

**ENGINEERING EXCELLENCE
IN EDUCATION**





AF1
DRAG FORCE
APPARATUS

110 100 90 80 70 60 50 40 30 20 10 0
SCALE IN GRAMS

9 10 11 12 B

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MODULAR AIR FLOW BENCH (AF10) AND DRAG FORCE (AF12)

SKILL SETS FOR THE GLOBAL ENGINEERING LABOUR MARKET

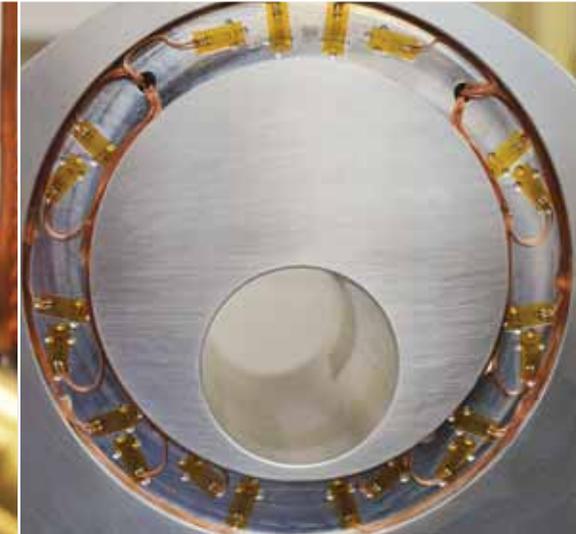
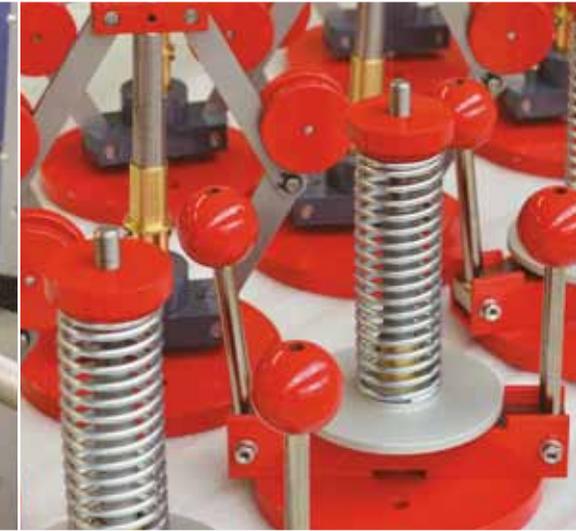
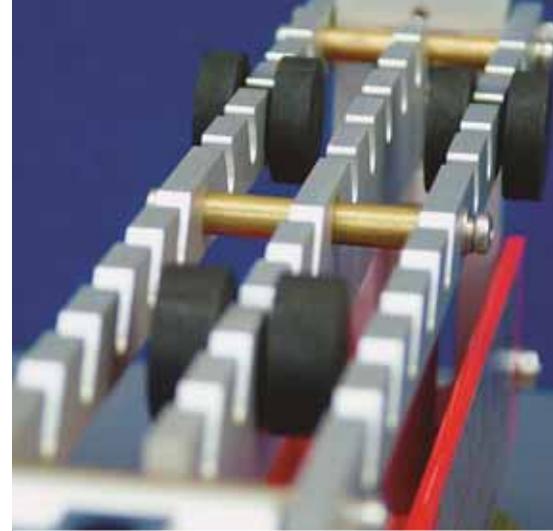
TecQuipment is committed to developing the best products for the practical teaching of engineering principles across the world. Giving students at universities, colleges, schools and training centres real-life understanding to match the skill sets required for the engineering labour market.

By working with the worldwide teaching community, we provide products that are designed to:

