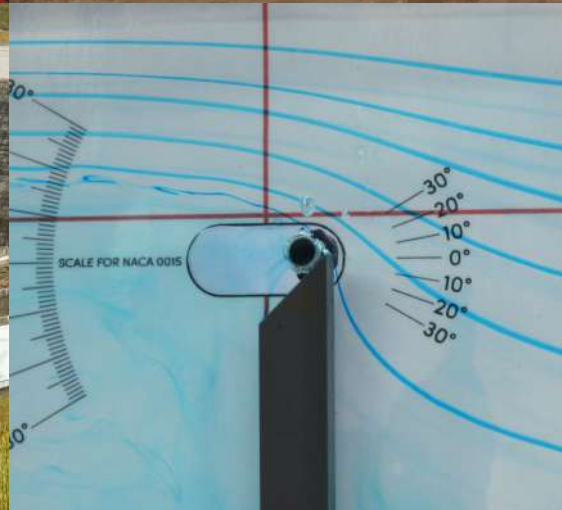


# MILITARY ENGINEERING EDUCATION

ENGINEERING EXCELLENCE IN EDUCATION



TECQUIPMENT



TECQUIPMENT.COM

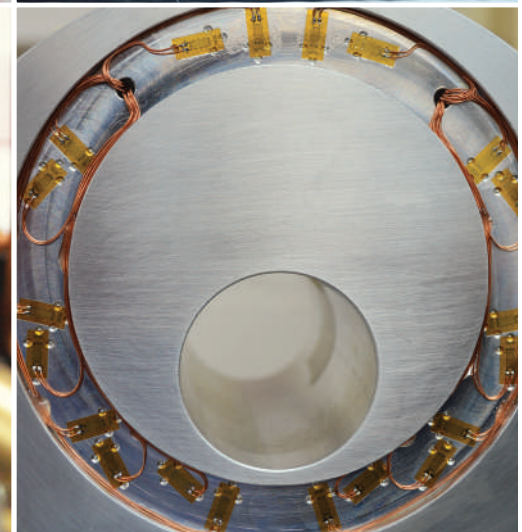
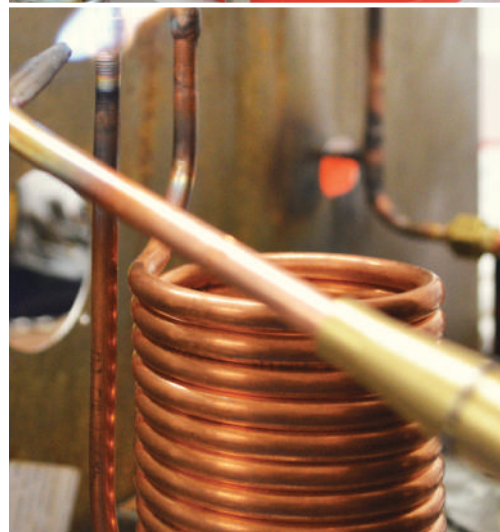
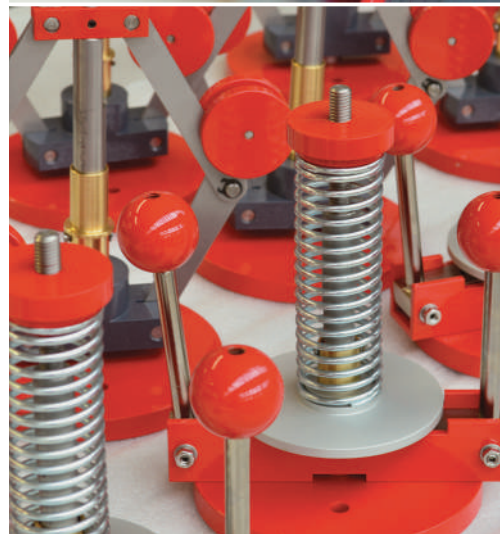
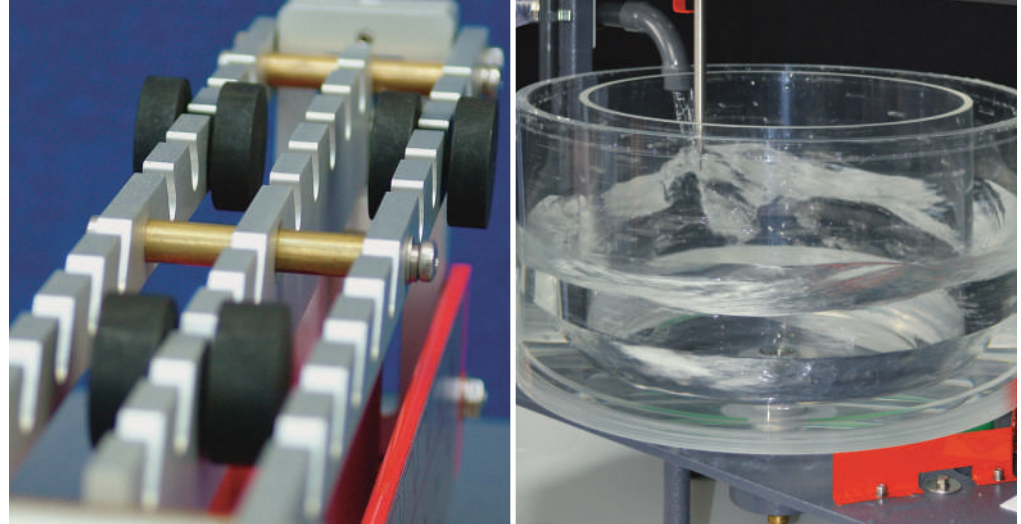
# PIONEERS OF PRACTICAL TEACHING EQUIPMENT

