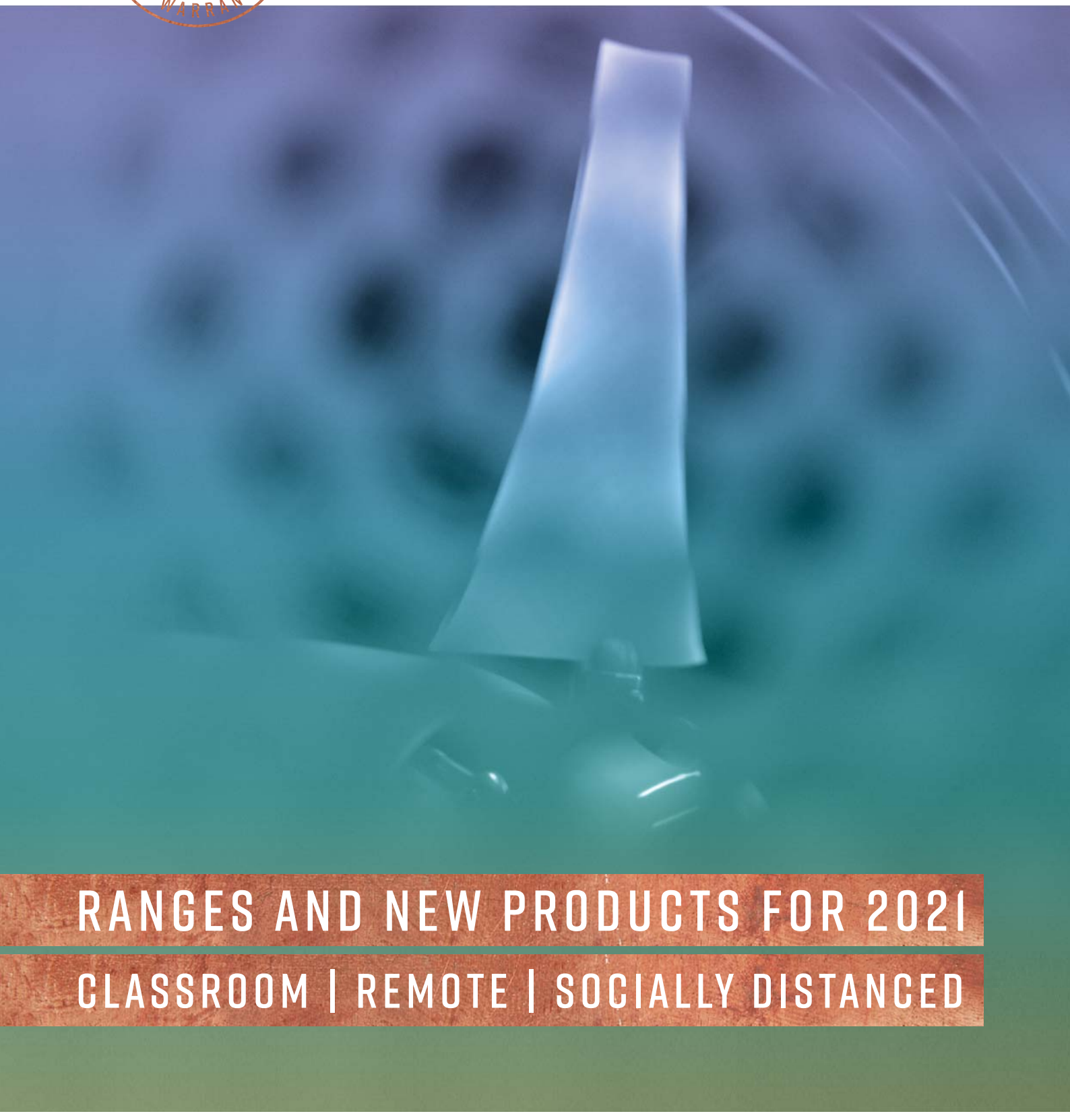
FIVE YEAR QUALITY TECQUIPMENT SINCE 1958 WARRANTY

TECQUIPMENT ACADEMIA

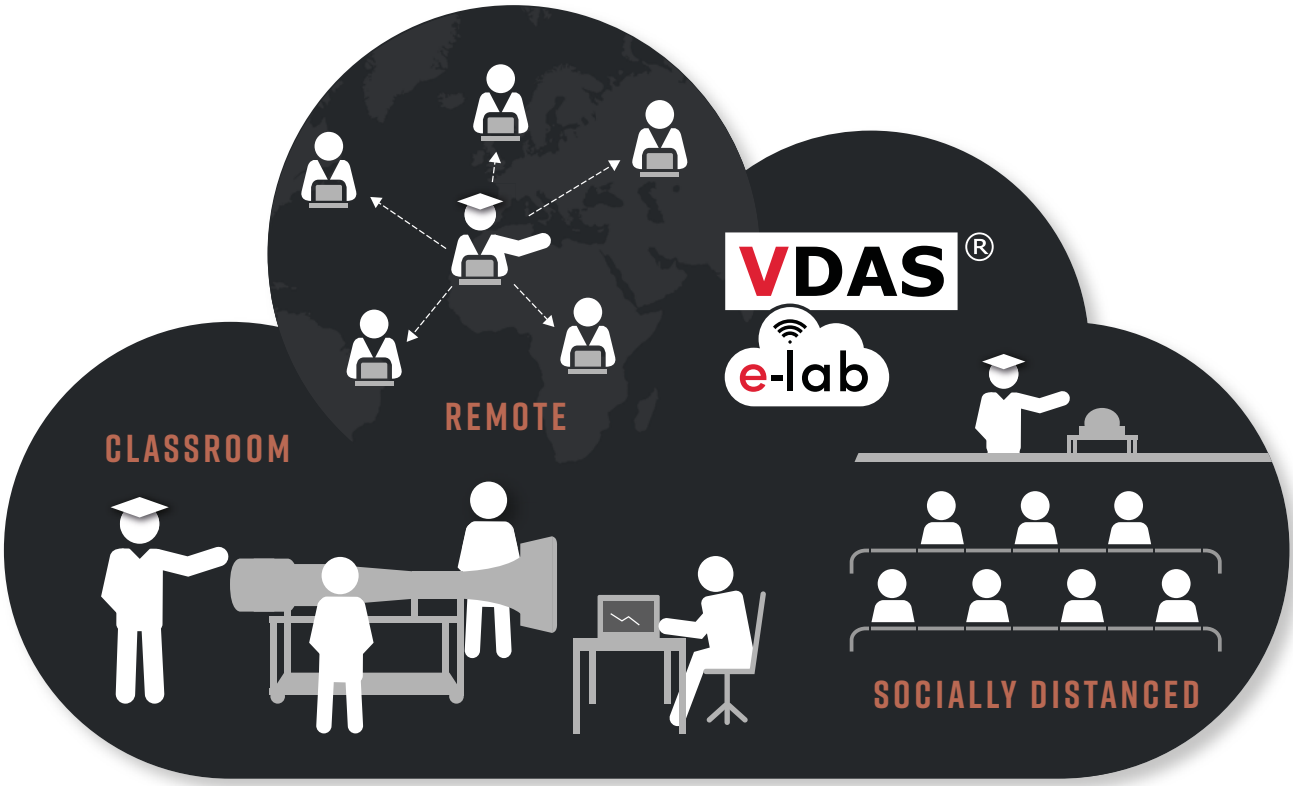


RANGES AND NEW PRODUCTS FOR 2021

CLASSROOM | REMOTE | SOCIALLY DISTANCED

TECQUIPMENT.COM

TEACHING APPARATUS AND SOFTWARE FOR FLEXIBLE TEACHING APPROACHES



CLASSROOM | REMOTE | SOCIALLY DISTANCED

TecQuipment continues to expand its range of practical teaching equipment for engineering disciplines in 2021, with the additional focus on enabling effective remote student engagement with VDAS® products. This allows educational establishments to offer high quality, equal-learning opportunities for all that can adapt to social-mixing restrictions. Giving the flexibility to engage students in laboratory sessions using different formats; whether in traditional close proximity, socially distanced within one room or multiple rooms, or by running experiments streaming remotely to students offsite.

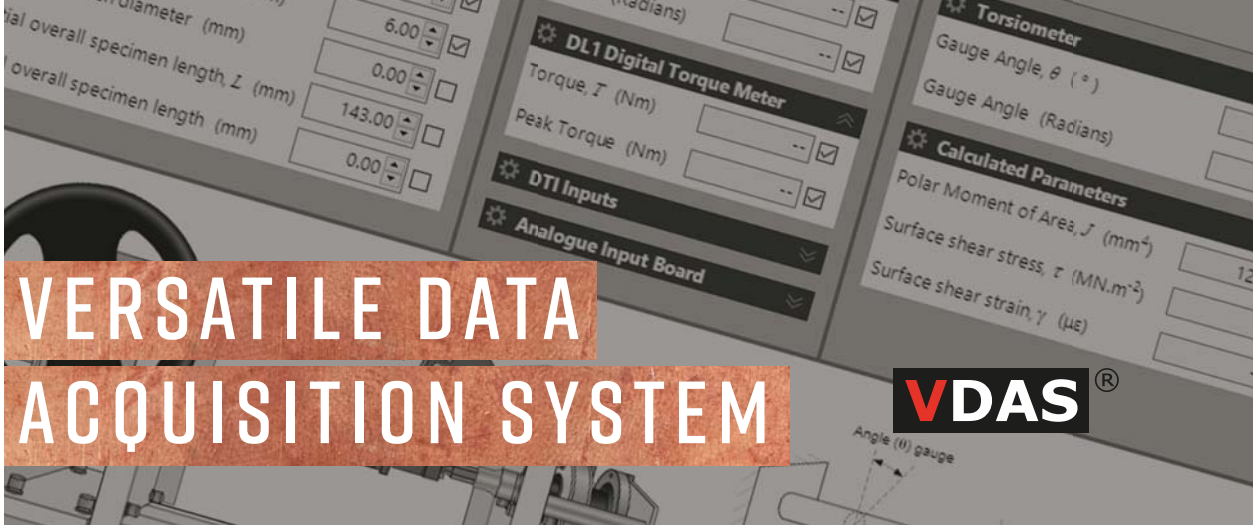
CE

Intertek UKAS MANAGEMENT SYSTEMS 014

CONTENTS

SALES PARTNERS

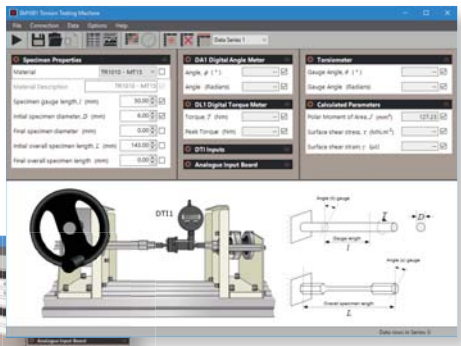
To find the contact details of your local TecQuipment representative, CLICK HERE to go to the interactive map on the TecQuipment website.

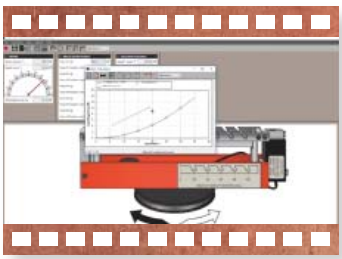


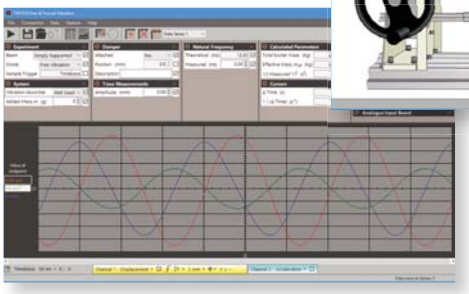
VERSATILE DATA ACQUISITION SYSTEM

VDAS®

VDAS® is a high capacity, accurate, efficient and user-friendly automatic data acquisition hardware and software package that works with a growing list of over 60 TecQuipment products, enabling real-time display and capture of experiment data.







PDF

VDAS® FAMILIARISATION

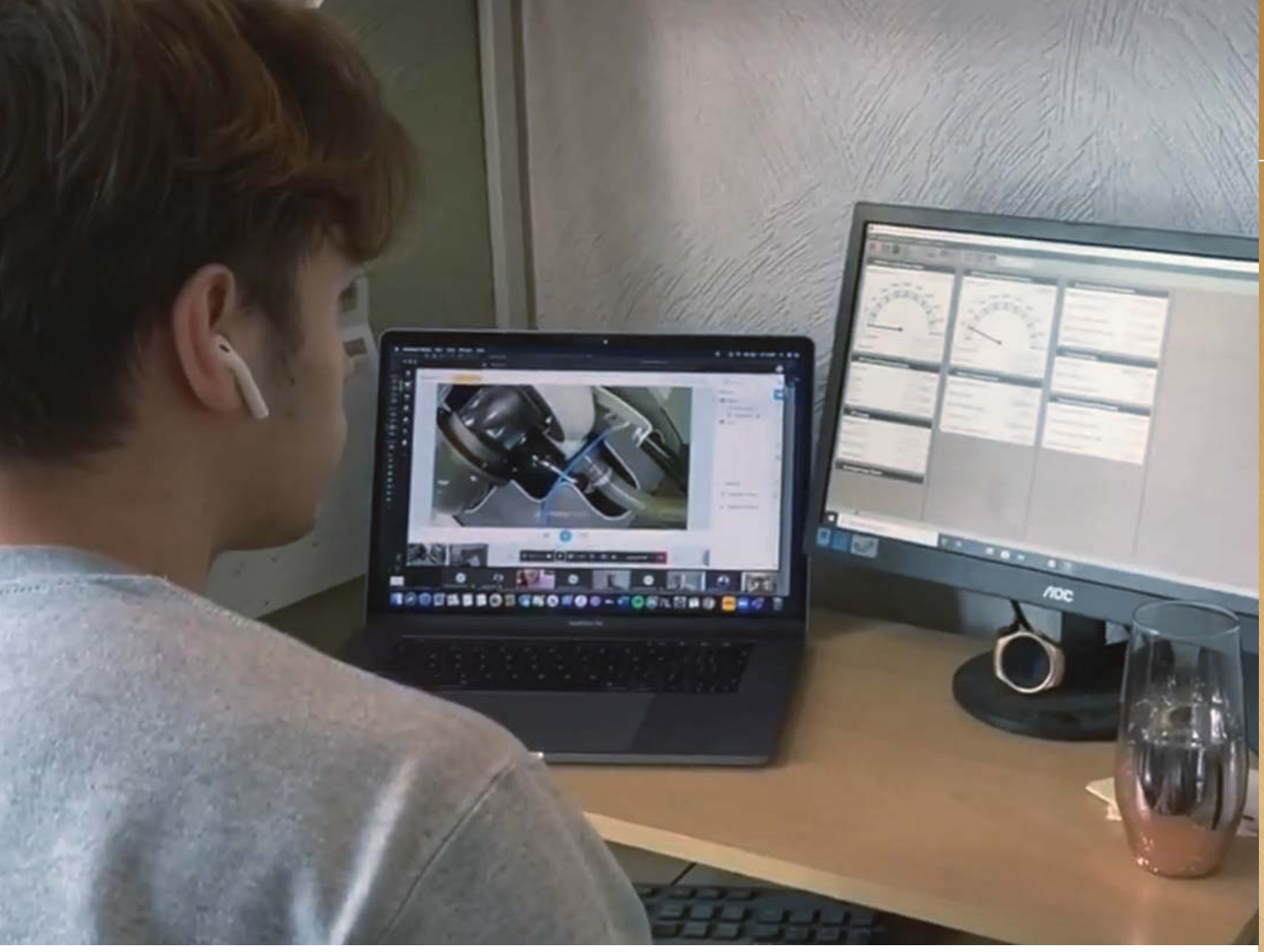
A REMOTE WORKING SOLUTION:

INTRODUCING VDAS® e-lab NEW

VDAS® e-lab is software that works with TecQuipment's VDAS®-enabled products that can be used remotely, allowing students to interactively engage and participate in laboratory experiments for an adaptable, blended learning approach.