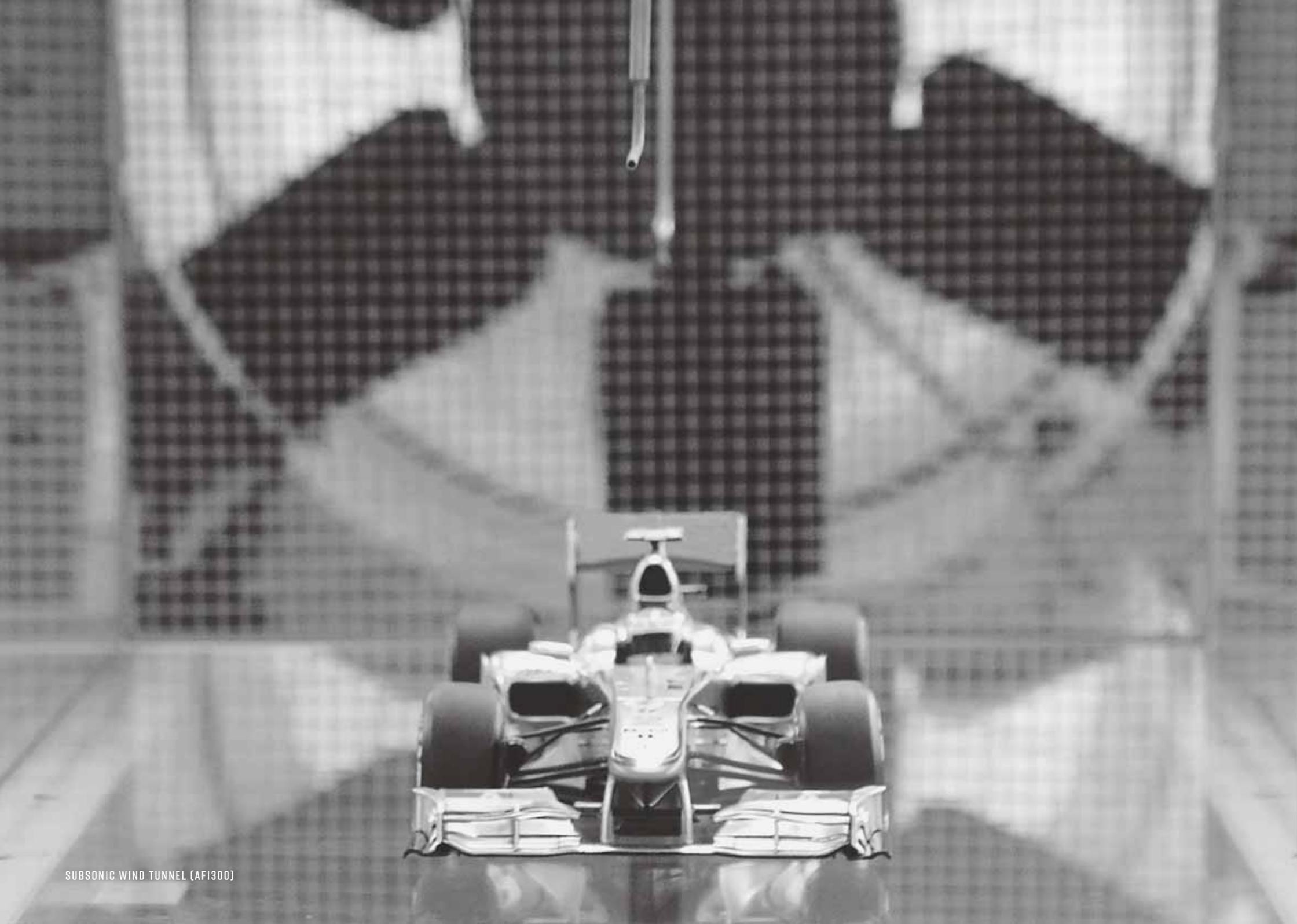
- Foster curiosity and spark passion with the student in mind
- Stand the test of time and rigours of student use
- Deliver optimum utilisation of laboratory time through faster and more effective experimentation

Simplifying teaching by:

- Integrating functionality into our teaching products that match changing syllabus requirements
- Providing supporting instructional and theoretical material relevant to today's engineering challenges



 ENGINEERING SCIENCE	 AERODYNAMICS	 CONTROL ENGINEERING	 PROCESS CONTROL ENGINEERING	 FLUID MECHANICS
 MATERIALS TESTING AND PROPERTIES	 STATICS FUNDAMENTALS	 STRUCTURES	 THEORY OF MACHINES	 THERMODYNAMICS
 ENGINES	 ENVIRONMENTAL CONTROL	 SOLAR ENERGY	 VDAS®	 ELECTRICAL POWER SYSTEMS



SUBSONIC WIND TUNNEL (AFI300)

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 bench-top 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.

KEY EXPERIMENTS:

- Bernoulli's equation
- Drag force
- Study of air flow at subsonic and supersonic speeds
- Fixed wing aircraft performance



MODULAR AIR FLOW BENCH (AF10)

KEY FEATURES AND BENEFITS

MADE FOR TEACHING: Realistic results yet small enough for laboratories.

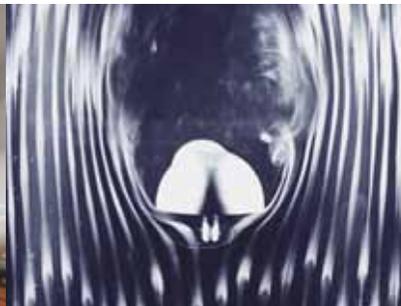
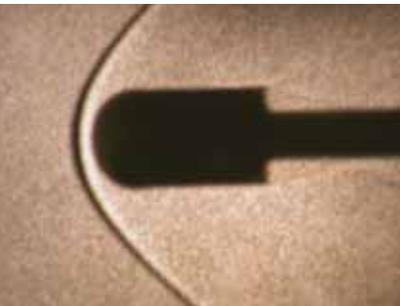
FLEXIBILITY: Packages of equipment can be chosen to suit budgets and needs.

EASY SET-UP: It takes only minutes to change and set up an experiment.

HANDS-ON: Laboratory-scale parts allow easy fitting and adjustments, for a more practical understanding.

AUTOMATIC DATA ACQUISITION **VDAS**[®]

Most of the products in this range work with TecQuipment's Versatile Data Acquisition System (VDAS[®]).



CONTROL ENGINEERING



KEY FEATURES AND BENEFITS

ACADEMIC AND INDUSTRIAL: Bench-top 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 your budget and needs.

