The effect of the biaxial stress system
- Sources of error in their experiments

RECOMMENDED ANCILLARIES

- Bench-mounted version of the Versatile Data Acquisition System (VDAS-B)

ESSENTIAL SERVICES

ELECTRICAL SUPPLY:

Single phase, 90 - 250 VAC, 50 / 60 Hz, 1A

BENCH SPACE NEEDED: 1 m x 0.5 m

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

SOUND LEVELS

The measured sound pressure level of this apparatus is less than 70 dB(A).

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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.

NETT DIMENSIONS AND WEIGHT:

715 mm x 370 mm x 380 mm and 30 kg

APPROXIMATE PACKED DIMENSIONS AND WEIGHT:

0.25 m^3 and 41 kg

OIL:

Shell Tellus S2 M32 or equivalent (supplied with 500 mL spare)

CYLINDER AND RESERVOIR CAPACITY:

Approximately 2 litres

CYLINDER MATERIAL:

Aluminium alloy

PRESSURE:

Displayed by Bourdon gauge, with output for VDAS®

STRAIN:

Measured by electrical resistance gauges and displayed digitally, with output for VDAS®