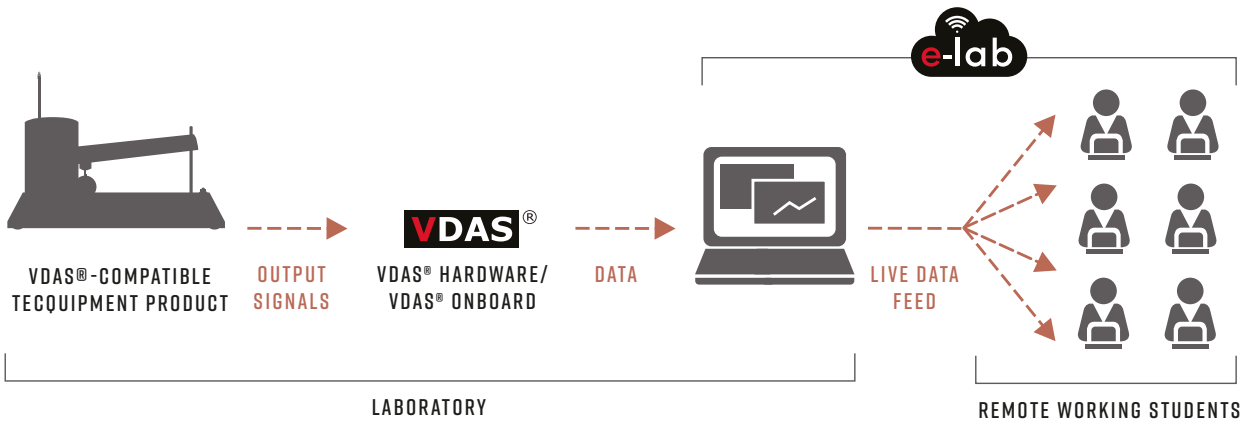
PDF

Live experimental data direct from the laboratory can be processed by an unlimited number of remote students.



- Provides automatic calculation, recording, charting and data export remotely
- An unlimited number of students can simultaneously acquire and process live experiment data remotely from their computer, just as they would in the laboratory
- Students can individually manipulate the experiment data remotely
- Intuitive and easy to use, with clear, customisable display and layout options
- To monitor engagement, the connection status of students are time logged
- Suited to remote classroom demonstrations, laboratory experiments and group work
- Low network bandwidth requirement of 1 Mbps to increase accessibility

For the live streaming of experiments and demonstrations, TecQuipment can also supply the necessary cameras, tripods and fittings - please turn to the following page for more information.



REMOTE VIEW HARDWARE NEW

RVH

Optional selections of cameras, fittings, rods and tripods for use with TecQuipment's VDAS®-enabled products for remote demonstrations to students, both locally and worldwide.

PDF

SMALL TRIPOD

Tripod with flexible legs

LARGE TRIPOD

Adjustable height tripod to 1.5 m

Differing bundles of the following equipment are available:

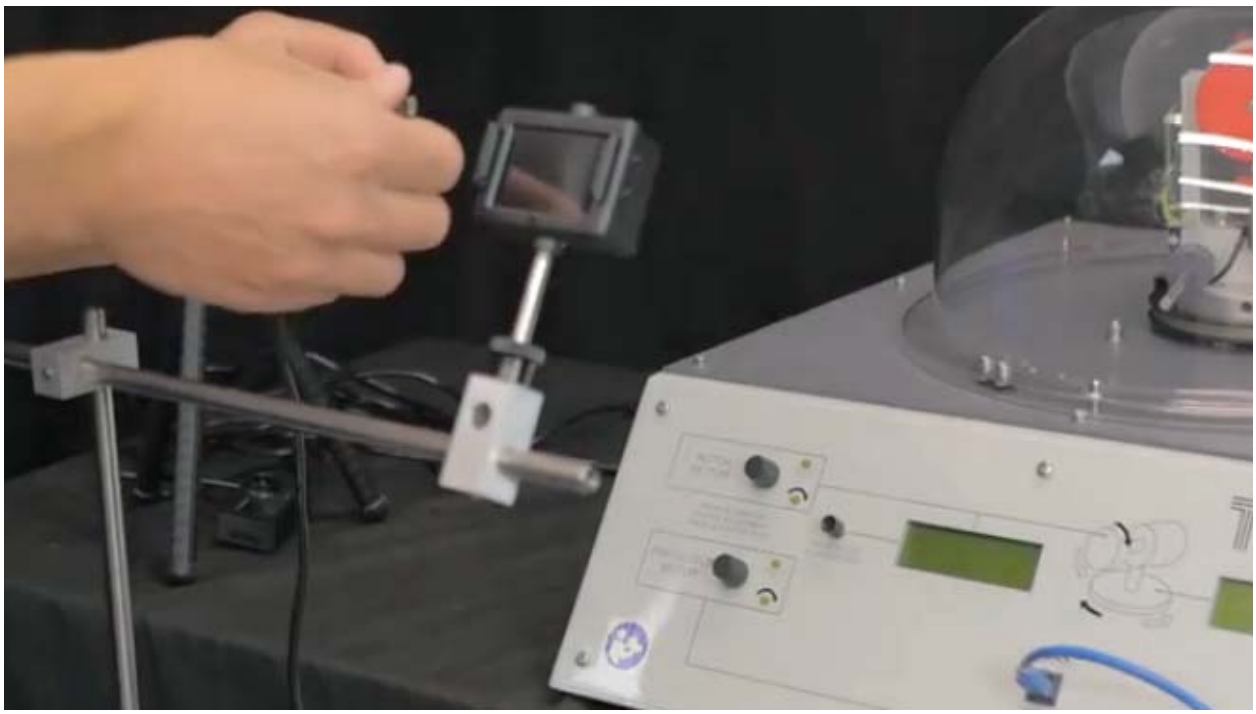
- Cameras and tripods
- Selection of fittings specifically for use with Tecquipment products
- Magnetic base
- Various lengths of rod
- Huge range of possible camera angles
- Hub for multiple cameras

CAMERA

Action camera including various accessories

SELECTION OF FITTINGS AND RODS

Selection of fittings and posts including a strong magnetic base and a heavy base supplied in a sturdy plastic box



ENVIRONMENTAL CONTROL

The Environmental Control range offers teaching equipment covering the fundamental theories associated with thermodynamics, fluid mechanics and heat transfer. This enables students to understand environmental control in the real industrial and consumer world. Experiments allow students to explore the workings of cooling towers, refrigeration, air conditioning and humidity, utilising psychrometric and P-h charts.

FUNDAMENTALS OF HVAC: The range provides the capabilities to study the fundamental components of an HVAC course.

DATA ACQUISITION AS STANDARD: Most products in the range come with TecQuipment's Versatile Data Acquisition System, offering high specification and great value.

INDUSTRIAL AND DOMESTIC: With units covering air conditioning and cooling towers, students can study the elements of both industrial and domestic environmental control.

RANGE HIGHLIGHTS:

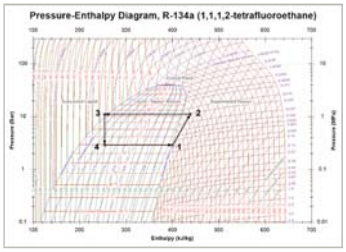
COOLING TOWERS ECI000V

Benchtop apparatus that demonstrates the operation characteristics of an evaporative cooling tower.

SHOWN WITH THE PACKING CHARACTERISTICS COLUMN (ECI000D)

REFRIGERATION CYCLE ECI500V

Benchtop apparatus that allows students to investigate and observe the stages of refrigeration, such as the coefficient of performance, superheat and subcooling.



ADVANCED HVAC & R TRAINER NEW

VDAS® ONBOARD ECI550V

A versatile, floor-standing apparatus for the in-depth study of heating, ventilation, air conditioning and refrigeration (HVAC & R) systems. Facilitates the analysis of individual and combined psychrometric processes commonly used in air conditioning. Also allows study of the vapour compression refrigeration cycle, including the use of pressure enthalpy (P-h) charts.

PDF

BASE UNIT (ECI550V)

- Equipped with variable-flow fan, PID controllers, steam humidifier, variable-flow pump serving water-to-air heat exchanger, high-pressure spray pump, air heaters and variable-flow dampers
- Lights and windows allow the components of each air process to be clearly identified
- Air conditioning processes and vapour compression cycle are fully instrumented
- A control panel allows the adjustment of key components such as air flow velocity, temperature and water flow rate allowing performance comparisons at different set points
- The apparatus reaches stability rapidly after a change in operating conditions allowing the students to investigate multiple air conditioning processes within one laboratory session

SCREENSHOTS OF THE VDAS® SOFTWARE CHARTS CAN BE DOWNLOADED

RECOMMENDED ANCILLARIES:

- Recirculation Duct (EC1550a)
- Environmental Chamber (EC1550c)

CONTINUED OVER PAGE

LEARNING OUTCOMES:

AIR HANDLING UNIT

- Investigation of psychrometrics, definitions, relations and psychrometric charts
- Understanding of an air handling unit's electro-mechanical components and their function
- Investigation of psychrometric processes including:

SINGLE STAGE PROCESSES:

- Sensible heating
- Sensible cooling
- Sensible and latent cooling and dehumidification
- Adiabatic humidification (evaporative cooling via air washer)
- Steam humidification

MULTIPLE STAGE PROCESSES (TYPICAL EXAMPLES):

- Heating and humidification
- Cooling and humidification
- Cooling, humidification and heating
- Observation of the effect of varying the fan speed, pump flow rates and temperature settings for all the above psychrometric processes and combinations
- Calculation of the sensible heat ratio and dew point
- Evaluation of the heat transfer across the water-to-air heat exchanger and the log mean temperature difference (LMTD) driving force

WATER CHILLER

- Understanding of refrigeration components and their function
- Investigation of the vapour compression refrigeration cycle including:
  - Real-time plotting of the P-h thermodynamic cycle for refrigerant R134a
  - Calculation of superheat, subcooling, pressure ratio, saturated evaporating temperature and saturated condensing temperature
  - Calculation of the isentropic efficiency of the compressor
  - Calculation of the heat balance, mass flow rate and theoretical power of the saturation cycle
  - Understanding the effect of suction temperature and condenser temperature on the refrigeration effect and CoP
  - Calculation of the effect of varying the load on the refrigeration cycle
- Determination of the mass flow and energy balance across the refrigeration cycle

BASE UNIT (EC1550V) FITTED WITH THE RECIRCULATION DUCT (EC1550A)

RECIRCULATION DUCT EC1550A

A recirculation duct can be fitted. Air flow through the recirculation unit can be varied via the manually controlled dampers allowing a wide range of experiments.

LEARNING OUTCOMES:

AIR HANDLING UNIT

- Determination of the mass flow and energy balance across the whole unit
- Adiabatic mixing of air streams

ENVIRONMENTAL CHAMBER EC1550C

Complimentary to the air duct, a 2 m^3 environmental chamber can be used to mimic a room. This is designed to accommodate a student, allowing them to stand within an environment conditioned by the EC1550V. They can assess their comfort level and compare this with the calculated mean vote.

BASE UNIT SHOWN WITH THE ENVIRONMENTAL CHAMBER (EC1550C) AND RECIRCULATION DUCT (EC1550A)

LEARNING OUTCOMES:

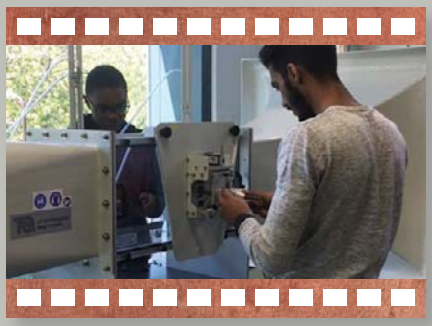
- Investigation of HVAC for human comfort applications – calculation of the Predicted Mean Vote (PMV) and Percentage of People Dissatisfied (PPD)

CASE STUDIES AND BLOG POSTS

From the single installation of a subsonic wind tunnel, to entire engineering laboratories, find out how equipment supplied by TecQuipment has been used in teaching establishments across the world.

More case studies HERE.