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

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

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 TecEquipment's dedicated controllers with easy-to-use control software. The simple, low-voltage connections allow safe and quick experiment set-up.



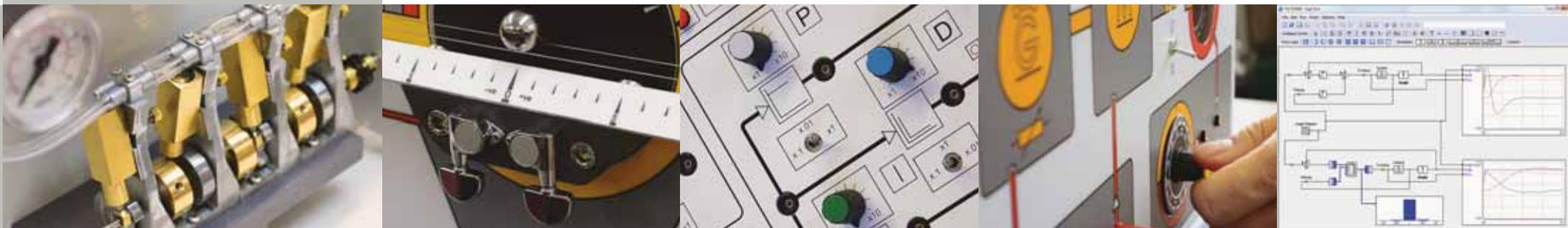
ENGINE SPEED CONTROL APPARATUS (CEI07)



COUPLED DRIVES (CEI08)

KEY EXPERIMENTS:

- Principles of control engineering, including engine speed, temperature, flow, pressure and level



PROCESS CONTROL ENGINEERING



The Process Control Engineering range extends from bench-top 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.

KEY EXPERIMENTS:

- Programmable logic control
- Ladder logic operations
- Timers, counters and monitoring
- Proportional, integral and derivative (PID) control
- Level, pressure, flow and temperature control

PLC PROCESS
(CE111)



FLOW/PROCESS
TRAINING SYSTEM
(TE3300/03)