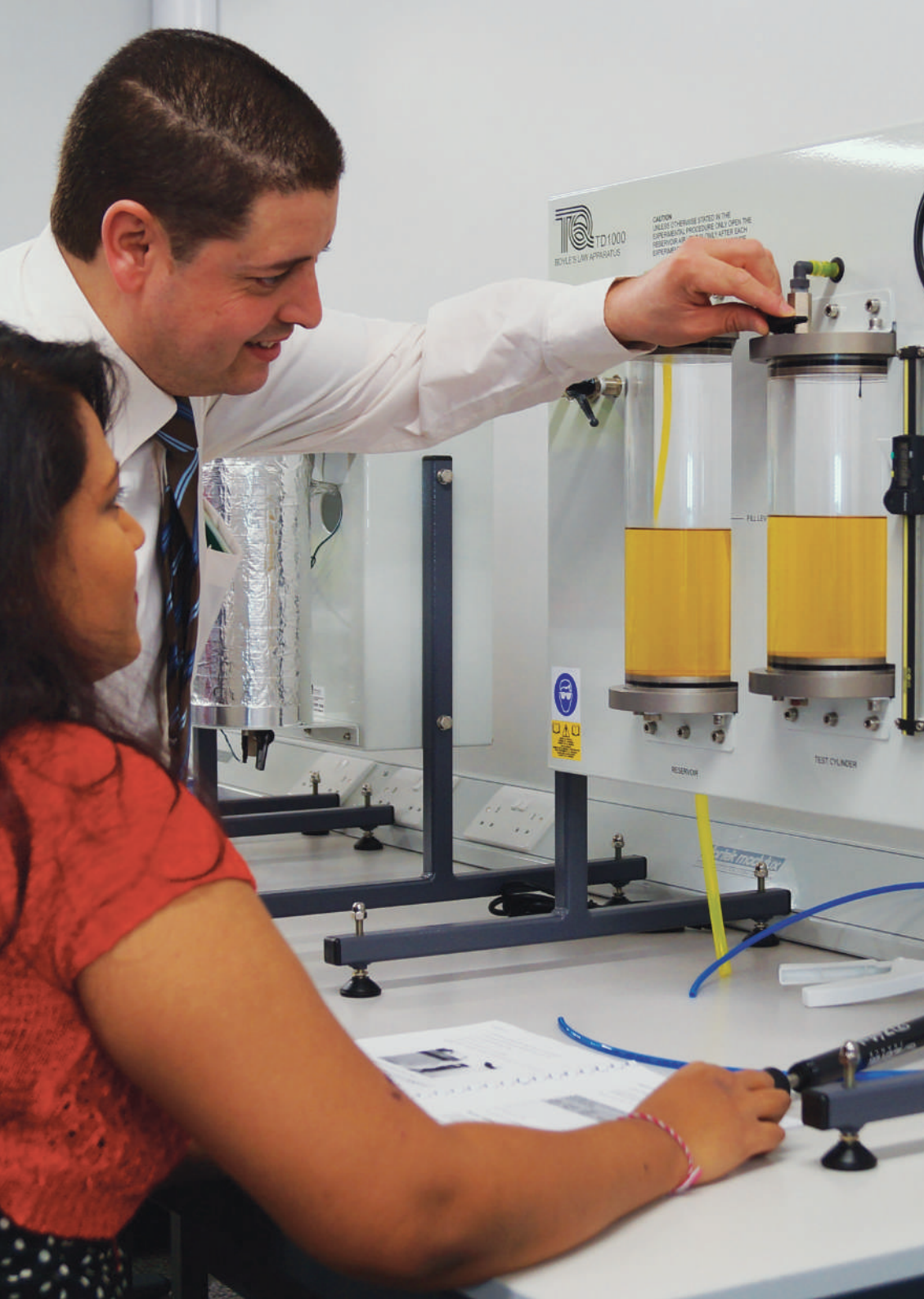
TecQuipment Ltd is a leading manufacturer of educational equipment for engineering programmes, supplying top-tier institutions in over 150 countries around the world.