BEDFORD COLLEGE EXPANDS PRACTICAL TEACHING FOR CIVIL ENGINEERING AND CONSTRUCTION



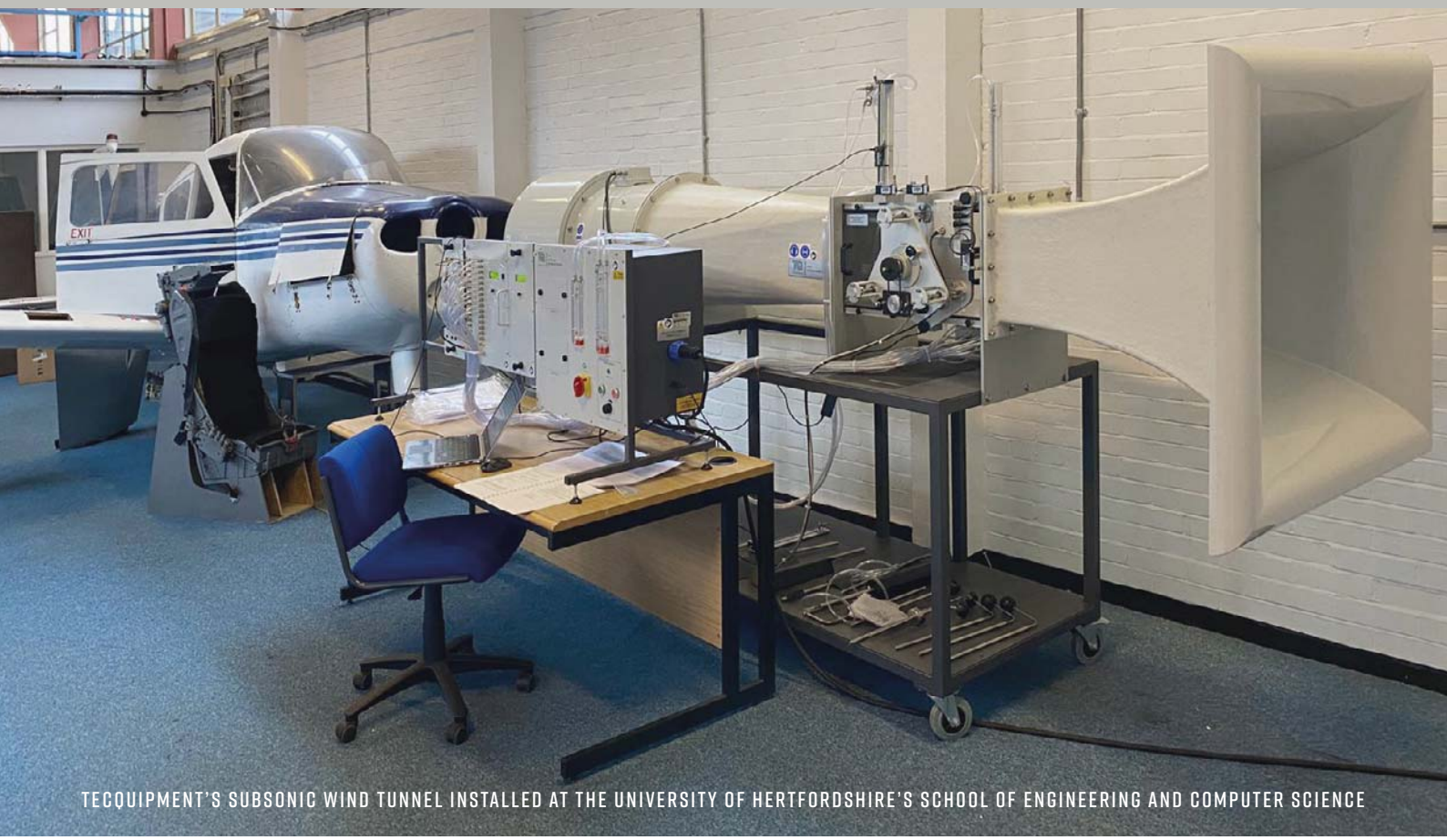
MILTON KEYNES COLLEGE CHOOSES TECQUIPMENT PRODUCTS FOR TEACHING AEROSPACE ENGINEERING

CYCLING AERODYNAMICS AND WIND TUNNEL TESTING

THE IMPLEMENTATION OF CARBON FIBRE IN RUNNING SHOES

Sit back and immerse yourself in the world of engineering education with the latest blog posts from in-house experts and guest authors.

More blog posts HERE.



TECQUIPMENT'S SUBSONIC WIND TUNNEL INSTALLED AT THE UNIVERSITY OF HERTFORDSHIRE'S SCHOOL OF ENGINEERING AND COMPUTER SCIENCE

ALTERNATIVE ENERGY

The Alternative Energy range offers teaching equipment for the core principles of solar and wind energy. Students can learn about the efficiencies and limitations of methods of harnessing and converting solar and wind energy for use in the real world.

PHOTOVOLTAIC, FOCUSING AND FLAT PLATE ENERGY COLLECTION: Demonstrates three key methods used in harnessing solar energy.

AUTOMATIC DATA ACQUISITION: VDAS® is particularly useful when monitoring longer duration experiments.

SAFE AND EASY SET-UP: Low temperatures, safe connections and simple, hand-operated controls allow the safe and quick set up of experiments.

RANGE HIGHLIGHTS:

PHOTOVOLTAIC CELLS TE4

This self-contained, floor-standing mobile unit allows students to investigate and demonstrate the performance characteristics of a typical photovoltaic system, including conversion of light to energy, managing the flow of electricity and battery storage, behaviour of different load units and the use of a solar pyranmometer.

NEW FEATURES

- Light bank that allows you to carry out experiments within the laboratory under controlled conditions.

LEARNING OUTCOMES:

- Understanding the characteristics and performance of photovoltaic panels including open circuit voltage, peak power voltage, current-voltage relationship and panel efficiency
- The effects of environment on photovoltaic panel performance including temperature, inclination angle, level of solar radiation
- Understanding the components and function of components within a standard PV system including the charge controller, batteries and DC-AC converter
- The different modes of battery charging and battery management including “float-mode” charging

FOCUSING SOLAR ENERGY COLLECTOR TE38

Floor-standing mobile apparatus that illustrates the workings of a focusing solar energy collector and allows students to study its performance. Supplied with four sizes of absorber.

PDF

WIND TURBINE DYNAMICS NEW

VDAS® ONBOARD AE1005V

A versatile, compact apparatus for teaching the fundamentals of kinetic wind energy conversion into electrical power. Flexibility is at the core, it has a castor-mounted frame for mobility and functionality and allows students to 3D-print their own blades for advanced experimentation.

PDF

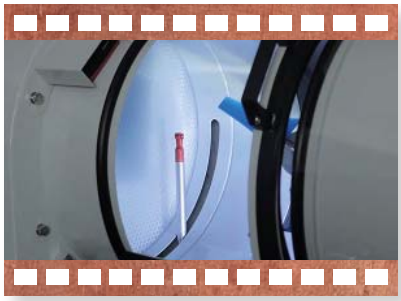
- 70 W turbine with calculated torque and power output
- Motorised blade pitch control
- Yaw control
- Integrated safety guards with solenoid interlock
- Smart shutdown: automatic over speed and over current shutdown
- Uninterrupted Ø400 mm tunnel with a Ø300 mm turbine
- Viewing from both sides of the tunnel for groups

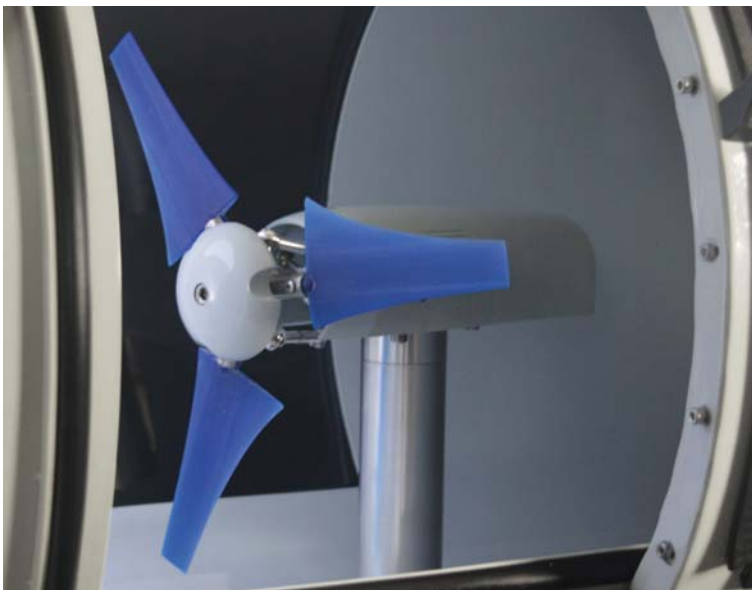
LEARNING OUTCOMES:

Comprehensive demonstration and investigation into the foundations of wind turbine energy conversion including:

- The relationship between turbine speed and wind velocity (TSR)
- Effect of blade pitch on turbine performance
- Effect of yaw angle on turbine performance
- Blade performance characteristics of different profiled blades
- Blade design theory

SCREENSHOT OF THE VDAS® SOFTWARE

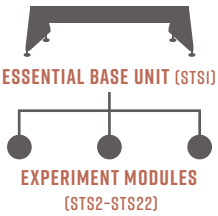




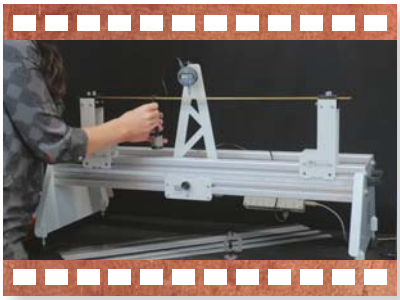
LAPTOP NOT INCLUDED

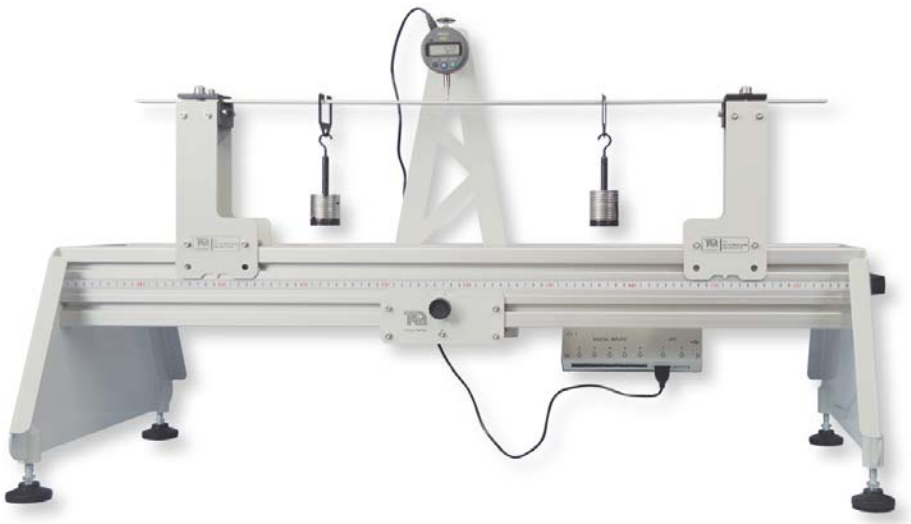
NEXT GENERATION STRUCTURES

The next generation Structures range is compact, robust and offers a clearer demonstration of experiments. It builds on the tried and tested modular technology but is easier to set up and use, taking performance to the next level.



The new benchtop platform-based mounting frame (STS1) is solid and stable, allowing easy viewing of experiments from all angles: perfect for use by groups of students and for longer range viewing in classroom demonstrations.





STS EXPERIMENTS POSTER

VDAS® ONBOARD

The USB interface hub means this entire range has VDAS® Onboard. The hub directly connects to a computer (not supplied) running VDAS® software which accurately simulates all 21 experiment modules without the need of the Structures hardware.

The 21 experiment modules teach basic structural principles relating to beams, bridges, cantilevers, arches, struts, davits, weight, reaction, moment, shear force and torsion.

ARCHES, BRIDGES AND TRUSSES

- Pin Jointed Frameworks (STS8)
- Three-Pinned Arch (STS9)
- Two-Pinned Arch (STS10)
- Fixed Arch (STS11)
- Redundant Truss (STS17)
- Simple Suspension Bridge (STS19)
- Suspended Beam Bridge (STS21)

FAILURE

- Euler Buckling of a Column (STS12)
- Plastic Bending of Beams (STS15)
- Plastic Bending of Portals (STS16)

DEFLECTIONS AND STRESS

- Deflection of Beams and Cantilevers (STS4)
- Bending Stress in a Beam (STS5)
- Continuous and Indeterminate Beams (STS13)
- Curved Bars and Davits (STS14)
- Frame Deflections and Reactions (STS18)

MOMENTS

- Bending Moments in a Beam (STS2)
- Shear Force in a Beam (STS3)
- Bending Moments in a Portal Frame (STS20)
- Equilibrium of a Simply Supported Beam (STS22)

TORSION

- Torsion of Circular Sections (STS6)
- Unsymmetrical Bending and Shear Centre (STS7)

BENDING MOMENTS IN A BEAM NEW

VDAS® ONBOARD STS2

Experiment that illustrates and proves the basic theory of bending moments in a beam. Mounts on the Structures platform and connects to the Structures automatic data acquisition unit and software (VDAS® Onboard).