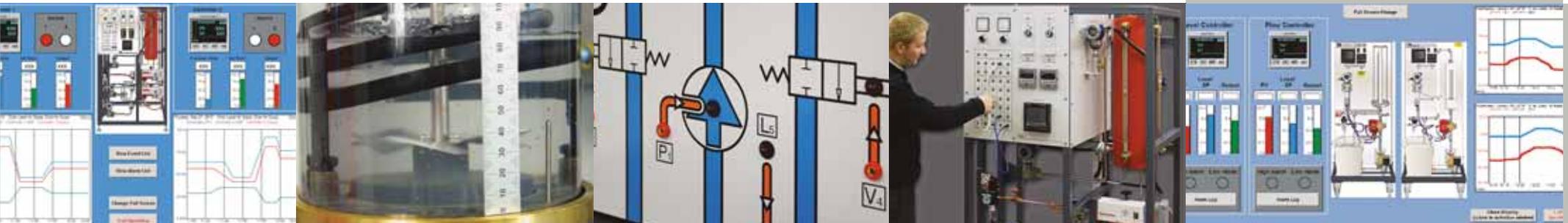


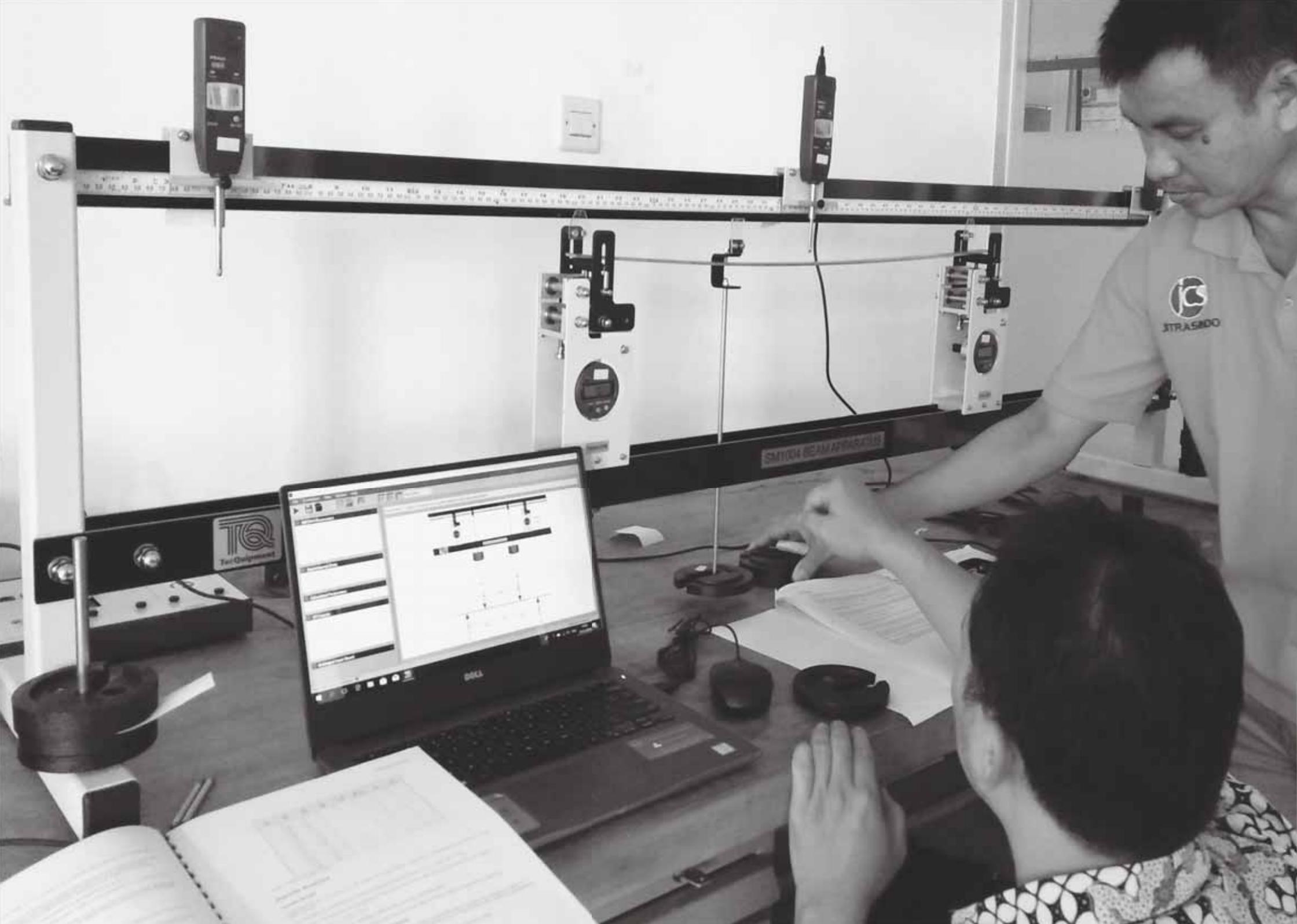
KEY FEATURES AND BENEFITS

ACADEMIC AND INDUSTRIAL: Bench-top 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.





ENGINEERING SCIENCE

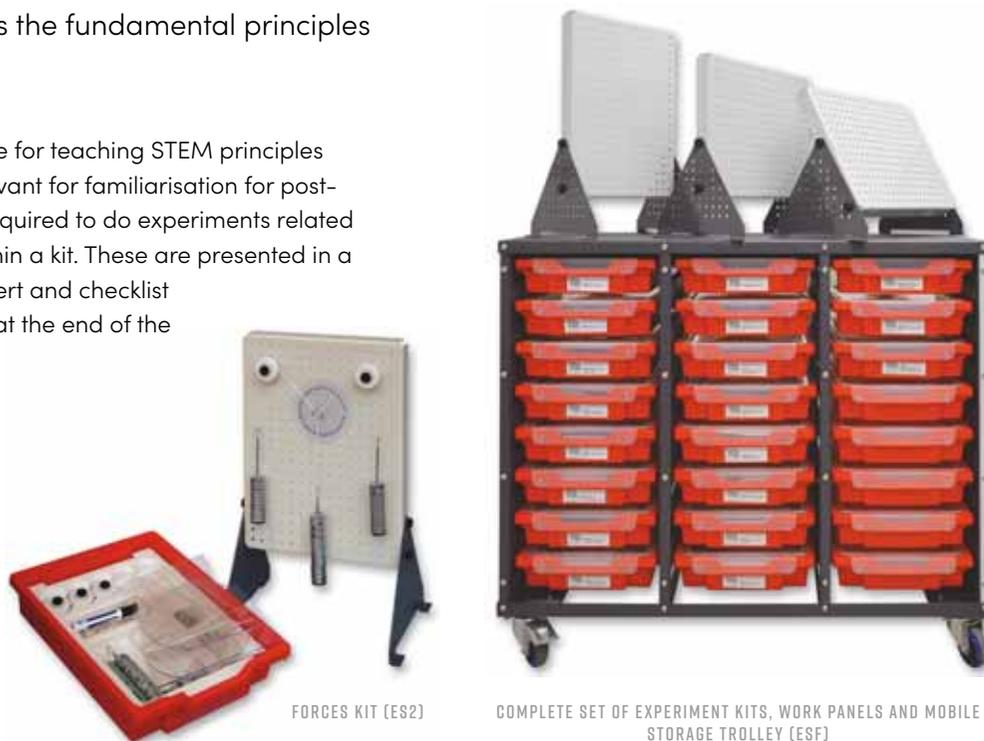


The Engineering Science range is a modular system of experimental kits that addresses the fundamental principles of mechanical engineering.

The high quality, robust kits are suitable for teaching STEM principles at beginner level, while remaining relevant for familiarisation for post-graduate 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.

KEY EXPERIMENTS:

- Materials testing
- Pulleys, cams and gears
- Forces, moments and vibration
- Friction
- Simple machines



KEY FEATURES AND BENEFITS

VALUE: Each kit can perform a number of different experiments.