For over 65 years we have worked with thousands of universities, military schools and training centres across the globe by supplying premium education engineering solutions.

Our products are designed and manufactured by our in-house Engineering team in Nottingham, UK and are designed to support curriculum needs for topics taught by military schools.

We have equipped many state-of-the-art military schools and military colleges all around the world, including Brazil, India, Pakistan, Poland, UK and France.





# CONTENTS

In this brochure you will find links to **VIDEOS** to watch, **DATASHEETS** to view, ancillary **FLYERS** to download and more **INTERACTIVE** content to make your research into TecEquipment's teaching apparatus quick and easy.

If you have any questions please either contact us directly by emailing [sales@tequipment.com](mailto:sales@tequipment.com) or contact your local TecEquipment Sales Partner who can be found on the website at [tequipment.com/sales-partners](http://tequipment.com/sales-partners).

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# MILITARY ENGINEERING EDUCATION

Military engineering encompasses applying scientific principles to solve problems and improve operations within the military. The field of military engineering exists to design and maintain military infrastructure, vehicles, vessels, physical structures, technology and weapons.

Students can pursue a variety of roles as military engineers, including:

- Technicians
- General engineer
- Watercraft engineer
- Aerospace engineer
- Mechanical and electrical engineer
- Civil engineer

TecEquipment has experience in working closely with military schools in supporting them with teaching equipment to help students learn fundamental engineering principles.

# TECEQUIPMENT'S ENGINEERING EXPERTISE

TecEquipment is a community of experienced, multi-disciplinary engineers and fabricators with extensive knowledge and skills applicable to both civil and military applications.

For over 65 years we have built an enviable reputation for designing and developing world-class practical teaching engineering equipment used in university and college labs around the world.



# LEARN FROM PIONEERS IN PRACTICAL TEACHING ENGINEERING EQUIPMENT

Engineers and technicians in the Armed Forces are essential to ensure that all kinds of military vehicles and equipment, deployed in missions around the world, are operational for a range of missions.

Military training schools need the right practical teaching equipment to ensure that their future engineers and technicians understand a broad mix of engineering principles. The maintenance and repair of an extensive range of land vehicles, aircraft and marine vessels to perform a variety of operations successfully in harsh environments is essential.

We have extensive experience in supplying world-class teaching equipment to the global higher education market, ensuring that college and university graduates, who have trained using our apparatus, are highly skilled for a variety of military technical roles. Our close collaboration with the education market helps guide our product development roadmap, ensuring that students are provided with the best teaching equipment to address curriculum needs and so add immediate value when they enter the workplace.



# AN INDEPENDENT COMPANY

We are an employee-owned business and collectively share a passion for developing robust, reliable, high-quality, practical engineering teaching equipment that give students a positive learning experience. As an employee-owned company we are values-led and collectively we are passionate about how each of us contributes to the overall success of our company. We believe that only an employee-owned company can be truly independent and foster a genuinely caring and responsible environment in everything we do, both for ourselves and our customers.



# ENGINEER A PARTNERSHIP WITH TECQUIPMENT

Trust us as your partner to guide, advise and help you choose the most suitable practical teaching engineering equipment for your precise military education training needs and requirements.



# TECQUIPMENT'S PRODUCT RANGES

An extensive product range for all military training needs.

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



The background of the entire page is a high-quality photograph of two F-35 fighter jets. One jet is in the foreground, flying directly towards the viewer, while the other is further away and lower in the frame. They are flying over a vast, undulating sea of white and grey clouds. The sun is low on the horizon to the left, creating a bright, golden glow and casting long, soft shadows across the clouds. The sky transitions from a pale yellow near the sun to a deep, clear blue at the top.

# AIR FORCE

Aviation and aerospace engineering is concerned with the design, development and construction of aircraft and spacecraft. Students need a broad understanding of a range of engineering principles.

TecQuipment has a wide range of products that deal with the fundamental elements of aerospace, including aerodynamics, control engineering, thermodynamics and material properties.



# FIXED-WING AIRCRAFT

## AERODYNAMICS

| Flight Demonstration  
Wind Tunnel AF41V



## CLIMATE CONTROL

6 Refrigeration Cycle  
EC1500V



## AEROFOIL

2 Tapped Aerofoil  
AF18



## AIRCRAFT POSITIONING

5 Gyroscope TMI004



## FUEL TANK MANAGEMENT

3 Coupled Tanks  
Apparatus CE105



## STRESS AND DISTRIBUTED LOADING

4 Deflection of Beams and  
Cantilevers STS4



## 1 FLIGHT DEMONSTRATION WIND TUNNEL AF41V



A model aircraft suspended in an open circuit wind tunnel. Includes realistic fly-by-wire flight controls to simulate a variety of principles of aircraft flight.



## 2 TAPPED AEROFOIL AF18

Allows students to investigate the pressure distribution around a two-dimensional NACA aerofoil that has 12 tapping points along the chord.