- Unique beam 'cut' and load cell system for an accurate measurement of bending moment
- Includes multiple loads for many combinations of loads including uniformly distributed loads (UDLs)
- Direct reading of bending moment at the 'cut' for quick and simple experiments

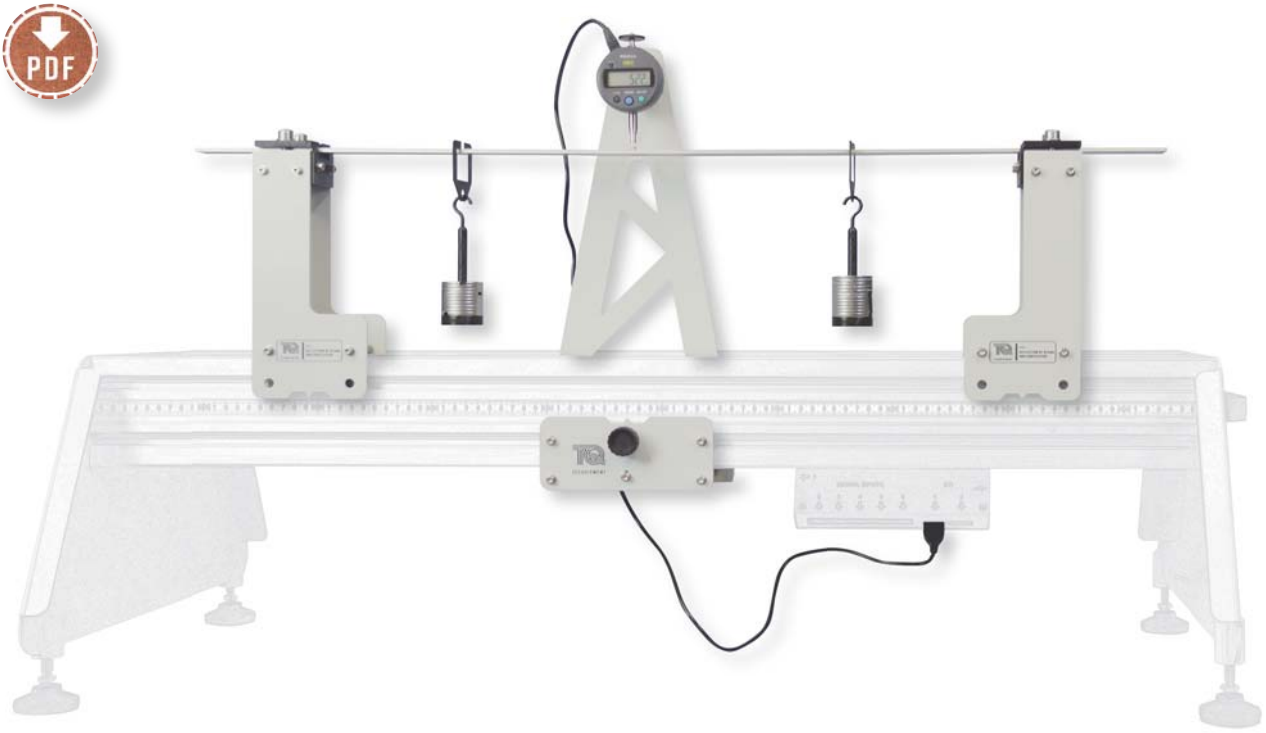
LEARNING OUTCOMES:

- Bending moment at the cut due to a varying single point load
- Bending moment at the cut due to a moving single point load
- Bending moment at the cut due to a uniformly distributed load
- Influence lines and superposition

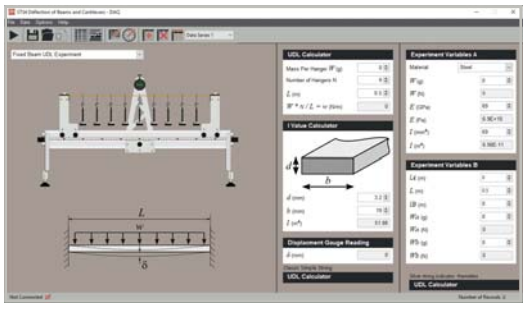
DEFLECTION OF BEAMS AND CANTILEVERS NEW

VDAS® ONBOARD STS4

Experiment for the study of beam deflection under different loads and fixing conditions, and the demonstration of Young's modulus. Mounts on the Structures platform and connects to the Structures automatic data acquisition unit and software (VDAS® Onboard).



- Selectable beam fixing conditions, with fully adjustable load and deflection measuring positions for increased experiment range
- Includes beams of different material and cross-section for comparison of elastic (Young's) modulus and Second Moment of Area (I value)
- High-resolution digital deflection indicator for maximum measurement accuracy



LEARNING OUTCOMES:

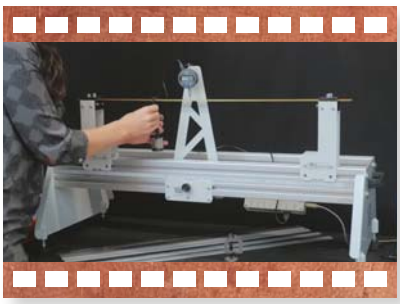
- Beam bending formula and structural 'stiffness'
- Deflection due to point loads and UDLs (uniformly distributed loads)
- How beam fixings affect deflection of:
  - Simply supported beams
  - Fixed or 'encastre' beams
  - Cantilever beams
  - Propped cantilever
- Shape of a deflected beam
- Beam length and deflection
- Beam material and deflection: the elastic (Young's) modulus
- Beam cross-section and deflection: the Second Moment of Area (I value)
- Pure bending of a beam
- Reciprocal theorem (Maxwell-Betti)

BENDING STRESS IN A BEAM NEW

VDAS® ONBOARD STS5

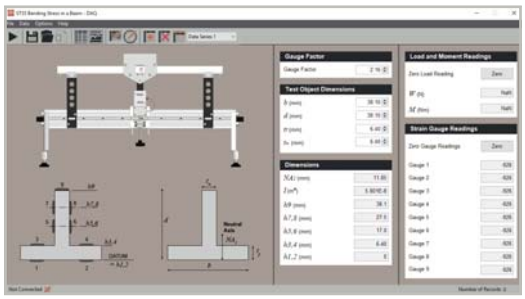
Experiment for the study of stress distribution across the section of a beam. Mounts on the Structures platform and connects to the Structures automatic data acquisition unit and software (VDAS® Onboard).

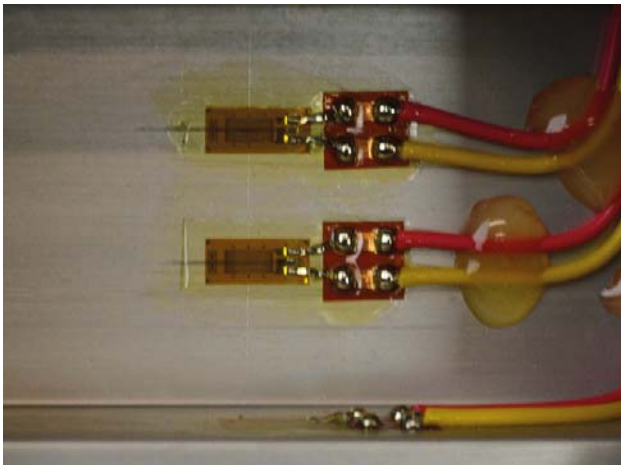
- Strain gauge amplifier and multiple strain gauges for a complete measurement of strain at different positions around the beam section
- T-section beam for stability, with an offset neutral axis



LEARNING OUTCOMES:

- Stress and strain relationship
- Strain gauges as instruments
- Finding the neutral axis by experiment and calculation
- How the beam cross-section dimensions affect the second moment of area (*I* value) and neutral axis





TORSION OF CIRCULAR SECTIONS NEW

VDAS® ONBOARD STS6

Experiment for the study of torque and deflection in different materials with circular section. Mounts on the Structures platform and connects to the Structures automatic data acquisition unit and software (VDAS® Onboard).

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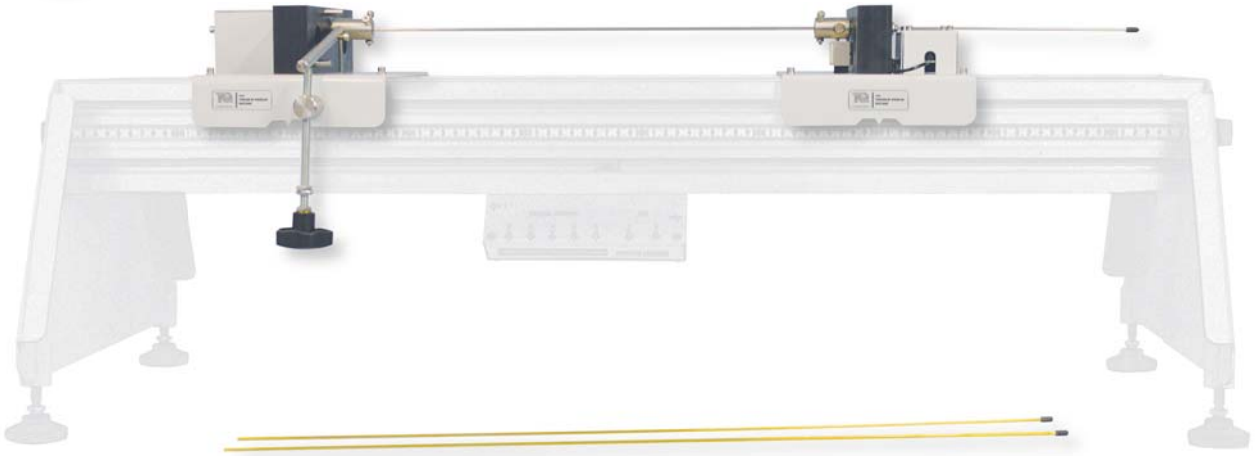


- Fully adjustable chuck positions for increased experiment range
- Includes rods of different material for comparison of shear modulus (modulus of rigidity)
- Includes a tubular (hollow) rod to show the effect of 'missing' material, compared to a similar solid rod

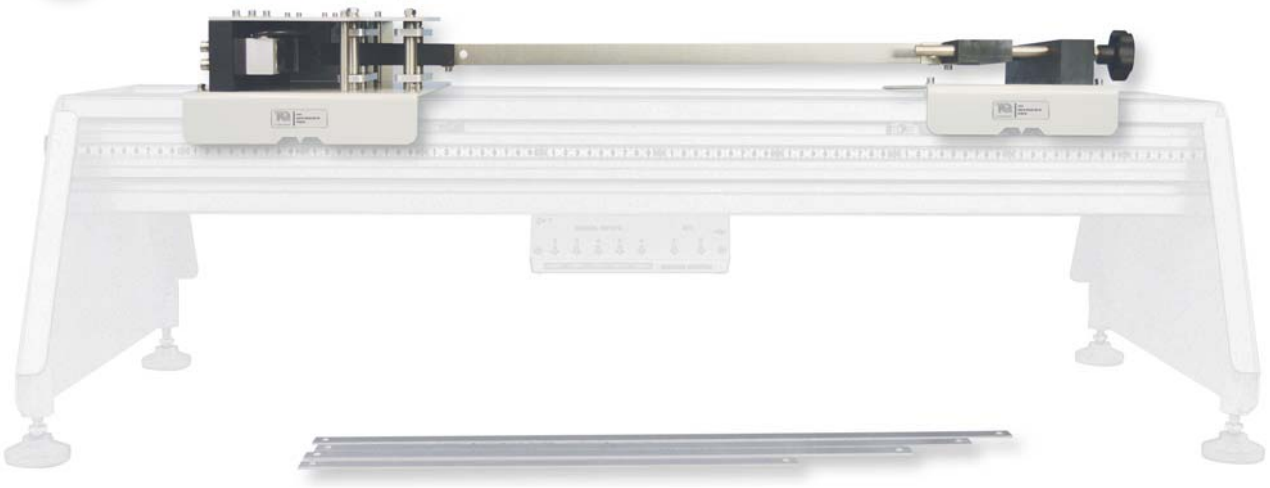
LEARNING OUTCOMES:

- Torsion formula
- Rod length and angle of twist relationship
- Rod material and angular deflection—the elastic (shear) modulus (G)
- Rod cross-sectional dimensions and torsion—the polar second moment of area (J)
- Comparison of angular deflection in similar hollow and solid rods
- Mass per unit length and torsional resistance efficiency of tubes compared to solid rods

EULER BUCKLING OF A COLUMN NEW

VDAS® ONBOARD STS12

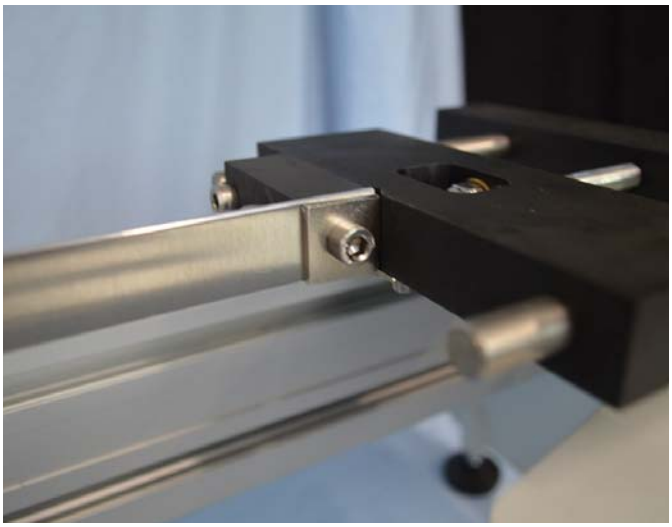
Experiment for the study of buckling of struts and the relationships between length, end fixing conditions and buckling load. Mounts on the Structures platform and connects to the Structures automatic data acquisition unit and software (VDAS® Onboard).



- Includes different fixings and a selection of different length specimen struts for multiple experiments
- Includes Vernier calliper for measurement of strut cross-section

LEARNING OUTCOMES:

- Strut length and the collapse load
- Euler's critical load
- Slenderness ratio
- Effective length
- The collapse load and strut fixings, including:
  - Pinned-pinned
  - Fixed-pinned
  - Fixed-fixed



CONTINUOUS AND INDETERMINATE BEAMS NEW

VDAS® ONBOARD STS13

Experiment that can be used to perform a wide variety of beam experiments, from simple cases to complex problems. Mounts on the Structures test frame and connects to the Structures automatic data acquisition unit and software (VDAS® Onboard).

