

# Mecmesin

testing to perfection

## Force & Torque Test Solutions



# Automotive

industry

# Introduction

**Your reputation depends on superior performance in every moving part. Wherever you need to measure compression, tension, adhesion or torque, we at Mecmesin can provide the means, in the most accurate and straightforward way.**



Steering torque test

The global automotive industry has never been more competitive. Challenges on materials, fuel efficiency, and recycling are adding to ever-increasing market demands for performance, price and safety. Whether it is a truck, a public transport vehicle or a family car, massive complexity is combined with user sophistication.

Tens of thousands of components from around one hundred suppliers go into the production of an average car. Each piece is integral to the reputation of each brand in the supply chain.

Parts failure is costly, leading to lost time during sub-assembly manufacture, vehicle recall, or expense to the end-user for repair and replacement.

Safety-critical features must never fail, so total compliance with standards is essential. Only rigorous testing at every stage will suffice, and the testing must be cost-effective, accurate and reliable.

## Test approaches and standards

Whether you are a supplier to the automotive trade of components, sub-assemblies or spare parts, or an OEM brand vehicle manufacturer, your reputation will depend on compliance with industry standards, internal specifications and customer expectations. Fast and accurate measurement with reliable **Force & Torque** test equipment is an essential part of controlling the quality of your products and assuring your brand position.

Using Mecmesin **Force & Torque** test equipment you can:

- Strength test to destruction or apply 'minimum loads'

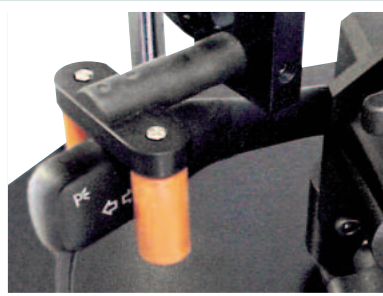
This helps to:

- monitor consistency of component performance from design to tooling, between manufacturing plants and suppliers
- identify component defects early to enable rapid response and production line adjustments
- evaluate supplier build quality by batch testing goods-in

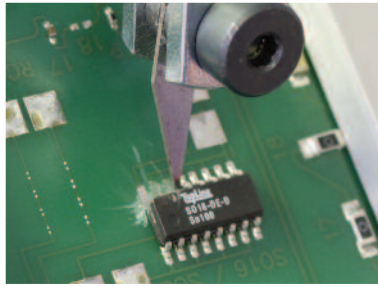
## Key benefits

- **Confidence** - from checking calibrated tooling, to component and assembly testing
- **Consistency** - between plants and suppliers, at production line level
- **Conformance** - the right equipment to test to industry standards
- **Precision** - accurate testing of all components, from membrane switches to torsion bars
- **Performance** - quality assurance across the entire product component range
- **Traceability** - sample tagging and operator identification for batch testing and analysis
- **Responsiveness** - rapid test programming, switching between tests and sample changing
- **Reliability** - protect your brand, wherever you are in the manufacturing chain
- **Service** - expert advice and custom engineered solutions

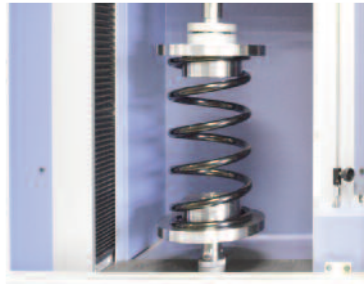
# Force & Torque Applications



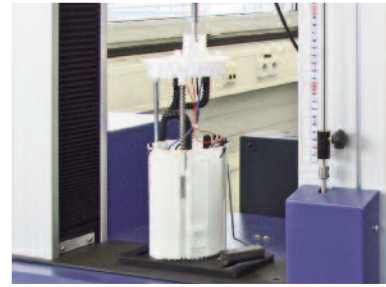
Checking operating torque of steering column controls