## 3 COUPLED TANKS APPARATUS CE105

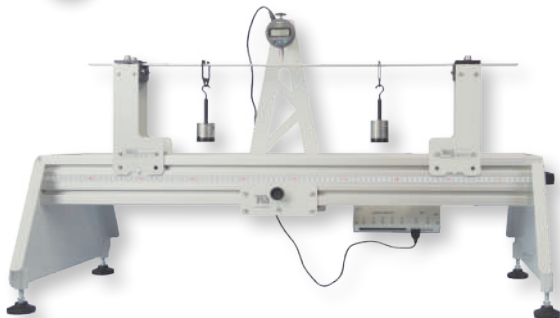
A self-contained benchtop apparatus to demonstrate basic and advanced principles of control of single and coupled tanks, including the study of static and dynamic systems.



## 4 DEFLECTION OF BEAMS AND CANTILEVERS STS4



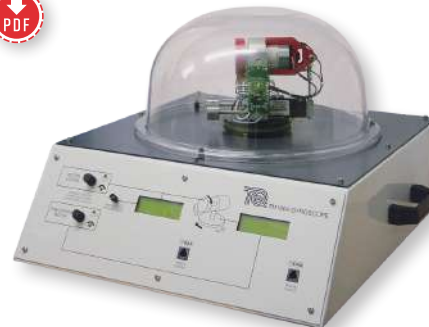
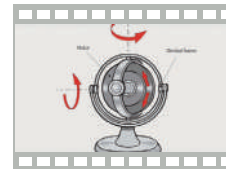
Experiment for the study of beam deflection under different loads and fixing conditions, and the demonstration of Young's modulus.



## 5 GYROSCOPE TM1004



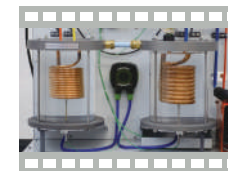
Benchtop apparatus for experiments in gyroscopic couple and velocities of motor and precision.



## 6 REFRIGERATION CYCLE EC1500V



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



# ROTOR BLADE AIRCRAFT

## WHIRLING SHAFT

5 Whirling of Shafts and Critical Speed TM1001



## ROTATING BLADES

4 Static and Dynamic Balancing TM1002



## POWER SYSTEM

Two-Shaft Gas Turbine GT185



## WINCH CABLE

2 Benchtop Tensile Testing Machine SM1002



## LANDING GEAR

3 Ideal Gases – Boyle's Law TD1000



## 1 TWO-SHAFT GAS TURBINE GT185 ADA

A self-contained, fully instrumented, educational two-shaft gas turbine that uses kerosene as the fuel. The experimental capabilities of this apparatus allows comprehensive investigations into the principles and performance of two-shaft gas turbines.



## 2 BENCHTOP TENSILE TESTING MACHINE SM1002 VDAS

SM1002 VDAS

A laboratory-scale hand-driven benchtop tensile testing machine, 20kN capacity.



## HERE TO HELP YOU

A team of specialist customer care personnel are available to answer a range of questions relating to technical details, spare parts and maintenance.

[CUSTOMER.CARE@TECEQUIPMENT.COM](mailto:CUSTOMER.CARE@TECEQUIPMENT.COM)



## 3 IDEAL GASES - BOYLE'S LAW TD1000 VDAS

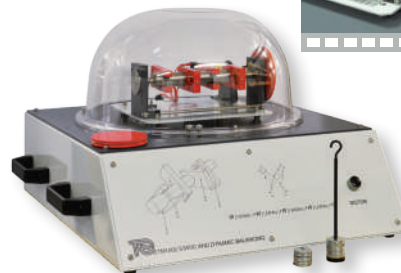
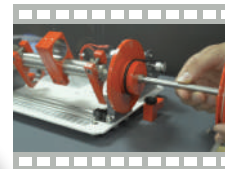
Benchtop apparatus that demonstrates the relationship between pressure and volume of an ideal gas at a fixed temperature.



## 4 STATIC AND DYNAMIC BALANCING TM1002 VDAS

TM1002 VDAS

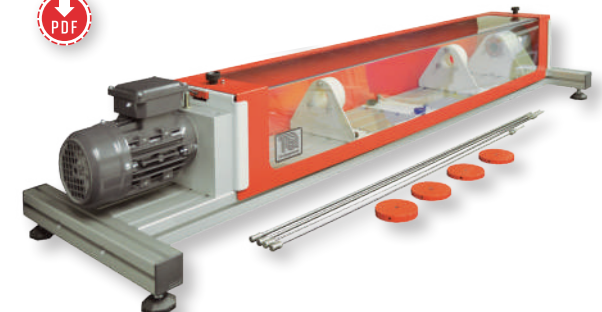
Benchtop apparatus for experiments in balancing a rotating mass system, statically and dynamically.



## 5 WHIRLING OF SHAFTS AND CRITICAL SPEED TM1001 VDAS

TM1001 VDAS

A compact benchtop experiment to demonstrate the phenomena of whirling shafts.