PDF

CONTINUOUS AND INDETERMINATE BEAMS EXPERIMENT

EXPERIMENT SETUP AND PROCEDURE

- Comprehensive range of experiments in both statically determinate and statically indeterminate beams
- Includes additional masses for experiments with a uniformly distributed load (UDL)

LEARNING OUTCOMES:

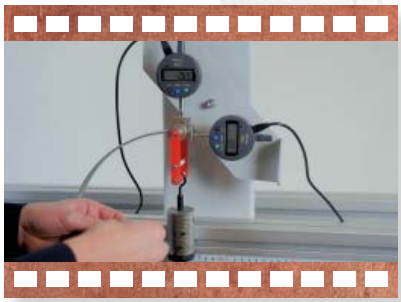
- Principle of moments
- Reactions for a point load along a simply supported beam
- Reactions for a uniformly distributed load (UDL) on a simply supported beam
- The principle of superposition
- Influence Lines
- Deflection of a simply supported beam
- Reactions for a continuous beam
- Reactions and moments of a propped cantilever
- Reactions and moments of a fixed beam
- The effect of a sinking support

CURVED BARS AND DAVITS NEW

VDAS® ONBOARD STS14

Experiment for investigations into two common curved structures and two common davit structures. Mounts on the Structures test frame and connects to the Structures automatic data acquisition unit and software (VDAS® Onboard).

CURVED BARS AND DAVITS (STS14)



DEFLECTION OF CURVED BARS AND DAVITS EXPERIMENT (STS14)

- An interesting application of Castigliano's theorem of elastic deflection
- Includes four different test structures for multiple experiments in deflection
- Industrial high-resolution indicators for accurate measurements

LEARNING OUTCOMES:

- How loads affect the vertical and horizontal deflection of:
  - a quarter circle
  - a semicircle
  - a curved davit
  - an angled davit
- Elastic bending
- Comparison of elastic deflection analysis techniques

OTHER EXPERIMENTS IN THE RANGE NEW

All experiments mount on the Structures platform and connect to the Structures automatic data acquisition unit and software (VDAS® Onboard).

ARCHES, BRIDGES AND TRUSSES

PIN-JOINTED FRAMEWORKS STS8

Experiment for the study of strains, stresses, forces and deflections in various pin jointed frameworks, and the study of Bow's notation.

PDF

THREE-PINNED ARCH STS9

Experiment for the study of the characteristics of a three-pinned arch under various load conditions.

PDF

TWO-PINNED ARCH STS10

Experiment for the study of the characteristics of a two-pinned arch under various load conditions.

PDF

FIXED ARCH STS11

Experiment for the study of the characteristics of a fixed arch under various load conditions.

PDF

REDUNDANT TRUSS STS17

Experiment for the study of determinate and indeterminate truss structures.

PDF

SIMPLE SUSPENSION BRIDGE STS19

Experiment for the study of the characteristics of a simple suspension bridge.

PDF

SUSPENDED BEAM BRIDGE STS21

Experiment for the study of the characteristics of a simple suspension bridge.

PDF

FAILURE

PLASTIC BENDING OF BEAMS STS15

Experiment for the study of plastic theory and limit state design of beams.

PDF

PLASTIC BENDING OF PORTALS STS16

Experiment for the study of plastic theory and limit state design in portal frames.

PDF

DEFLECTIONS AND STRESS

CURVED BARS AND DAVITS STS14

Experiment for investigations into two common curved structures and two common davit structures.

PDF

FRAME DEFLECTIONS AND REACTIONS STS18

Experiment for the study of rectangular portals subjected to vertical loads.

PDF

MOMENTS

BENDING MOMENTS IN A PORTAL FRAME STS20

Experiment for the study of bending moments and sway in portal frames.

PDF

EQUILIBRIUM OF A SIMPLY SUPPORTED BEAM STS22

Experiment for the study of the characteristics of a simply supported beam.

PDF

TORSION

UNSYMMETRICAL BENDING AND SHEAR CENTRE STS7

Experiment for the study of the vertical and horizontal deflection of different unsymmetrical sections.

PDF

CASE STUDY

TIDAR UNIVERSITY IN JAVA ADDRESSES THE CIVIL ENGINEERING SKILLS GAP IN INDONESIA

Students on the Civil Engineering study programme at TIDAR University in Java, Indonesia are now benefiting from the installation of a range of new fluid mechanics practical teaching apparatus from TecQuipment for understanding water resources engineering.

There is a shortage of civil engineers in Indonesia, particularly those that have the necessary expertise to support the growth of the infrastructure required within the country. Universities like TIDAR have been raising the standards of education using a competency-based curriculum that meets the requirements of the Indonesian National Qualifications

Framework (KKNI). An important element of this is teaching using practical didactic methods. After putting the project for fluid mechanics practical teaching equipment out to tender, they opted to purchase the teaching equipment from TecQuipment, working with Jitrasindo, TecQuipment's specialist provider within the country.

The Civil Engineering programme at TIDAR University covers the design, construction, renovation, operation and maintenance of buildings. The recently acquired equipment from TecQuipment focuses on the water resources engineering element of the teaching syllabus, covering flow and pressure measurement, laminar and turbulent flow, open channel flow, hydrology, hydrostatics and properties of fluids.

THERMODYNAMICS

The Thermodynamics range offers teaching equipment for the illustration of the basic principles of thermodynamics through to complex theories. Students can learn using practical experiments about the behaviour of gases, heat transfer and thermal conductivity, conduction, convection and heat exchange. They can get hands-on to prove theories such as the Antoine equation, Seebeck effect, Lenz and Thomson effects, Carnot cycle and reversible Carnot cycle, Stefan Boltzmann law, Kirchhoff's law and Lambert's direction law.

SAFE AND PRACTICAL DESIGN: Reduced experiment times.

BROAD RANGE OF PRODUCTS: From basic principles to gas turbines.

AUTOMATIC DATA ACQUISITION: Thermodynamics experiments require settling time and constant monitoring to achieve thermal equilibrium, making automatic data acquisition a useful tool.

SAFE, PRACTICAL AND REALISTIC

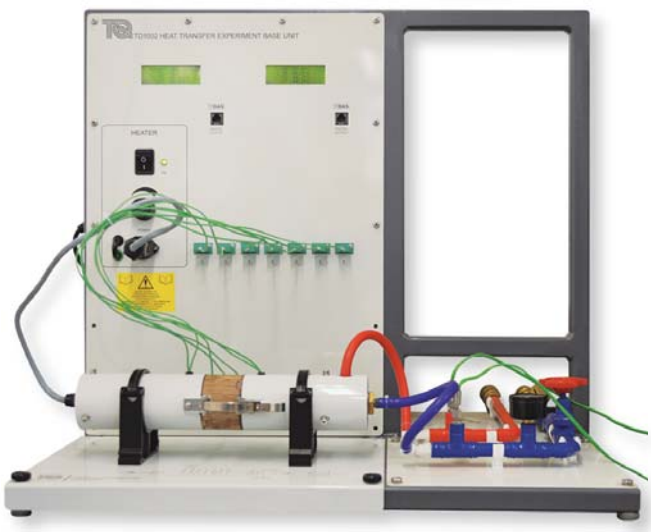
As thermodynamics experiments can often take many hours, the range has been designed to reduce the experiment time to a practical and realistic level, with safety as the key aspect.

RANGE HIGHLIGHTS:

BENCHTOP HEAT EXCHANGERS TD360

A modular system made up of a benchtop base unit (TD360) and four optional experiment modules, for examining and comparing small-scale heat exchangers to help students understand how they work.

- Concentric Tube Heat Exchanger (TD360a)
- Plate Heat Exchanger (TD360b)
- Shell and Tube Heat Exchanger (TD360c)
- Jacketed Vessel with Coil and Stirrer (TD360d)



HEAT TRANSFER EXPERIMENTS TD1002

Four optional experiment modules and a benchtop base unit (TD1002) form a modular system, for demonstrating different methods of heat transfer.

- Linear Heat Conduction Experiment (TD1002a MkII)
- Radial Heat Conduction Experiment (TD1002b)
- Extended Surface Heat Transfer Experiment (TD1002c)
- Conductivity of Liquids and Gases Experiment (TD1002d)

BOMB CALORIMETER COMING SOON

VDAS® ONBOARD TDX00B

This compact fuel calorimeter (bomb calorimeter) is for the hands-on investigation of energy gained from burning different fuels, either in liquid or solid form, within a safe, student-friendly contained receptacle.

- Central fuel-ignited crucible surrounded by a water jacket to absorb the heat of combustion
- Control box, including control and measurement instrumentation
- Solid or liquid fuels can be used

LEARNING OUTCOMES:

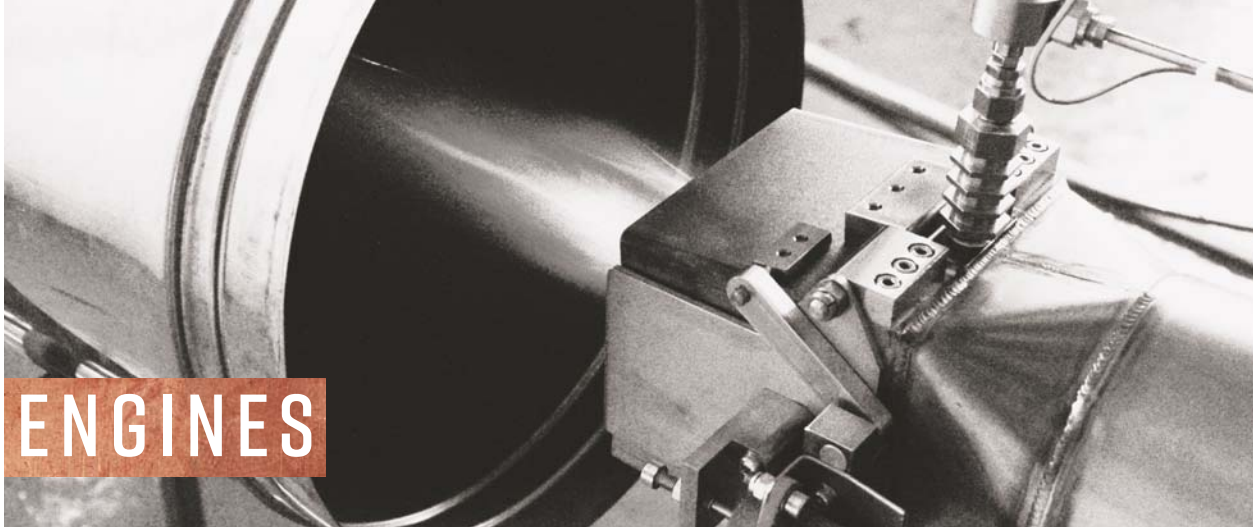
- Appreciation of the energy content of different fuels gained through burning very small quantities in a safe environment
- Understanding the concept of a bomb calorimeter and seeing the conversion of chemical energy into heat energy
- Learning how to measure the energy content of different types of fuel

MADE UNDER ONE ROOF

YouTube

The Made Under One Roof series of videos provides an insight into the design and manufacturing processes at TecQuipment.

Sign up to our social media for news of the latest videos:



ENGINES

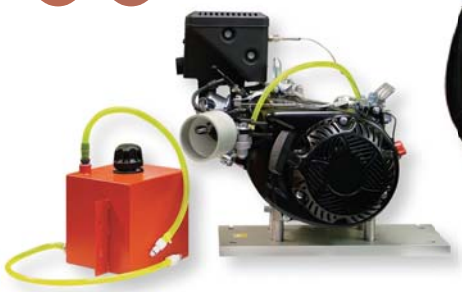
The Engines range offers teaching equipment for a wide variety of engine-specific theory. It covers internal combustion engines, starting with simple four-stroke engines, through to gas turbines/turbojets, along with a steam engine trainer.

The range meets entry level requirements for the general teaching of mechanical engineering. It also addresses the more advanced theories required for final-year students, enabling them to meet the learning objectives required for specific industries, such as aerospace, automotive and power.

RANGE HIGHLIGHTS:

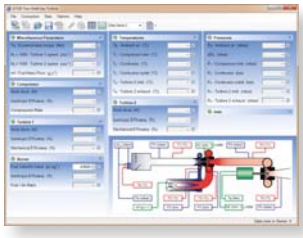
SMALL ENGINE TEST SET TD200

Trolley-mounted, mobile engine test bed with benchtop instrumentation for investigations into the fundamental features of internal combustion engines. Requires at least one of the eight four-stroke petrol and diesel engines, available in pull or electric start (ES).



TWO-SHAFT GAS TURBINE GT185

Trolley-mounted, mobile apparatus that allows detailed experiments on how a two-shaft gas turbine works, and tests its performance.



THERMAL POWERPLANT WITH STEAM TURBINE

COMING SOON

TD1050T

This laboratory-scale apparatus allows students to investigate the performance of a steam powerplant, using a steam turbine to convert thermal energy into mechanical energy and then into electrical energy.

The unit includes instrumentation for data acquisition and safety features to ensure temperatures and pressures can never exceed safe working limits.