Pull-off strength of circuit board components



Compression testing a suspension spring



Tensile testing a fuel pump assembly

## Mecmesin test systems applications

- Spring testing
- Soldered flexi-circuits tensile test (component pull-off)
- Wiring harness terminal testing (crimp strength)
- Connector pull test on fuel-injection components
- Dashboard controls testing (switch, stalk, and membrane, push and twist effort)
- Compression testing the membrane buttons of a key fob
- Stall torque of motorcycle engines
- Vehicle door opening/closing effort
- Windscreen flexure and strength
- Car window sliding force (glass/rubber friction test)
- Seat operating efforts (headrest, recliner, etc)
- Window and sunroof winder torque
- Determining the break-back force of door mirrors
- Car bumper deformation testing
- Steering rack torque measurement
- Brake pad attachment shear strength
- Seat belt release effort under tension
- Airbag connector pull strength (pull-test weld to break)
- Interior cord, plastic toggle fasteners, and webbing tie-down bonds
- Adhesives strength; structural use and interiors
- Puncture, tear and peel of HGV curtains, straps and restraints

quality  
efficiency  
cost reduction



Test the force to open the door and adjust the seat



Wing mirror fold test



Engine components test

# Structural & Mechanical

**Automotive components are placed under constant stress, in assemblies that are replaceable but not repairable, and often with relative inaccessibility. Many parts are designed for safety to collapse or deform, and to be replaced.**

Other parts are more cosmetic, such as trims and finishes, which nevertheless represent the design standards and build quality of the brand. All are secured by joints, fastenings and adhesives that must perform within tight tolerances over the life of the vehicle.

Physical testing to check the strength of automotive parts is an essential way to assess their quality.

Mecmesin's force gauges and test stands are designed to measure from a few millinewtons right up to 50 kN - ideal for testing the smallest spring through to the toughest steering arm.

## Typical test examples

- Threaded fasteners - residual torque
- Crimp joint fasteners - pull-off strength
- Springs, clips, locks and catches
- Door slam effort and handle pull
- Electric window anti-pinch and stall control
- Driver control efforts: steering, pedals, levers
- Steering arm strength under compression and tension
- Panel strength, ductility and spring-back behaviour
- Windscreen flexure



Suspension spring under compressive test on a Mecmesin MultiTest 25-i system



Pedal force testing



Slam force of car door



Testing torque with or without power steering

# Safety

Automotive safety systems are covered by a wide range of industry standards, covering materials strength and durability, to precise actuation forces and response times. Mecmesin force testing systems are versatile enough to meet all these needs.

# reliability conformance

## Typical test examples

### Air bag actuator components

Airbags deploy within 25 milliseconds, triggered by multiple g-force sensors that require precision force testing, acting through mechanical connectors that must not fail.

### Seat belt webbing strength

Ensuring the tensile strength of the belt is sufficient to withstand the forces applied to it in an emergency. ▶

- Belt retractor effort
- Buckle release effort under tension
- Anchor attachment point strength
- Interior panel and bumper/fender deformation
- Emergency door release effort
- Emergency handle operation



Seat belt release effort under tension



Air bag actuator testing



Emergency exit release effort

# Electrical & Electronics

Automotive electronics are subject to wide temperature ranges, vibration and stress. Component integrity and connector strength are essential guarantors of durability, but also ease of assembly, replacement or maintenance.

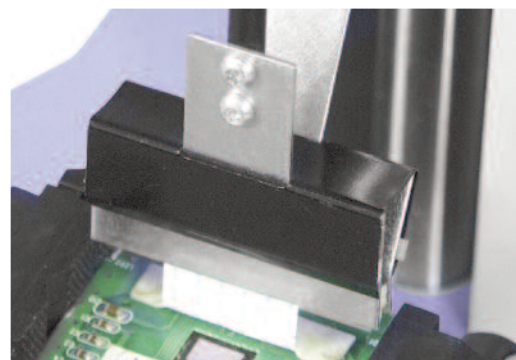
integrity  
durability

## Typical test examples

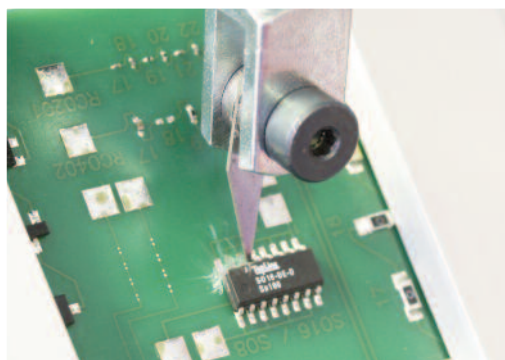
- Pull-off strength of crimped terminals
- Insertion and withdrawal test of connectors
- Control and switch effort
- Spark plug pull-out effort
- Tensile strength and shear test of PCB components



Tensile testing of crimped and welded joints



Adhesive peel testing



Pull-off strength of soldered components



Torque testing of rotary switch

# Power & Braking

Whilst the greatest stress forces take place in power-assisted braking, steering and suspension, these systems are supported by electrical, fuel & hydraulic systems. Mecmesin test equipment covers the full range of tensile and compression forces involved in quality control of these assemblies.