# ARMY

A military land vehicle can serve different purposes depending on its designed use. This can include carrying troops to a battlefield, medical and logistics support, and combat. These vehicles may be modified civilian equipment or purpose-built military vehicles

These vehicles operate in a range of harsh and hostile environments. TecQuipment offers a broad range of practical teaching equipment to help students acquire an understanding of the fundamental principles of engineering to prepare them for a variety of technical roles in the military.



# TANKS

## WIND RESISTANCE

1 Three-Dimensional Drag Models AF1300J



## ENGINES

6 Modified Four-Stroke Diesel Engine TD212



## IMPACT TESTING

2 Energy Absorbed at Fracture TE15



## ARMOUR TESTING

3 Universal Testing Machine SM1000



## ROTATING TURRET

4 Geared Systems TM1018



## CHAIN DRIVE

5 Roller Chain Drive Unit TM1018D



## 1 THREE-DIMENSIONAL DRAG MODELS

AF1300J

Five drag investigation models for use with the TecQuipment AF1300 Subsonic Wind Tunnel: streamlined shape, sphere, hemisphere, "dimpled" sphere, and a flat plate. All the models have a 50 mm frontal area for easy comparison.



## 2 ENERGY ABSORBED AT FRACTURE TE15

A small-scale benchtop notched bar impact tester to provide students with an effective and safe introduction into commonly used material impact testing techniques.



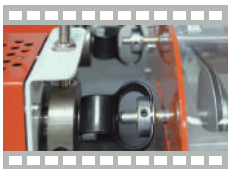
## 3 UNIVERSAL TESTING MACHINE SM1000 VDas®

A versatile benchtop machine for compressive and tensile tests on different materials and structures.



## 4 GEARED SYSTEMS TM1018 VDas®

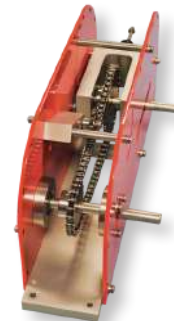
An experimental unit to allow students to find the dynamic efficiency of various drive types. The unit comes complete with a gear drive unit which can be configured as a simple or compound drive.



## 5 ROLLER CHAIN DRIVE UNIT

TM1018D

A roller chain drive unit for use with the Geared Systems (TM1018).



## 6 MODIFIED FOUR-STROKE DIESEL ENGINE

TD212

A four-stroke single-cylinder diesel engine with modified cylinder head and crank, with manual or electric start, for use with TecQuipment's TD200 Small Engine Test Set.



# CIVIL ENGINEERING: DAMS

## PRECIPITATION

6 Advanced Hydrology and Rainfall Apparatus H313V



## PUMPS

5 Centrifugal Pump MFPI01



## PUMPS

4 Pelton Turbine H19



## PUMPS

3 Francis Turbine H18



## FLUID FLOW

Flumes FC80-FC300



## FLUID FLOW

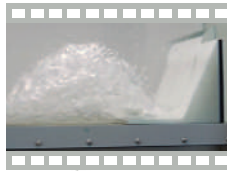
2 Sluice Gate with Tappings FC300C





## 1 FLUMES FC80-FC300

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.



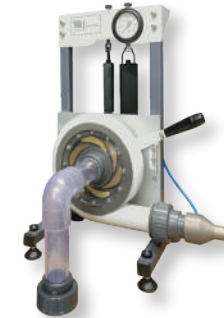
## 2 SLUICE GATE WITH TAPPINGS FC300C

A sluice gate with ten tapings across its face. Enables students to investigate changes in pressure across the face of a sluice gate; also how the pressure varies with flow rate and depth. For use with an FC300 Flume.



## 3 FRANCIS TURBINE H18

A compact experiment for use with the TecQuipment's Hydraulic Bench (H1F) to demonstrate how a Francis turbine works and to test its performance.



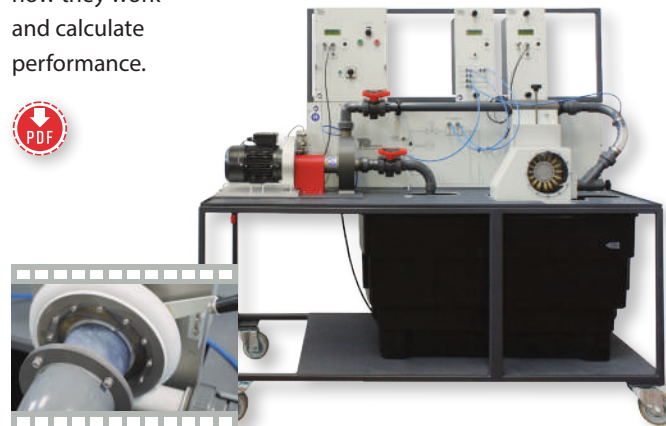
## 4 PELTON TURBINE H19

A compact experiment for use with TecQuipment's Hydraulic Bench (H1F) to demonstrate how a Pelton turbine works and to test its performance.