A clean and convenient electric boiler generates steam which passes under pressure into and through a single-stage steam turbine. The turbine is connected to a dynamometer which provides the load and enables investigation of the performance characteristics of the turbine. Exhaust steam passes through a condenser and is returned to the water tank. Instrumentation is included to measure:

- Electrical power to the boiler
- Steam temperature, pressure and flow rate
- Turbine inlet and outlet steam temperature and pressure
- Turbine speed
- Dynamometer torque
- Electrical output from the dynamometer

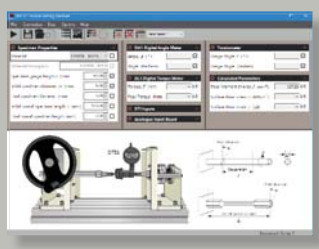
LEARNING OUTCOMES:

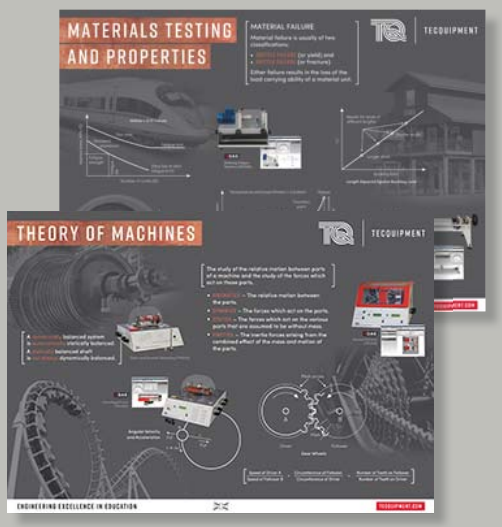
- Setting up and running "hot" experiments safely using the comprehensive user guide and using the data acquisition system to collect high quality experimental data
- Obtaining experimental data describing the performance of a steam plant including:
  - Temperatures and pressures
  - Turbine speed and torque output
  - Electrical input to the boiler
  - Electrical output from the dynamometer
- Creating characteristic curves for the powerplant including:
  - Rankine cycle pressure enthalpy curve
  - Turbine efficiency
  - Boiler efficiency
  - Condenser efficiency
- Investigating and analysing the effect of changing parameters on system and component performance

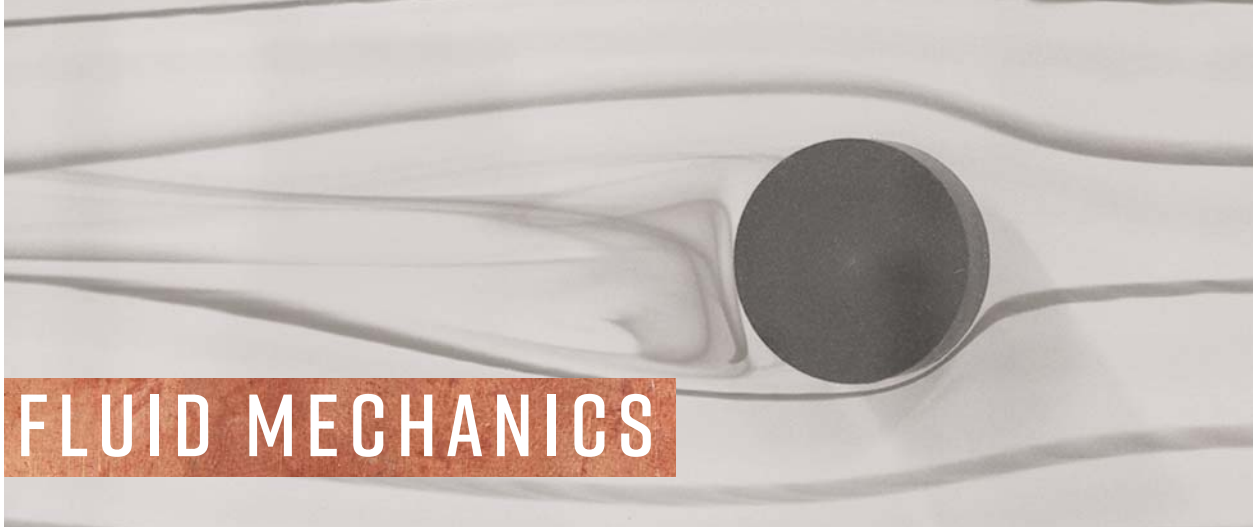
DOWNLOAD POSTERS, SOFTWARE AND CATALOGUES

TecQuipment offers a wide range of digital content such as posters, brochures, catalogues, charts and software on the website.

TECQUIPMENT.COM/DOWNLOADS







FLUID MECHANICS

The Fluid Mechanics range offers a wide scope of teaching equipment for the delivery of complete courses in fluid dynamics.

BASE UNIT AND MODULES FOR FLEXIBILITY

In many settings, the modular Digital Hydraulic Bench (H1F) acts as a base unit, allowing tutors to swap out individually mounted experiment modules on these self-contained benches, reducing laboratory set-up time, space requirements, the need to be near a water source and cost. Modules include experiments for exploring Bernoulli's theorem, the function and dynamics of weirs, pressure and flow measurement, pipe friction and energy loss, and much more.

UNDERSTANDING FLOW

The impressive flow and sediment channels, for demonstrating the mechanics of flow, also enable the practical teaching and demonstration of phenomena such as critical and sub critical flow, hydraulic jump, and dune formation. There are many ancillaries available for use with the flow channels, enabling them to be used as both teaching and research aids.

MFP EXPERIMENTS POSTER

RANGE HIGHLIGHTS:

DIGITAL HYDRAULIC BENCH HIF

A mobile, self-contained bench with recirculating water supply. It provides water at variable flow rates direct to experiments and includes digital flow display for hydraulic and fluid mechanics experiments.

PDF

HIF EXPERIMENTS POSTER

MODULAR FLUID POWER RANGE MFP

The MFP range demonstrates real-world applications of fluid mechanics and includes pumps and turbines, which also provide a link to renewable energy. An easy-to-transfer Universal Dynamometer (MFP100), with sensors for measuring power, speed and torque, provides motive power to seven different experiment modules.

PDF

FLUMES FC300

A 300 mm wide, 5 to 15-metre long flume for student study and advanced research into a wide range of fluid flow topics. A huge range of ancillaries are available to extend learning potential and offers the opportunity for innovative experimentation.

PDF

FC300 ANCILLARIES POSTER

MULTI-PUMP TEST SET COMING SOON

VDAS® ONBOARD H85

A versatile, self-contained mobile unit designed to investigate and demonstrate the performance characteristics of a range of different pump types, including positive displacement gear and piston pumps, rotodynamic centrifugal, axial and channel impeller pumps and a positive displacement pump.

The unit consists of a water tank, pipework, suction and delivery throttle valves, AC dynamometer and quick-release couplings to support a wide range of pump types. An onboard PC provides control and data acquisition including:

- Pump speed
- Suction and delivery pressure
- Flow rate
- Dynamometer torque and speed

LEARNING OUTCOMES:

- Understanding the performance of the six different pump types:
  - Positive displacement gear pump
  - Positive displacement piston pump
  - Rotodynamic centrifugal pump
  - Rotodynamic axial pump
  - Positive displacement vane pump
  - Rotodynamic channel impeller pump
- Connecting pumps in a hydraulic circuit using quick-release couplings
- Creating characteristic curves for each pump type from experimental data
- Investigating, analysing and comparing the characteristics of the six pump types

HYDROLOGY AND RAINFALL APPARATUS

VDAS® ONBOARD H313V

NEW FEATURES

- VDAS® Onboard
- Two extra switchable rain banks
- Improved flow measurement

A self-contained, floor-standing unit consisting of a water reservoir and a tank for sand with overhead spray nozzles that simulate rainfall, both stationary and moving. It is for studying hydrology principles including rainfall, throughflow and the movement of water over land and rivers.

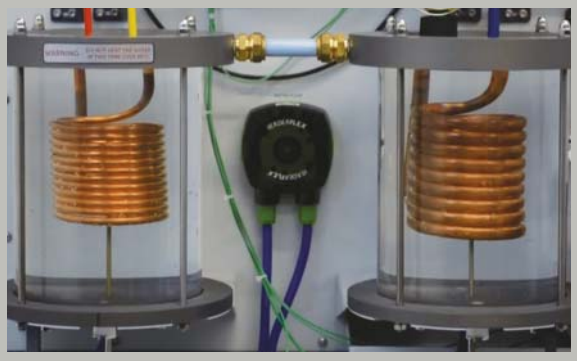
- VDAS® Onboard for data acquisition and results analysis including the plotting of hydrographs
- Two extra switchable rain banks for the simulation of multiple storms, equalling four in total
- Improved flow measurement in the form of magnetic inductive flow meters
- Permeable catchment area fed with 'rain' from overhead spray nozzles and/or by groundwater flow from ends of tank
- Spray nozzles to supply half or all of catchment area
- Can measure 'drawdown' due to single or two interacting wells
- Self-contained, requires only an electrical supply
- Sediment capture device with sensor reads the sediment loads

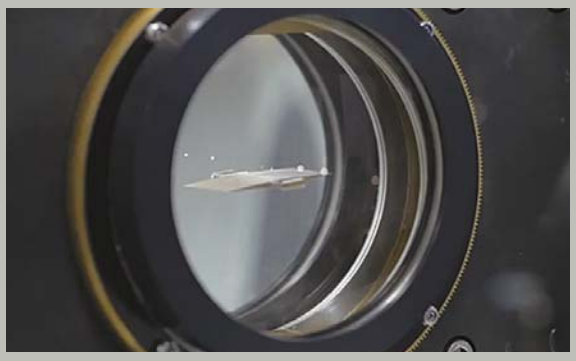
LEARNING OUTCOMES:

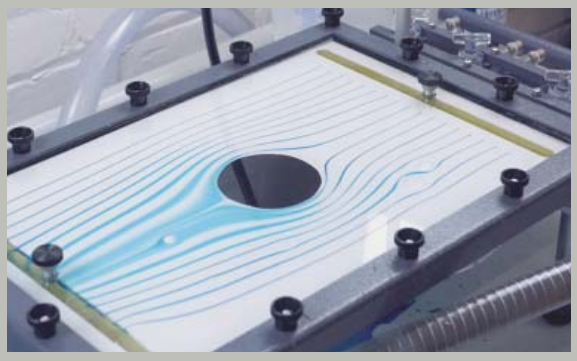
- Investigation of rainfall/run-off relationships for dry, saturated and impermeable catchments of various slopes (surface run-off only)
- Effect of interflow on outflow hydrograph surface run-off (plus groundwater flow)
- Simulation of multiple and moving storms
- Measurement of cone of depression for a single well, and comparison with theory interaction of cones of depression for two adjacent wells
- De-watering of excavation sites by use of wells
- Flow from a well in a confined aquifer
- Demonstration of watersheds for a simulated island with rainfall and well flows
- Sediment transport and meanders in simulated rivers
- Studies of scour around simulated bridge piers

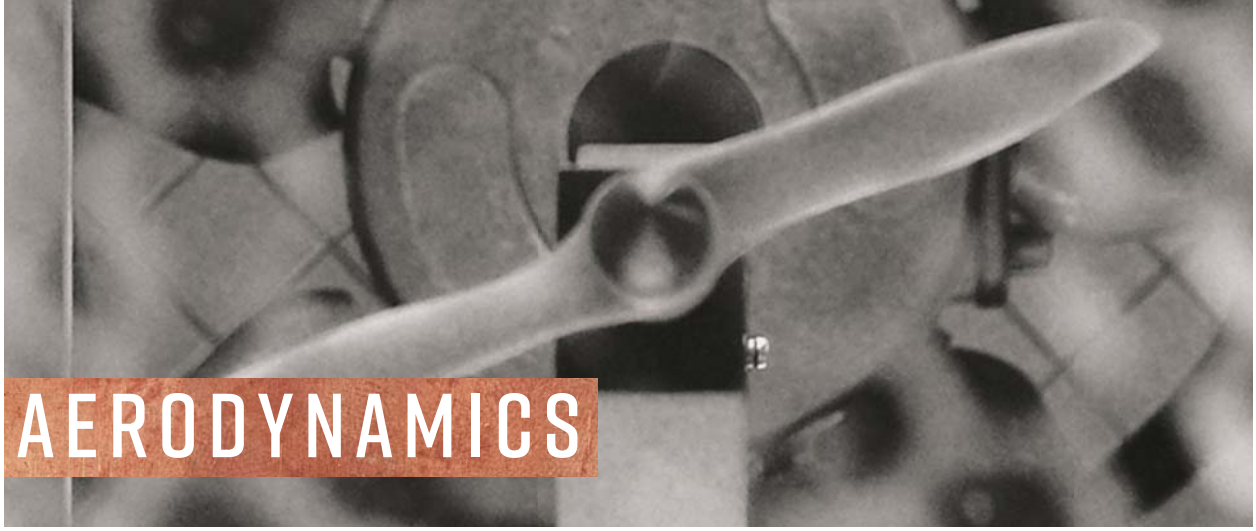
TECQUIPMENT YOUTUBE CHANNEL

Visit and subscribe to the TecQuipment YouTube channel for all the latest product showcases, installation and user videos: YOUTUBE.COM/C/TECQUIPMENT









AERODYNAMICS

The aerodynamics range is used for teaching a vast range of aerodynamic principles – from fundamentals through to advanced theories – with products to suit every space, budget and complexity requirement. The wind tunnels span a variety of sizes and experimentation capabilities, from benchtop models for learning the basics, to versions requiring large laboratories for a more detailed understanding of aerodynamics.

PRINCIPLES OF AERODYNAMICS

TecQuipment's subsonic wind tunnels teach students the basics of lift, drag and pitching moments, plus high-level topics such as boundary layer and pressure distribution around models. Students can also perform wake investigations.

ADVANCED THEORY OF AERODYNAMICS

TecQuipment's supersonic wind tunnels are for the more advanced teaching of aerodynamics engineering, with experiments that start with nozzle pressure distribution, on to analysis of Mach numbers, and the measurement and visualisation of pressure and shock waves using Schlieren apparatus.

AUTOMATIC DATA ACQUISITION

A variety of the products in this range work with TecQuipment's unique Versatile Data Acquisition System (VDAS®).

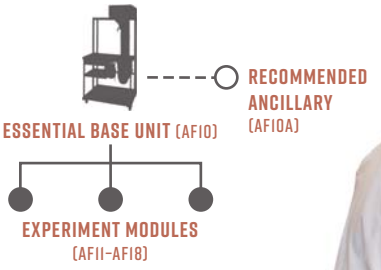
RANGE HIGHLIGHTS:

MODULAR AIR FLOW BENCH

AF10

This is a small-scale wind tunnel with an electric fan and adjustable air flow control, with eight different experiment modules that demonstrate key principles and phenomena of air flow.

PDF



AVAILABLE EXPERIMENT MODULES:

- Bernoulli's Equation (AF11)
- Drag Force (AF12)
- Round Turbulent Jet (AF13)
- Boundary Layer (AF14)
- Flow Around a Bend (AF15)
- Coandă Effect and Jet Flow (AF16)
- Flow Visualisation (AF17)
- Tapped Aerofoil (AF18)

AF10 EXPERIMENTS POSTER

SUBSONIC WIND TUNNEL 305 MM AFI300

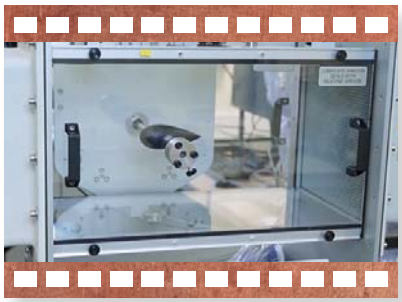
A compact, free-standing, open-circuit suction subsonic wind tunnel with a working section of 305 mm by 305 mm and 600 mm long, allowing students to perform advanced study such as analysing boundary layers, performing flow visualisation and observing velocity in the wake, offering extensive teaching and research functionality.