consistency  
safety

## Typical test examples

### Torque testing of:

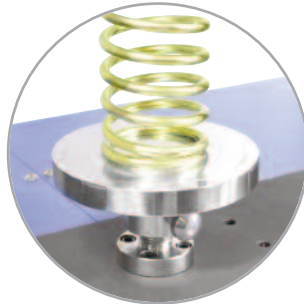
- Engine components

### Compression & tension testing of:

- Fuel delivery assemblies
- Brake lining shear strength
- Clutch spring strength

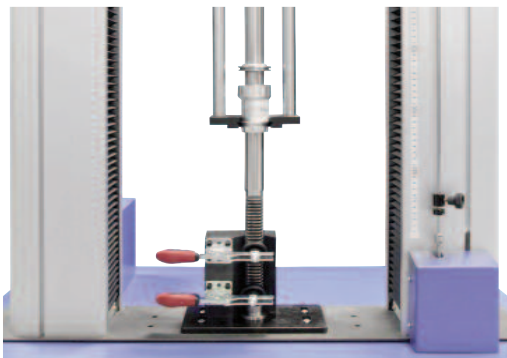
### Pull testing of:

- Hydraulic connectors



Force

Spring compression testing using a 10 kN test system fitted with safety guard



Tension & compression testing of a steering rack component



Measuring shear strength of brake linings



Torque testing a motor shaft

# Interior

The quality of a vehicle interior is key to the driver or passenger experience. Perceptions of quality are measured by dashboard controls that provide optimal resistance, trim that is durable and secure, seats that move easily but engage positively, and locks or catches that operate smoothly. Mecmesin test equipment is ideal for quantifying all these parameters.

quality  
usability  
resilience

## Torque

### Typical test examples

- Dashboard control and mirror efforts
- Seats, linings, textiles: deformation, tensile and puncture strength
- Adhesives peel strength
- Clip fastening forces
- Plastic panels and rubber seals
- Seat fold-and-restore effort
- Handles, levers and releases
- Sun visor and rear shelf pull-out forces



usability  
consistency



Strength of interior door trim fasteners



Rotary controls under torque test



Automotive windscreen wiper stalk test



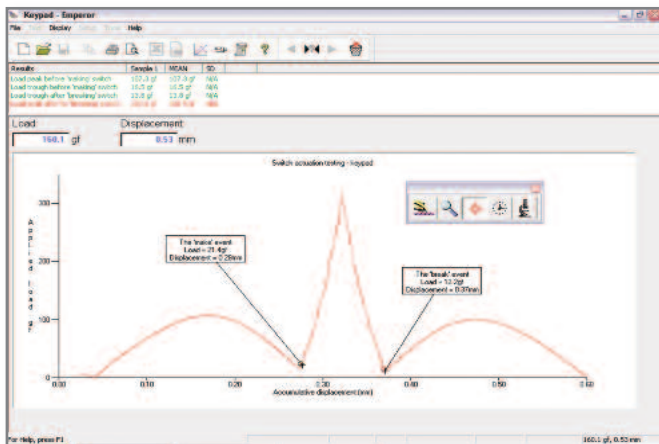
# Emperor™ Data-acquisition & Control Software

Created for ultimate force and torque test performance, Mecmesin's Emperor™ software is a fully-featured programming environment for use with our top-of-the range MultiTest-*i* and Vortex-*i* computer-controlled test systems.

