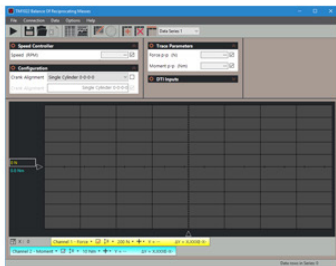




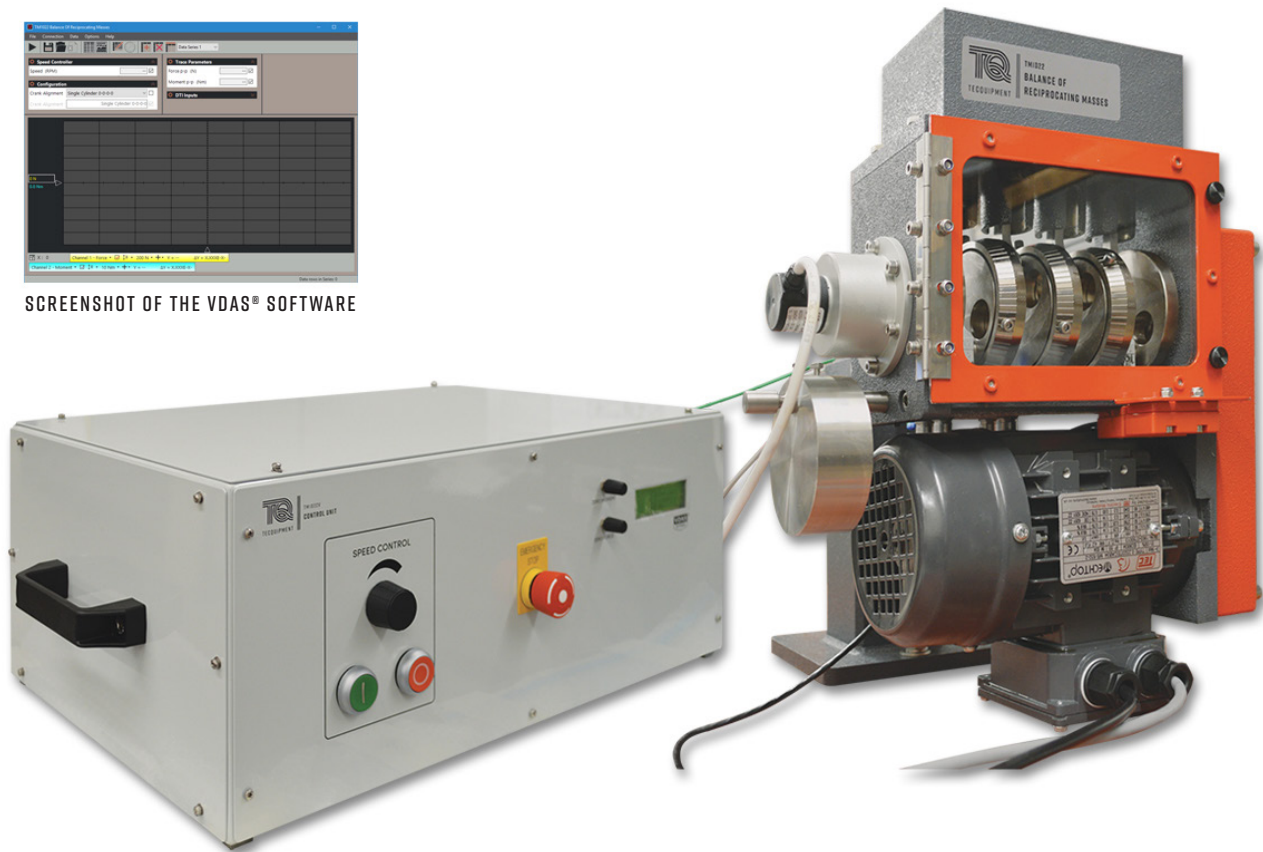
TM1022V

BALANCE OF RECIPROCATING MASSES

Bench-mounted model four-cylinder engine with control and instrumentation unit that demonstrates the primary and secondary forces and moments when balancing reciprocating masses.



SCREENSHOT OF THE VDAS® SOFTWARE



KEY FEATURES

- Model four-cylinder engine assembly held on a cantilever supported on a bench-mounted pillar
- Includes a control and instrumentation unit to process the force and moment signals – this unit also has an electronic drive control, to adjust and display the engine speed accurately
- Shows both primary and secondary forces and moments and how to balance them
- Simulates one-, two- and four-cylinder engines
- Variable crank angle settings and additional piston masses – for a range of tests
- Highly visual – ideal for classroom demonstrations
- TD1022V comes with VDAS® On Board featuring data acquisition via USB
- VDAS® data acquisition works with software to show dynamic force and moment waveforms for popular engine arrangements and compare them with theory



BALANCE OF RECIPROCATING MASSES

DESCRIPTION

A bench-mounting model four-cylinder engine that shows primary and secondary forces and moments in reciprocating masses and how to balance them. This product is an excellent follow-on from the Static and Dynamic Balancing equipment (TM1002).

A robust support pillar fixes to a suitable table or bench (not supplied) with a low natural frequency. The pillar holds a cantilever that holds a model four-cylinder engine. The model engine has a crankshaft, connecting rods, bushes (as big-end bearings), pistons and a cylinder block. A separate control and instrumentation unit (included) controls a motor that turns the engine crankshaft.

The crankshaft has adjustable sections. Students can rotate each section relative to the others to change the crank angles.

The crankshaft includes a sensor that works with the control and instrumentation unit to measure and display engine speed. It also helps to give a trigger output at top dead centre of the first piston.

The supporting pillar fixes to a workbench, so the engine's centre of mass is on the cantilever axis. Strain gauges on the cantilever detect the bending and torsional strains. The gauges connect to VDAS® On Board. A USB cable (supplied) connects from the back of the unit to a suitable PC (not supplied) running TecQuipment's VDAS® software that captures, records and displays data.

Students first find the engine's resonant speeds. They then experiment with different engine arrangements to understand balancing and how to allow for unbalanced reciprocating masses.

A hinged transparent guard with a safety interlock protects students from the moving crankshaft.

STANDARD FEATURES

- Supplied with comprehensive user guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives
- An ISO 9001 certified company

LEARNING OUTCOMES

- Primary and secondary forces and moments in popular engine configurations - one, two and four-cylinder
- Primary and secondary forces and moments for different crank settings
- Comparing measured force and moment wave forms with theoretical results

VDAS® SOFTWARE

PC running Windows 7 or newer, required for optional VDAS® software

ESSENTIAL SERVICES

BENCH SPACE NEEDED:

1000 mm x 1000 mm (allowing for the oscilloscope)

NOTE: The bench must be strong and heavy and have a low natural frequency.

ELECTRICAL SUPPLY (TM1022) (SPECIFY ON ORDER):

Single phase, 220 - 240 VAC, 50 / 60 Hz, 1.5 Amp

OR

Two phase, 220 - 240 VAC, 50 /60 Hz, 1.5 Amp

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

Less than 70 dB(A) in normal use

SPECIFICATIONS

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

NETT DIMENSIONS AND WEIGHTS:

Engine, support pillar and cantilever: 35 kg

Dimensions of the engine, pillar and cantilever when fixed to a suitable table: 400 mm x 300 mm x 410 mm

Control and instrumentation unit: 620 mm long x 225 mm high x 370 mm wide and 14 kg

PACKED DIMENSIONS AND WEIGHT (TOTAL):

0.16 m³ and 50 kg