AFI300 ANCILLARIES POSTER

NEW

FLUTTER WING AFI300R

An aerofoil suspended on springs within a frame, used to demonstrate wing flutter. The suspension positions of the wing can be altered, as can the angle of attack.



CONTINUOUS SUPERSONIC WIND TUNNEL AF302

A suction-type, continuous operation supersonic (up to Mach 1.8) wind tunnel for investigations into subsonic and supersonic air flow around two-dimensional models. Also for analysis of the profile of the tunnel working section.

FLIGHT DEMONSTRATION WIND TUNNEL

VDAS® ONBOARD AF4IV

A hands-on simulator that consists of a model aircraft suspended in an open-circuit wind tunnel that allows students to experience a variety of practical hands-on flight simulations to investigate the behaviour of a fixed-wing aircraft and wing performance using fly-by-wire control.

TUFTS ON THE WING CLEARLY DEMONSTRATE THE PHENOMENONS OF SEPARATION AND STALL

NEW FEATURES

- VDAS® Onboard
- Digital flight controls
- Fly-by-wire control

- Includes VDAS® Onboard for data acquisition, including the tracing of altitude and attitude, and provides the ability to export and chart data
- Gives students a safe, realistic introduction to the controls of a light aircraft
- Aircraft able to move vertically and pitch about the quarter chord point independently
- Simulates take off, level flight, cruise and landing with digital flight controls
- Demonstrations include aerofoil lift, stall, longitudinal stability and transient motion
- Includes electronic display of air speed, attitude, altitude, pressure and lift
- Tufts on the wing clearly demonstrate the phenomenons of separation and stall
- Bright LED-illuminated working section
- Model centre of gravity adjustable
- Removable yoke and silencer for shipping and storage
- Optional smoke generator

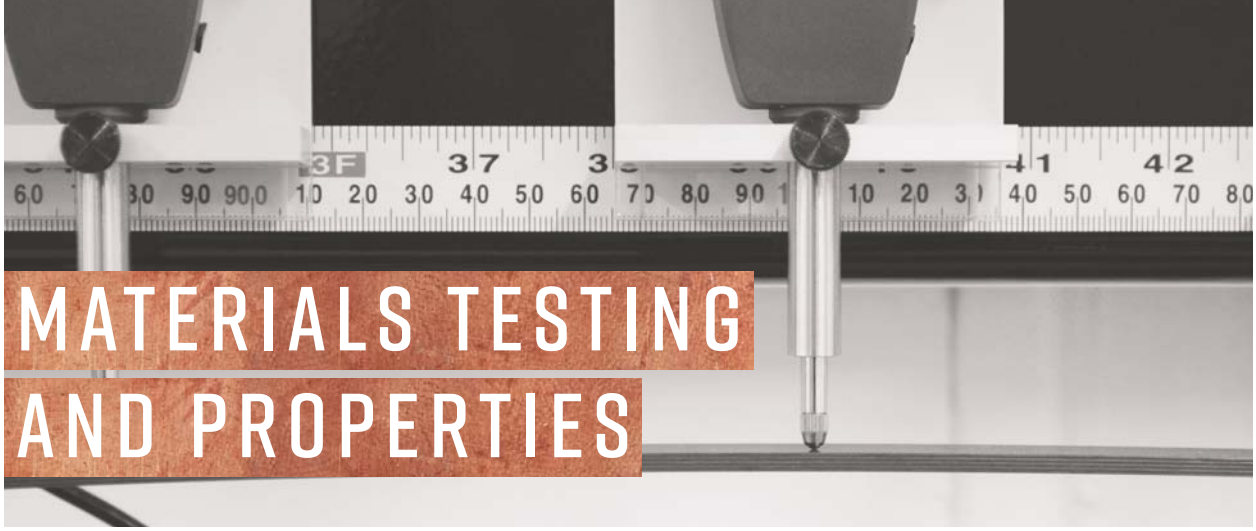
LEARNING OUTCOMES:

A variety of practical demonstrations, 'hands-on' flight simulations, and student investigations into the behaviour of fixed-wing aircraft and wing performance, including:

- Practical investigation of longitudinal stability and control of the aircraft to demonstrate behaviour during take-off, level flight and landing
- Determination of the effect of speed on attitude for level flight and stall
- Measurement of the lift curve for the wing up to and beyond stall
- Students can adjust the centre of gravity of the model to alter its trim. They can then plot trim curves and determine the neutral point
- Demonstration of phugoid motion in terms of altitude via high-speed VDAS®
- Short period oscillation due to sudden disturbance can be shown by the change of incidence via high-speed VDAS® Onboard

With Smoke Generator and Probe (AFA10, available separately):

- Visualisation of flow patterns past the aircraft's aerofoil and tail-plane



MATERIALS TESTING AND PROPERTIES

The Materials Testing and Properties products offer a wide range of teaching equipment to demonstrate key materials' properties; they cover Hooke's law and Young's modulus associated with elastic properties, and stress/strain analysis. For more advanced learning, experiments available progress to hardness testing, complex analysis of stress and strain, testing specimens to destruction and various apparatus for learning about material fatigue.

The range also extends into the area of structures and structural elements, providing supplementary products to the complete modular Structures range.

REFINED PRODUCTS: Meets the needs of a modern materials course.

BROAD AND PROGRESSIVE RANGE OF EXPERIMENTS: Teaches the fundamental principles, progressing to complex stress and strain analysis.

AUTOMATIC DATA ACQUISITION: Multiple and fast-changing measurements make data acquisition a valuable tool.

RANGE HIGHLIGHTS:

BEAM APPARATUS SM1004

A benchtop frame with load cells and cantilevers for the study of deflection and forces on different types of beams for a wide range of supports and loads. Also demonstrates Young's modulus.

PDF

UNIVERSAL TESTING MACHINE SM1000

A versatile, bench-mounted machine for compressive and tensile tests on different materials and structures.

PDF

THIN CYLINDER SM1007

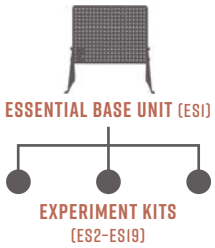
Benchtop machine to allow students to perform stress and strain tests on a thin-walled cylinder. Introducing Mohr's circle and Poisson's ratio.

PDF

ENGINEERING SCIENCE

The Engineering Science range is a modular system of experiment kits that address the fundamental principles of mechanical engineering, including:

- FORCES AND MOMENTS
- MATERIALS TESTING
- VIBRATION, FRICTION AND ENERGY
- SIMPLE MACHINES
- MECHANISMS



The high quality, robust kits are suitable for teaching STEM principles at beginner level, while remaining relevant for familiarisation for postgraduate students. All the hardware required to do experiments related to a particular topic are contained within a kit. These are presented in a storage tray with a purpose-made insert and checklist to ensure all of the parts are returned at the end of the laboratory session.

AVAILABLE EXPERIMENT KITS:

- Forces Kit (ES2)
- Moments Kit (ES3)
- Deflection of Beams and Cantilevers Kit (ES4)
- Torsion of Circular Sections Kit (ES5)
- Tensile Tester Kit (ES6)
- Simple Harmonic Motion Kit (ES7)
- Friction and Inclined Plane Kit (ES8)
- Potential and Kinetic Energy Kit (ES9)
- Pulley Kit (ES10)
- Drive Systems Kit (ES11)
- Cam, Crank and Toggle Kit (ES12)
- Gear Trains Kit (ES13)
- Simple Mechanisms Kit (ES14)
- Bar Linkages Kit (ES15)
- Centrifugal Force Kit (ES16)
- Rotational Friction Kit (ES17)
- Additional Mechanisms Kit (ES18)
- Spring Tester Kit (ES19)

RANGE HIGHLIGHTS:

FORCES KIT ES2

Demonstrates how to find the centre of gravity of shapes and the relationship between angles and coplanar forces, using force triangles.

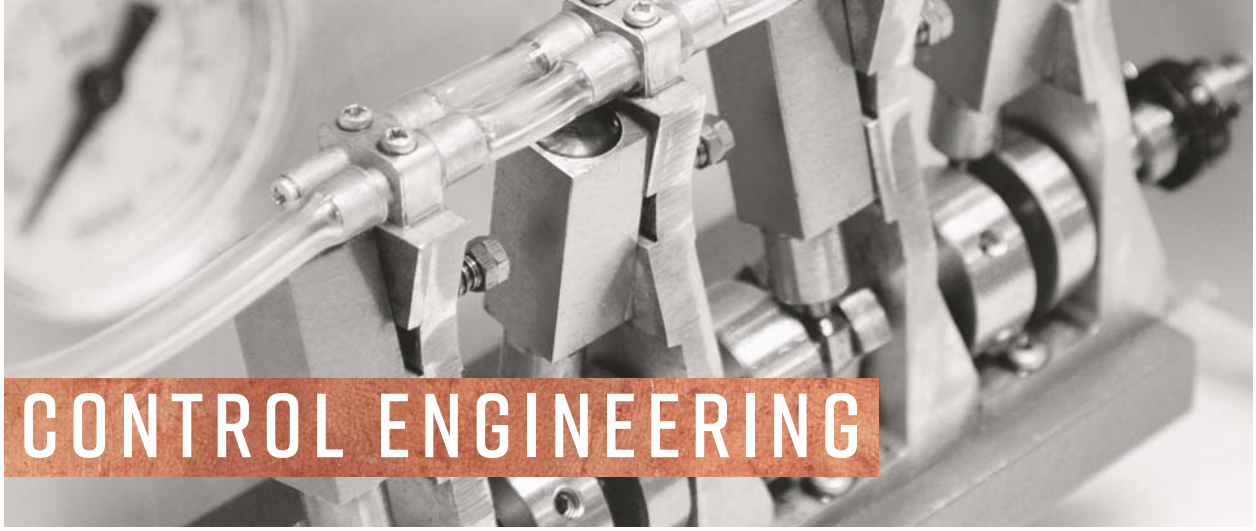
SIMPLE MECHANISMS KIT ES14

Demonstrates how the Scotch yoke, crank and slider and quick return mechanisms convert motion.

STEM

ENGINEERING SCIENCE FULL SET ESF

A complete set of Engineering Science kits and three work panels within a mobile trolley.



CONTROL ENGINEERING

The Control Engineering range focuses on the teaching of specific control principles relating to static and dynamic systems, as well as naturally unstable, non-linear, multi-variable and oscillatory systems.

The majority of the range can be connected to TecQuipment's dedicated controllers with easy-to-use control software. The simple, low-voltage connections allow safe and quick experiment set up.

ACADEMIC AND INDUSTRIAL: Benchtop products for academic teaching and industrial products for vocational training.

CHOICE: Start with a single control scenario and build up, or choose a more complete product to suit the budget and needs.

SAFE AND EASY SET-UP: Simple, low-voltage connections allow safe and quick experiment set up.

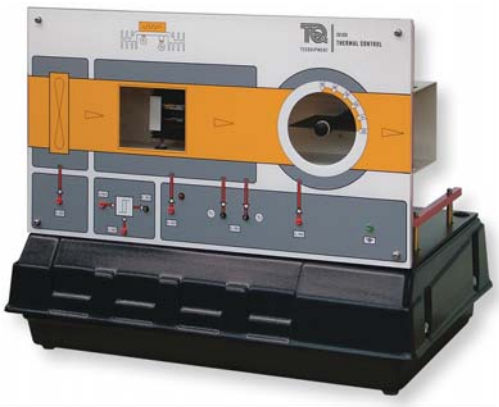
HANDS ON: Both the academic and industrial products allow easy connection and adjustments, for a more practical understanding.

RANGE HIGHLIGHTS:

THERMAL CONTROL PROCESS APPARATUS CE103

A self-contained, benchtop temperature control apparatus that mimics common industrial processes, designed to allow students at all academic levels to investigate the basic and advanced principles of control.

PDF



CONTROL SOFTWARE CE2000

Software that simulates control systems and works with TecQuipment's controller (CE120) or digital interface (CE122) to control and acquire data from TecQuipment's Control Engineering range.

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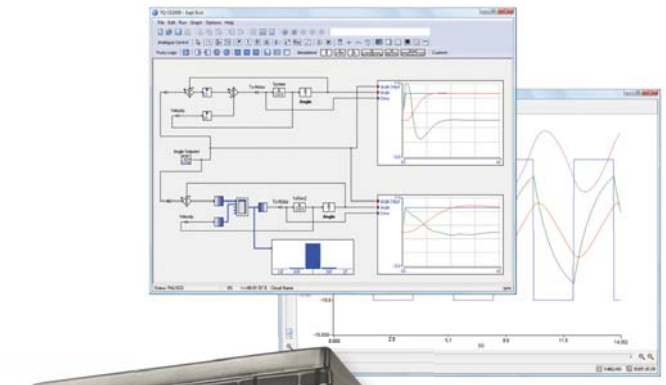


COUPLED TANKS APPARATUS

CE105/CE105MV

A self-contained, benchtop apparatus to demonstrate basic and advanced principles of control of single and coupled tanks, including the study of static and dynamic systems.

PDF

CONTROL EXPERIMENTS POSTER

PROCESS CONTROL ENGINEERING

MADE FOR ACADEMIC AND INDUSTRIAL TRAINING

The Process Control Engineering range extends from benchtop products, made for demonstrating control principles, to equipment using industrial parts for vocational training.

ACADEMIC AND INDUSTRIAL SOFTWARE

All our Process Control products work with software. Most of the academic products work with TecQuipment's own CE2000 control software. The more industrial products work with industrial process or PLC control software.

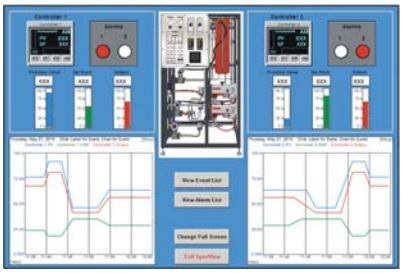
CONNECTIVITY

The Process Training system (TE3300) can be used individually to study control elements in isolation. They can also be connected to other units in the system to introduce more complexity and wider experimentation capability.