BROAD RANGE OF TOPICS: From materials testing and vibration to simple machines and friction.

HANDS-ON LEARNING: Highly tactile, easy-to-use components, together with pre-prepared worksheets, allow students to work alone or with minimal supervision.

MODULAR AND COST EFFECTIVE: Select just the kits you need, or buy the whole set.

NO STORAGE PROBLEMS: Supplied in their own robust trays with optional mobile storage unit.



FLUID MECHANICS

KEY FEATURES AND BENEFITS

LONGEVITY: Long-lasting equipment to teach principles that do not go out of date.

WATER AND SPACE SAVING: Many experiments work with the self-contained, mobile hydraulic bench to save water and laboratory space.

LARGE CHOICE OF EXPERIMENTS: A huge range of experiments for a complete course in fluid mechanics, from simple flow and pressure measurements to advanced studies of vortices and open-channel flow.

MODULAR FLUID POWER RANGE

The Fluid Mechanics range includes a sub-section of Modular Fluid Power products to demonstrate real-world applications of fluid mechanics. They include pumps and turbines, which also provide a link to renewable energy.

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.

KEY EXPERIMENTS:

- Flow and pressure measurement
- Pipe friction and energy loss
- Laminar and turbulent flow
- Nozzles, jets, vortices and cavitation
- Flow visualisation
- Pipe surge and water hammer
- Flow channels
- Hydrostatics and properties of fluids
- Hydrology
- Pumps and turbines



MATERIALS TESTING



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.



STRAIN GAUGE TRAINER (SM1009)

KEY FEATURES AND BENEFITS

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.



BENCH-TOP TENSILE TESTING MACHINE (SM1002)

KEY EXPERIMENTS:

- Basic elastic properties
- Stress and strain analysis
- Torsion, fatigue, creep, tensile, hardness and impact testing
- Bending of unsymmetrical cantilevers
- Deflection and forces on beams
- Loading and buckling of struts

AUTOMATIC DATA ACQUISITION **VDAS**[®]

Most of the products in this range work with TecQuipment's Versatile Data Acquisition System (VDAS[®]).



STATICS FUNDAMENTALS

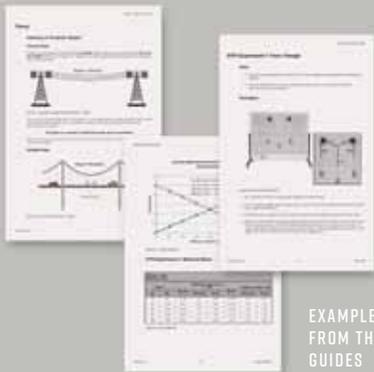


KEY FEATURES AND BENEFITS

FLEXIBILITY: Share one work panel between experiment kits, or one work panel for each kit.

HANDS-ON: Large tactile parts for students to fit and adjust.

HIGHLY VISUAL: For classroom demonstrations or groups of students.



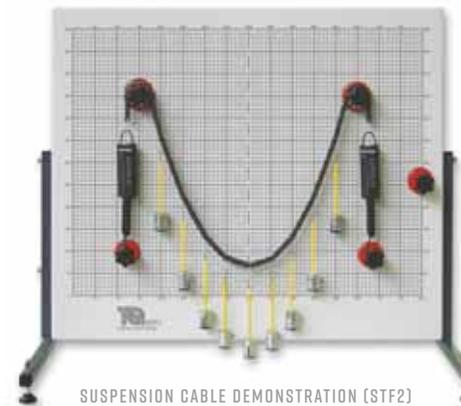
EXAMPLE PAGES FROM THE USER GUIDES

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.

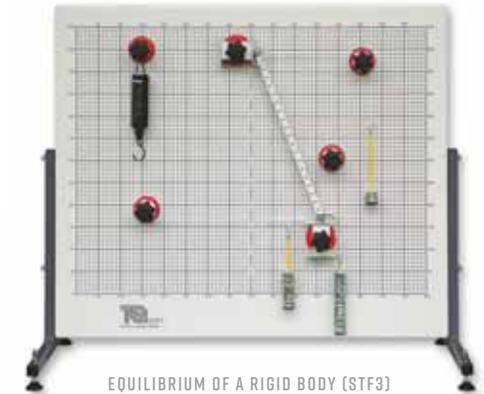
The range consists of a series of modular experiment modules that fit to the essential base unit (Statics Work Panel), these can be mixed and matched to suit teaching requirements.