## 5 CENTRIFUGAL PUMP MFPI01

A self-contained, floor-standing, mobile unit with full instrumentation for studying and performing tests on a centrifugal pump and optional turbines, to understand how they work and calculate performance.



## 6 ADVANCED HYDROLOGY AND RAINFALL APPARATUS H313V

For studying hydrology principles, including rainfall, through flow and movement of water over land and rivers.



# CIVIL ENGINEERING: BRIDGES

A bridge is a structure built to span a physical obstacle (such as a body of water, valley, road or rail) without blocking the way underneath. It is constructed for the purpose of providing passage over the obstacle, which is usually something that is otherwise difficult or impossible to cross. There are many different designs of bridges, each serving a particular purpose and applicable to different situations.

## SUSPENSION BRIDGES

A suspension bridge is a type of bridge in which the deck is hung below suspension cables on vertical suspenders.



### SIMPLE SUSPENSION BRIDGE STS19

The STS19 from the Next Generation Structures product range allows students to study the characteristics of a simple suspension bridge.

The hardware apparatus comes integrated with automatic data acquisition software, VDAS® Onboard, to automatically collect readings.

It also helps students understand the overwhelming influence of the deck mass against the relatively small loads, such as vehicles passing over the bridge.



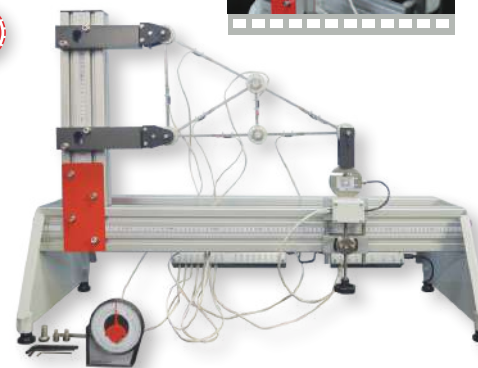
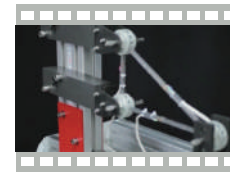
## TRUSS BRIDGES

A truss bridge is a bridge whose load-bearing superstructure is composed of a truss, a structure of connected elements, usually forming triangular units.



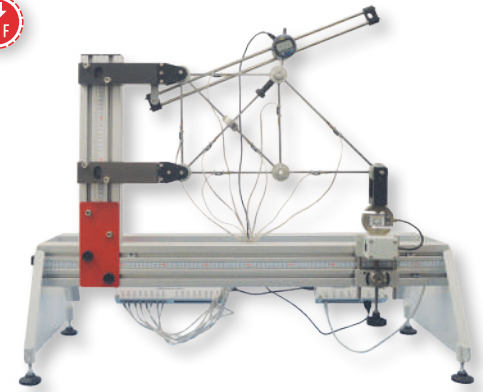
### PIN-JOINTED FRAMEWORKS STS8

Experiment for the study of strains, stresses, forces and deflections in various pin-jointed frameworks, and the study of Bow's notation. This product helps students to understand the forces and deflections in four popular pin-jointed frameworks, due to a load.



### REDUNDANT TRUSS STS17

Experiment for the study of determinate and indeterminate truss structures. Mounts on the Structures platform (STS1) and comes integrated with automatic data acquisition software (VDAS® Onboard).



## CONTINUOUS BRIDGES

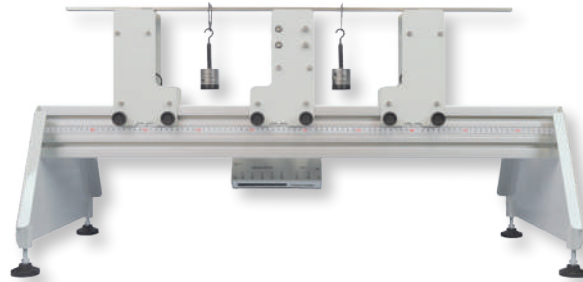
A continuous beam is a structural component that provides resistance to bending when a load or force is applied. A beam of this type has more than two points of support along its length. These are usually in the same horizontal plane, and the spans between the supports are in one straight line.



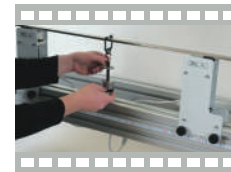
## CONTINUOUS AND INDETERMINATE BEAMS STS13

For this type of bridge design this apparatus is ideal to perform a wide variety of beam experiments, from simple cases to complex problems, to understand forces at key points under the bridge.

Students apply loads to any position along the beams and measure the resulting reactions, deflections and moments. They use textbook beam equations to predict the results for any given load and compare the calculated results with the measured results. This helps confirm the reliability of the textbook equations and the accuracy of the experiment results.