ACADEMIC AND INDUSTRIAL: Benchtop products for academic teaching and industrial products for vocational training.

HANDS ON: All the products allow easy connection and adjustments, for a more practical understanding of principles.

INDUSTRIAL COMPONENTS: Realistic student experience, with the use of industry-standard instrumentation.



RANGE HIGHLIGHTS:

PLC TRAINER CE123

Uses an industry-standard PLC to control the PLC process using ladder logic programming running on a PC. For use with the PLC Process (CE111).

PDF

PLC PROCESS CE111

A self-contained benchtop liquid flow and level process, providing a physical system to experience the programming of programmable logic controllers, for use with the PLC Trainer (CE123).

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PROCESS TRAINER CE117

A self-contained benchtop, fully integrated teaching apparatus that mimics industrial process engineering, including a comprehensive range of experiments in flow, level, pressure and temperature, ranging from basic theories through to more advanced principles.

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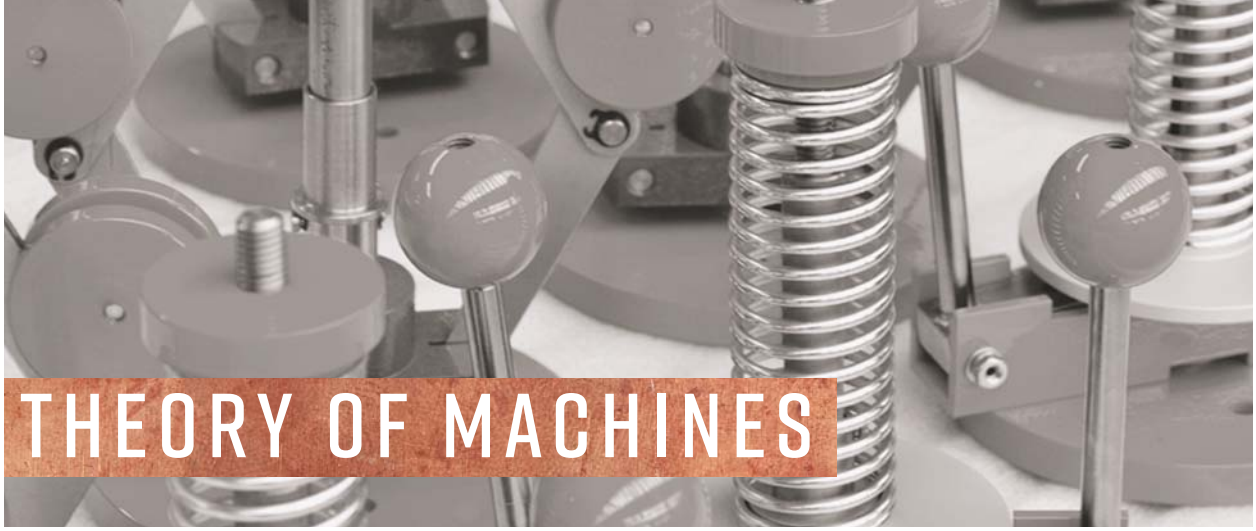
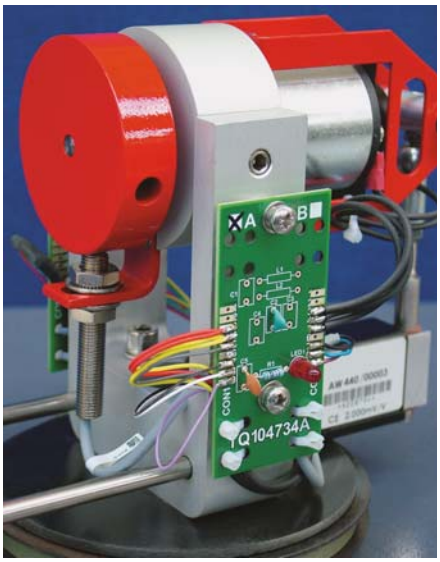


THEORY OF MACHINES

The Theory of Machines range offers teaching equipment for the basics of machine engineering, such as motion, to more advanced studies of free and forced vibration, friction in bearings, geared systems and governors.



SAFE YET HIGHLY VISUAL

Due to the amount of fast moving parts in this range, extra safety features have been incorporated. Interlocked guards prevent accidents, while care has been taken in the design process not to compromise the visibility.

RANGE HIGHLIGHTS:

STATIC AND DYNAMIC BALANCING TM1002

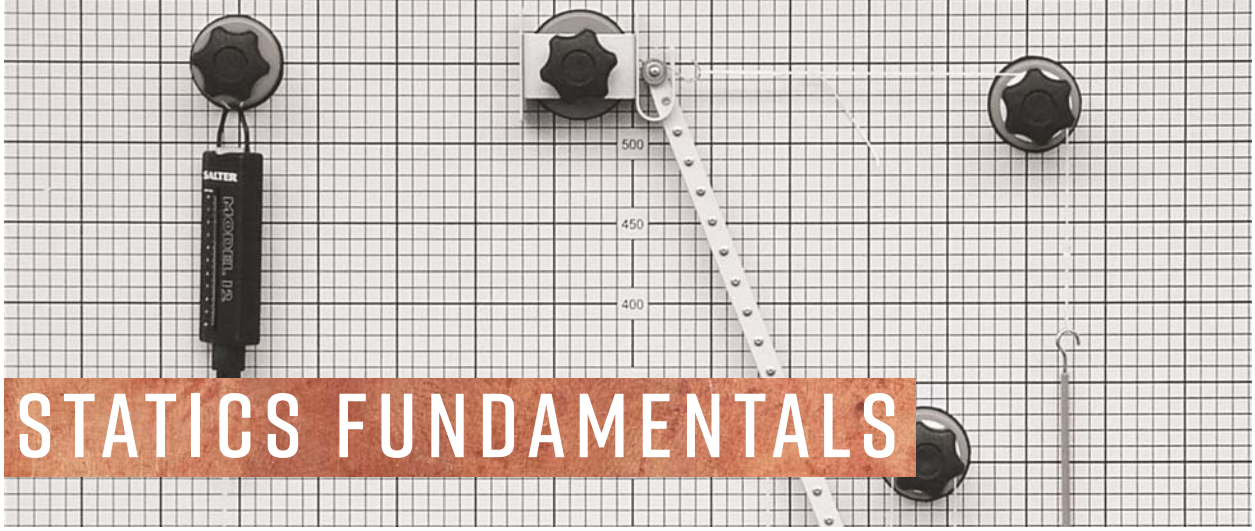
Benchtop apparatus for experiments in balancing a rotating mass system, statically and dynamically.

GYROSCOPE TM1004

Benchtop apparatus for experiments in gyroscopic couple and velocities of rotor and precision.

FREE AND FORCED VIBRATIONS TM1016V

Investigates the free and forced vibrations of a rigid beam with a spring, and a simply supported beam. Demonstrates Rayleigh's approximation and Dunkerley's method.



STATICS FUNDAMENTALS

The Statics Fundamentals range offers teaching equipment for understanding the core principles required for civil and mechanical engineering disciplines. The range brings theories, such as concurrent and non-concurrent coplanar forces, Bow's notation, equilibrium theory, parabola theory, and many more, to life.

The range consists of a series of modular experiment kits that fit to the essential base unit (Statics Work Panel), these can be mixed and matched to suit teaching requirements.

RANGE HIGHLIGHTS:

STATICS WORK PANEL STF1

Work panel for use with TecQuipment's Statics Fundamentals (STF) range.

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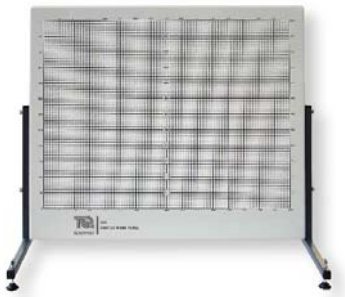

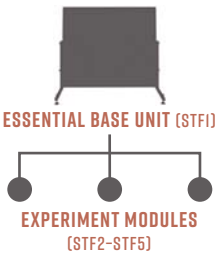

SUSPENSION CABLE DEMONSTRATION STF2

A kit for use with the work panel that demonstrates the tensions and shapes in a suspension cable, comparing them with theory.

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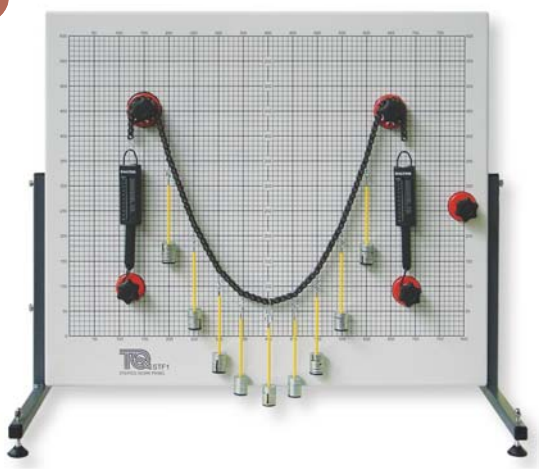

EQUILIBRIUM OF FORCES STF4

A kit for use with the work panel for experiments with three or more coplanar forces at equilibrium and an introduction to Bow's notation.

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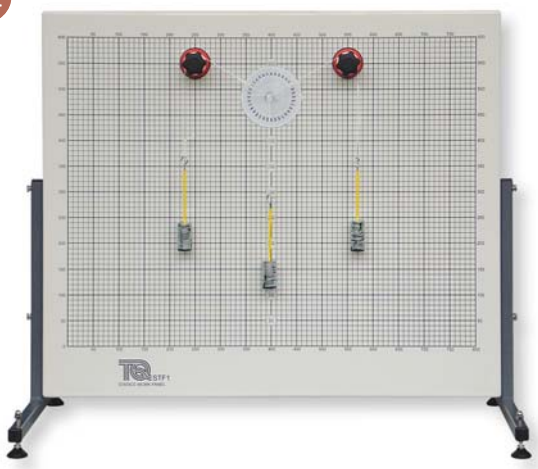
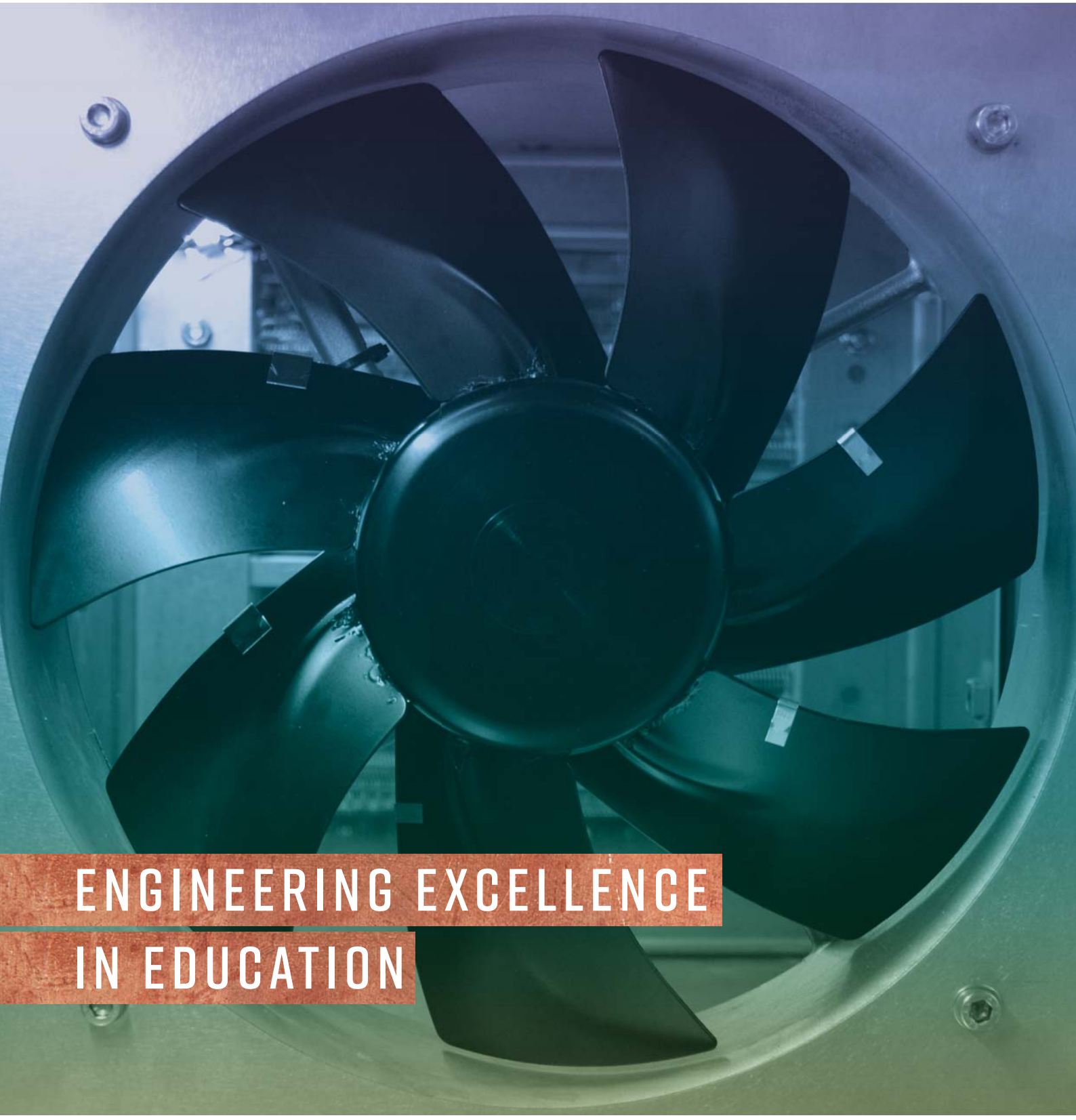


TECQUIPMENT
ACADEMIA



ENGINEERING EXCELLENCE IN EDUCATION

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