KEY EXPERIMENTS:

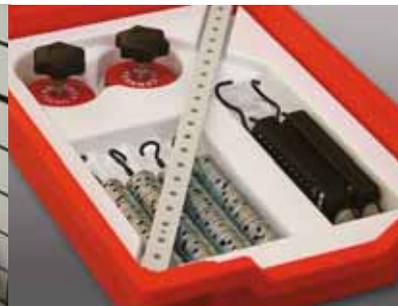
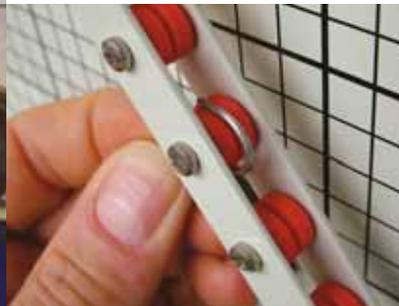
- Suspension cable demonstration
- Equilibrium of a rigid body
- Equilibrium of forces
- Equilibrium of a beam



SUSPENSION CABLE DEMONSTRATION (STF2)



EQUILIBRIUM OF A RIGID BODY (STF3)



STRUCTURES

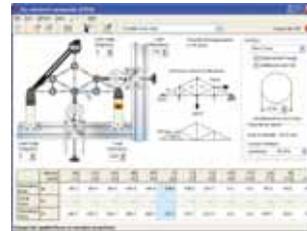


The Structures range consists of teaching equipment for understanding basic structural principles, focusing on beams, bridges and cantilevers for students of mechanical, civil and structural engineering.

The 19 desk-mounted experiment modules can be used stand alone or with TecQuipment's powerful Structures software which provides automatic data acquisition (ADA). To complement laboratory learning, experiments can also be performed virtually, using only the software.



PIN-JOINED FRAMEWORKS (STR8)



STRUCTURES SOFTWARE (STRS)

KEY EXPERIMENTS:

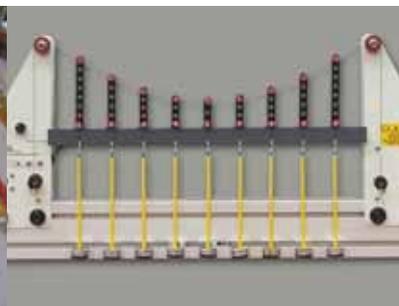
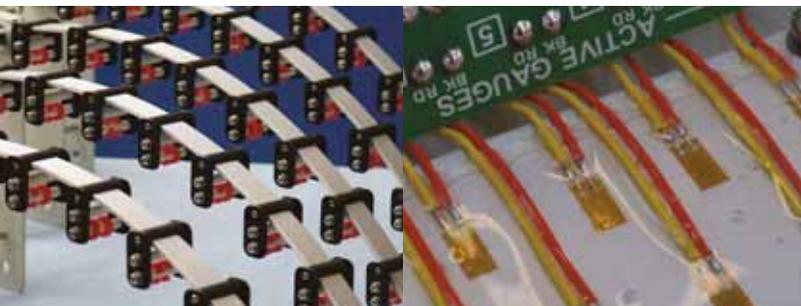
- Bending moments in a beam
- Shear force in a beam
- Deflection of beams and cantilevers
- Plastic bending of portals
- Three-pinned arch
- Two-pinned arch
- Buckling of struts and many more...

KEY FEATURES AND BENEFITS

FUNCTIONALITY: High-quality design and manufacture, combined with modularity, extensive capabilities, choice of hardware and software, means our Structures range provides an unsurpassed teaching solution at an unbeatable price.

EXPANSIVE: The Structures Software provides virtual experiments, which allow students to complete experiments beyond the limits of the equipment.

FLEXIBLE: Experiments are easily removed and swapped for another, making sensible use of laboratory space and time.





GEARS FROM THE BENCH-TOP TENSILE TESTING MACHINE (SM1002)

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.



FREE AND FORCED VIBRATIONS (TM1016)

KEY EXPERIMENTS:

- Performance and pressure distribution around a gas lubricated bearing
- Hertz's theories of contact between materials
- Pressures around a journal bearing
- Cams and followers and their 'bounce' speed
- Geared systems
- Static and dynamic balancing
- Gyroscopes and centrifugal force
- Free and forced Vibrations



BALANCE OF RECIPROCATING MASSES (TM1022)

KEY FEATURES AND BENEFITS

BASIC TO ADVANCED TEACHING: To suit all your laboratory needs.

SAFETY BY DESIGN: Interlocked guards where required prevent accidents.

AUTOMATIC DATA ACQUISITION: Fast moving equipment often requires multiple fast measurements, making data acquisition a powerful tool.

AUTOMATIC DATA ACQUISITION **VDAS**[®]

Most of the products in this range work with TecQuipment's Versatile Data Acquisition System (VDAS[®]).





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, 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.

KEY EXPERIMENTS:

- Boyle's law and Gay-Lussac's law
- Heat transfer
- Peltier and Seebeck tests
- Temperature, humidity and steam
- Single and two-stage compressors



IDEAL GASES -
BOYLE'S LAW
(TD1000)



WATER-TO-AIR HEAT EXCHANGERS (TD1007)

KEY FEATURES AND BENEFITS

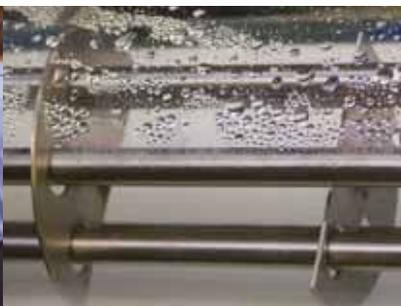
SAFE AND PRACTICAL DESIGN: Reduced experiment times.

BROAD RANGE OF PRODUCTS: Covers from basic principles to gas turbines.