CONTINUOUS AND INDETERMINATE BEAMS EXPERIMENT



EXAMINING THE CENTRAL LOAD POINT

## SHEAR FORCE IN A BEAM STS3

Experiment that illustrates and proves the basic theory of shear force in a beam.



## TWO-PINNED ARCH BRIDGES

A two-pinned arch has a hinge at the base of each arch (the springing point), while a three-pinned arch has a third hinge at the crown of the arch. In a two-pinned arch bridge no bending moments are transferred to the abutments, due to the presence of the hinge.



## TWO-PINNED ARCH STS10

This apparatus helps students to understand how loads affect the horizontal reaction forces in a two-pinned arch.

In this example of a bridge, forces are transferred outward from the centre to the side.



An aerial photograph showing three large, modern naval ships, likely frigates or destroyers, sailing in formation on a deep blue sea. The ships are painted in a dark blue-grey color and feature complex superstructures with various radar masts, antennas, and gun turrets. Each ship has a helicopter landing deck on its upper deck. The ships are moving from the top left towards the bottom right, leaving white wakes behind them. The sky is clear and bright, suggesting a sunny day.

# NAVY

Naval architects work on the basic design of ships, including the form and stability of hulls. They are involved in designing, building and maintaining the engines, propulsion, steering, systems and equipment used in ships, remote-operated vehicles, as well as subsea and offshore installations. Marine engineers are concerned with ensuring that the ship's systems function as per the design.

# SHIPS

## ENGINES

5 Four-Stroke Diesel Engine TD302



## PUMPS

4 Axial Flow Pumps MFPI02



## THERMODYNAMICS

6 Ideal Gases – Boyle's Law TD1000



## PUMPS

3 Centrifugal Pump Test Set H47



## STABILITY

2 Metacentric Height and Stability H2



## WAVE SPLITTER

1 Flow Splitter FC80U



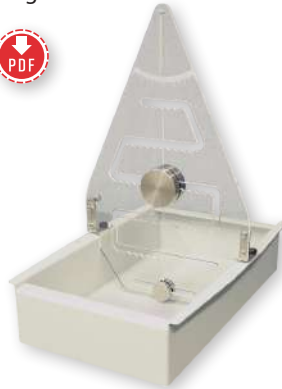
## 1 FLOW SPLITTER FC80U

A flow splitter apparatus to extend the range of applications and experiments for the FC80 Flow and Sediment Channel range.



## 2 METACENTRIC HEIGHT AND STABILITY H2

A benchtop apparatus to determine the stability of a pontoon with its centre of gravity metacentric height and metacentre at various heights.



## 3 CENTRIFUGAL PUMP TEST SET H47 VDAS®

A self-contained, floor-standing mobile unit consisting of a water reservoir, pump, motor and Venturi meter for a comprehensive range of investigations into the performance and characteristics of a centrifugal pump. Demonstrates cavitation and the use of a Venturi tube.



## 4 AXIAL FLOW PUMP MFPI02 VDAS®

A self-contained, floor-standing mobile unit consisting of a water reservoir, pump, calibrated nozzle and valves. It allows students to study and perform tests on an axial flow pump to understand how it works and calculate its performance.



## 5 FOUR-STROKE DIESEL ENGINE TD302

A four-stroke single-cylinder diesel engine with modified cylinder head and crank for use with TecQuipment's TD300 Regenerative Engine Test Bed.



## 6 IDEAL GASES - BOYLE'S LAW TD1000 VDAS®

Benchtop apparatus that demonstrates the relationship between pressure and volume of an ideal gas at a fixed temperature.



## TECQUIPMENT NEWSLETTER SIGN-UP



Don't miss out on the latest new products, case studies, demonstration videos and blog posts. Sign up to the TecQuipment newsletter today.

[TECQUIPMENT.COM/SUBSCRIBE](https://www.tecquipment.com/subscribe)

# SUBMARINES

**HEAT TRANSFER**  
5 Radiant Transfer Experiments TD1003



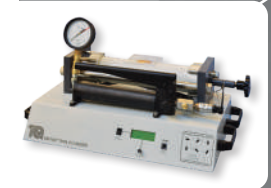
**MATERIALS STRESS**  
1 Rotating Fatigue Machine SM1090V



**VISUALISING FLOW PATTERNS**  
4 Flow Visualisation FC15



**PRESSURE**  
2 Thin Cylinder SM1007



**PRESSURE**  
3 Centre of Pressure H11



## 1 ROTATING FATIGUE MACHINE SMI090V

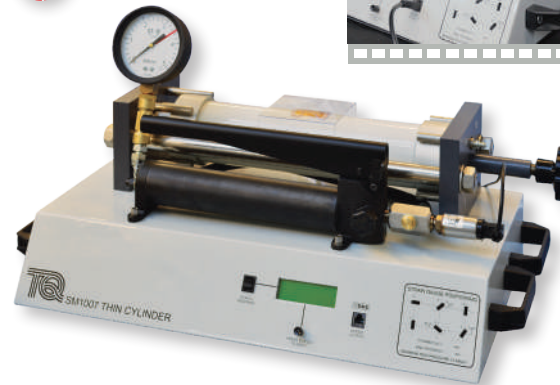
This machine demonstrates the fatigue failure of materials when subject to alternating stresses. Based on Wohler's design, it uses a motor to rotate a circular cantilever specimen with a load at its free end.

A useful experiment for students to understand how pressure and stresses will impact the rotor propellers of a submarine when it is submerged at great depths.



## 2 THIN CYLINDER SMI007

A benchtop apparatus to allow the stresses and strains of a pressurised thin-walled cylinder to be investigated and analysed.



## 3 CENTRE OF PRESSURE H11

A pivoted clear plastic assembly which students use to find the centre of pressure of a totally or partially submerged plane surface. Compact, self-contained and excellent for classroom demonstrations.



## 4 FLOW VISUALISATION FC15

A compact, entry-level piece of equipment for visualising flow patterns around weirs and other objects in an open channel. Can also be used with the included lock gates to perform wave flow experiments.



## 5 RADIANT TRANSFER EXPERIMENTS TD1003

A benchtop unit to show the laws of radiant transfer from heat and light sources.



## PRODUCT DEVELOPMENT

Products are continually being improved. For the latest up-to-date specifications refer to the digital datasheets on [TECEQUIPMENT.COM](http://TECEQUIPMENT.COM)





# SATISFIED CUSTOMERS AROUND THE WORLD

“

The Structures equipment from TecEquipment is being used to teach student groups at undergraduate level. There is minimal setup required and students are easily able to switch between experiments. The excellent quality of the TecEquipment manuals has enabled us to design our labs with relative ease. The equipment was delivered on schedule and the AYVA team has been very diligent in following up and providing us with the resources we need in a timely fashion.

DR H J KWON, PROFESSOR, DEPARTMENT OF MECHANICAL AND MECHATRONICS ENGINEERING, UNIVERSITY OF WATERLOO, CANADA



“

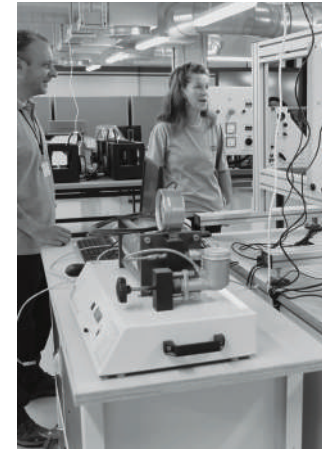
For a number of years now we have procured laboratory-based teaching resources from TecEquipment for use within mechanical and electrical engineering laboratories. Operation of this equipment, coupled with the robust build quality, provides students with a clear understanding of the intrinsic features behind thermo-fluids and mechanical principles. This instils confidence for a safe, hands-on experience demonstrating these principles in practice. Furthermore, the build quality of TecEquipment products also gives assurance that the investment made satisfies our ongoing teaching needs well in to the future

GRAHAM PREECE, FACULTY OF COMPUTING, ENGINEERING AND SCIENCES, STAFFORDSHIRE UNIVERSITY

“

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.

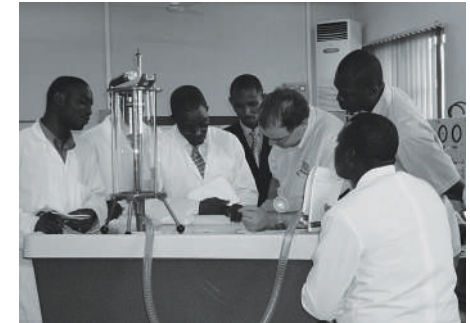
DR AHMED IBRAHIM AHMED, DEAN, COLLEGE OF ENGINEERING, SUDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY



“

Our students are comfortable while using products from TecEquipment in labs. Highly innovative products by TecEquipment Ltd for engineering education are ideal for engineering and technical education at all levels. Our students are regularly using this equipment for masters and doctoral research. The products are user-friendly and need minimum after-sales service.

PROF R D MISAL, DEFENCE INSTITUTE OF ADVANCED TECHNOLOGY, GIRINAGAR, PUNE, INDIA UNIVERSITY OF SCIENCE AND TECHNOLOGY



“

The TecEquipment teaching solutions and scalable teaching equipment has allowed the Thermal Engineering and Energy Department to provide training up to Masters degree level with continuous and undeniable quality.

PROF JEAN-NOËL BLANCHARD, IUT ORLEANS, FRANCE

“

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 TecEquipment products to be among the best.

PROF DARYOUSH HABIBI, EDITH COWAN UNIVERSITY, AUSTRALIA



## GET IN TOUCH

Contact the Sales team at TecEquipment's headquarters:

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