AUTOMATIC DATA ACQUISITION: Thermodynamics experiments need several minutes of constant monitoring to achieve thermal equilibrium, making automatic data acquisition a useful tool.

AUTOMATIC DATA ACQUISITION **VDAS**[®]

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ENGINES

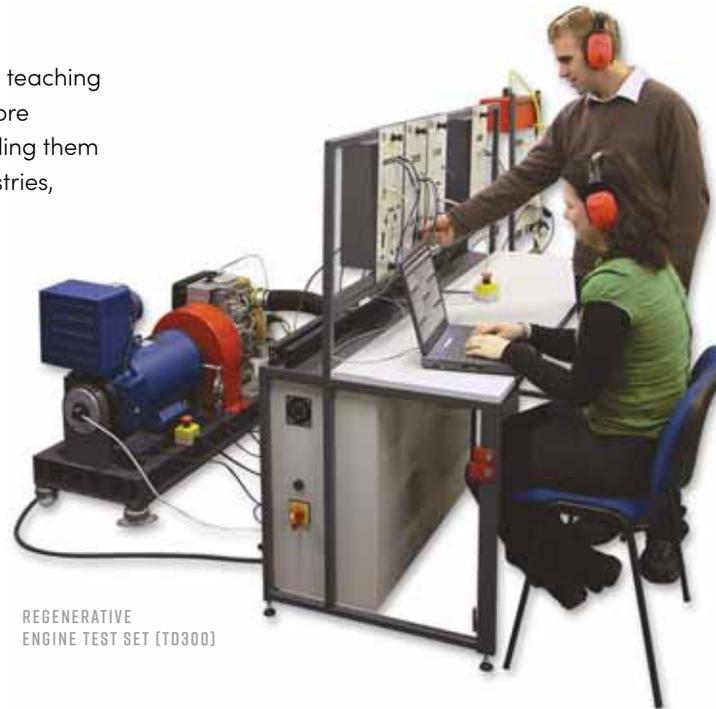


The Engines range offers teaching equipment for a wide variety of engine-specific theory. It covers internal combustion engines, starting with simple four-stroke engines, through to gas turbines/turbojets, along with a steam engine trainer.

The range meets entry level requirements for the general teaching of mechanical engineering, through to addressing 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.

KEY EXPERIMENTS:

- Internal combustion engines
- Steam
- Gas turbines



REGENERATIVE
ENGINE TEST SET (TD300)

KEY FEATURES AND BENEFITS

MODULAR: Entry level packages with further options available.

DESIGNED FOR SAFETY: Suitable for all university student levels.

SPECIALIST: The whole range has been developed to provide the perfect facility for education, both academic and industrial.

AUTOMATIC DATA ACQUISITION

VDAS[®] Most of the products in this range work with TecQuipment's Versatile Data Acquisition System (VDAS[®]).

ADA TecQuipment's gas turbine products work with our unique Gas Turbine software.



ENVIRONMENTAL CONTROL



KEY FEATURES AND BENEFITS

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 TecEquipment'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.

AUTOMATIC DATA ACQUISITION **VDAS**[®]

Most of the products in this range work with TecEquipment's Versatile Data Acquisition System (VDAS[®]).

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, humidity and solar energy; utilising psychrometric and p-h charts.

KEY EXPERIMENTS:

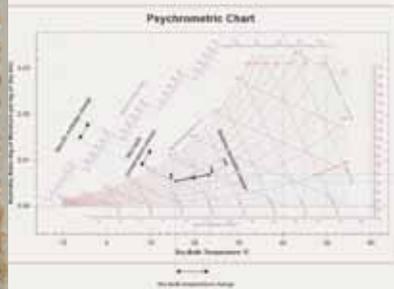
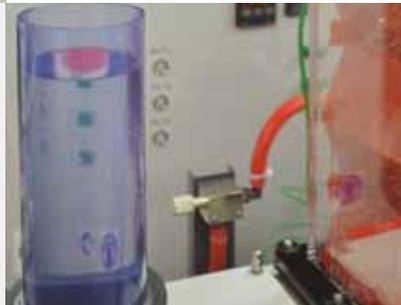
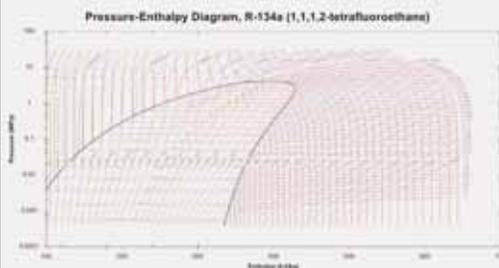
- Cooling
- Air conditioning
- Refrigeration
- Humidity



HUMIDITY MEASUREMENT (TE6)



COOLING TOWERS (EC1000)



SOLAR ENERGY



The Solar Energy range offers teaching equipment for the core principles of solar energy, including photovoltaic cells, flat plate solar thermal energy collectors and focusing solar energy collectors. Students can learn about the efficiencies and limitations of each method of harnessing and converting solar energy for use in the real world.

KEY FEATURES AND BENEFITS

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 you to set up an experiment safely and quickly.



FLAT PLATE
THERMAL SOLAR
ENERGY COLLECTOR (TE39)

KEY EXPERIMENTS:

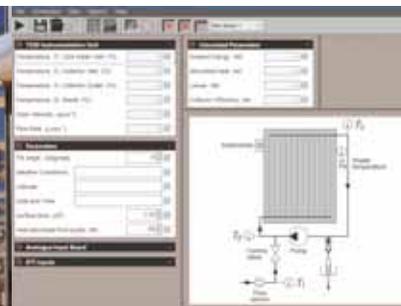
- Performance and use of solar panels
- Performance, advantages and limitations of a focusing solar energy collector
- Efficiency of a flat plate solar energy collector



PHOTOVOLTAIC
CELLS (TE4)

AUTOMATIC DATA ACQUISITION **VDAS**®

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



VERSATILE DATA ACQUISITION SYSTEM



KEY FEATURES AND BENEFITS

- Cost-effective digital automatic data acquisition hardware, software and accessories to enhance teaching and laboratory sessions
- Real-time traces, data capture, monitoring and display of your experiment readings on a computer
- Available in both frame-mounting and bench-top options for convenience
- Similar software layout for all VDAS® compatible products – no need to learn new software when changing experiments

High-capacity, accurate, efficient and user-friendly automatic data acquisition for over 60 TecQuipment products.

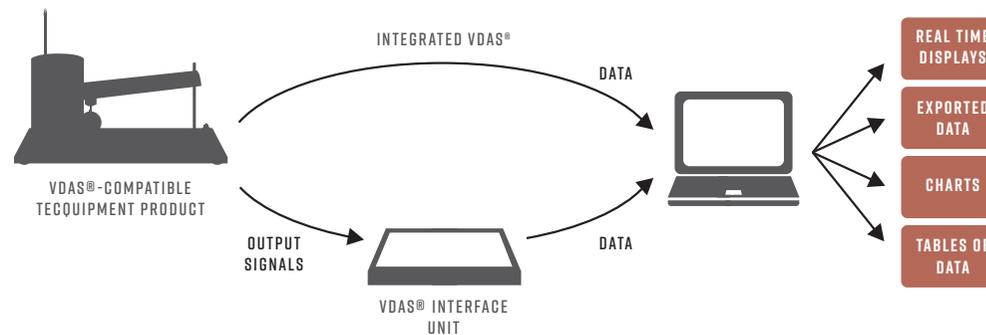


FRAME-MOUNTING AND BENCH-TOP VERSATILE DATA ACQUISITION SYSTEM INTERFACE UNITS (VDAS-F AND VDAS-B)



LABVIEW DATA ACQUISITION

Experimental data from all TecQuipment VDAS® compatible products can be acquired in real-time within National Instrument's LabVIEW software environment. LabVIEW users have the flexibility to extend TecQuipment's software to perform novel data processing, presentation and analysis.



SATISFIED CUSTOMERS AROUND THE WORLD

“

We chose TecQuipment because they ticked all the boxes and some more. They were great to work with from start to finish, from initial discussions at ASEE 2016 in New Orleans, through to the more recent installation, training and commissioning in August 2018. Even when we encountered problems, the Lab Midwest team and TecQuipment dealt with the situation with smiles and joyfulness.

Rachel Friesen, University of Northwestern St Paul, Minnesota



“

TecQuipment is well established as a provider of innovative and well developed science and technology equipment to the education sector, and having previous experience of the services offered and their reliability, then as a local supplier, TecQuipment fits our needs. Installation of the equipment went smoothly, including thoughtful and dedicated induction for both technicians and academics; the example experiments including example data are particularly useful. To date, the FC300 flume/flow channel has been very effective in contributing to our objectives.

Mathew Whomsley, University of Derby



“

We believe that your visit to make our wind tunnel ready to train our students and staff was a great success and we thank you for the great effort you did for us. It was very effective and useful work that raised the spirits of all the Aeronautical Engineering Department staff as well as the College Administration.

Dr Ahmed Ibrahim Ahmed, Dean, College of Engineering, Sudan University of Science and Technology



“

For a number of years I have been using TecQuipment equipment at the Institute of Technology in Bandung. Now at the Polytechnic Manufacturing Bandung it was a logical choice to once again purchase TecQuipment products, given our previous positive experience of working with the company and their local agent in Indonesia, Jitrasindo. Plus, I know from years of use that TecQuipment manufactures good quality products.

Asep Indra Komara, Polytechnic Manufacturing Bandung, West Java, Indonesia

“

At ECU we have been going through a rapid phase of expansion with our engineering programs since 2006. This has involved the establishment of a significant number of new laboratories and workshops, for which we have identified TecQuipment products to be among the best.

Prof Daryoush Habibi, Edith Cowan University, Australia



“

We are pleased with the TecQuipment set we have in our lab. It gives students a valuable chance to revisit the theory related to the material and structural behaviour studied in their mechanics of material and structural analyses courses.

Dr Ghada Karaki, Faculty of Engineering and Technology, Birzeit University, Palestine



TECQUIPMENT



TECEQUIPMENT
ACADEMIA