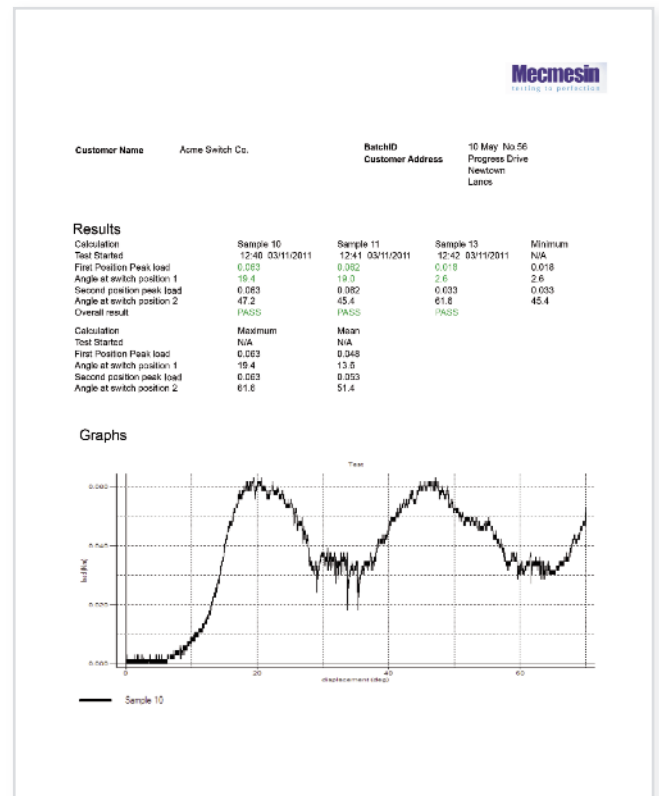
simplicity  
efficiency  
accuracy

## Key Features

- **Easy to use:** simple user interface combined with powerful functionality
- **Programmable:** develop sophisticated test programs
- **Visual:** see test performance displayed in real time
- **Control:** replay, analyse, archive, download data
- **Flexible:** customise settings and layout to suit your requirements
- **In-depth analysis:** use standard reports or export results to external software



Switch test results with opening and closing points identified



Printable report; can also be viewed as a PDF



Testing switch actuation on a key fob



Measuring torsion-sprung lock effort



Spring testing in a fuel pump assembly

# A Brand you can Trust

Mecmesin provides a comprehensive range of force and torque testing solutions to a wide variety of automotive customers worldwide.

safety  
conformity  
integrity

## A small selection of Mecmesin's customers

- Behr Thermotronic
- BMW
- Bosch Group
- Bridgestone
- Ford
- Johnson Controls
- Keiper
- Magal AWT
- Magneti Marelli
- PSA Peugeot Citroen
- Renault
- TVS Motor
- Yanfeng Visteon
- Yazaki Group



## A wide range of products available...

### Force Testing Systems

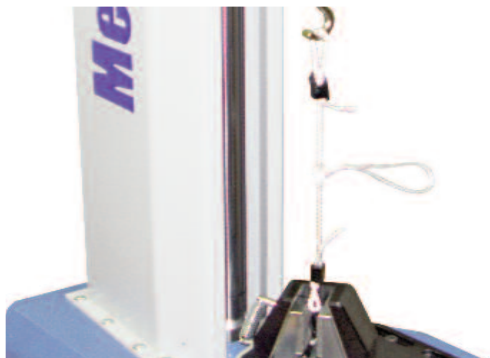
From single-column to twin-column frames. Mecmesin can measure tensile and compressive forces from 0 - 50 kN.



Testing a tension spring using a MultiTest 5-i



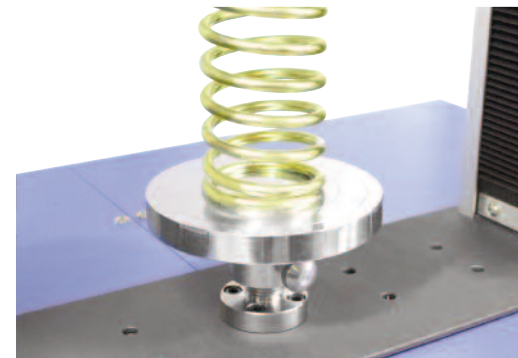
Tensile test using a MultiTest 25-i



Seat coverings use toggle fasteners; tested for strength



Airbag connector pull test



Spring testing in all components

# Testimonials

Quality professionals worldwide rely upon Mecmesin force & torque measurement products to quantify and guarantee the quality of their raw materials, components or finished products.

## Cyprium Ltd

'We have been very satisfied with our purchase of the Mecmesin MultiTest 1-x, it has become an essential part of our quality control system and allows us to calibrate our tooling and ensure our product is as reliable as possible in the severe environment of motorsport.'

**Nigel Barber, Senior Engineer**

## A wide range of products available...

### Torque Testing Systems

The Vortex range of motorised torque testers accurately measures loads from 0 - 10 N.m



### Force & Torque Gauges

Rugged, reliable and accurate.

### Smart Transducers

Rotary and static torque transducers, pinch sensors, S-Beam, button and donut loadcells....

For integration into your own test rigs or use as hand-held testers.



## Testimonials

### Yazaki Europe, supplier of automotive components

"To survive in the automotive business today, we need partners that fully understand Total Cost Performance when supplying to this industry. Mecmesin was able to respond to our needs by supporting our standardisation initiatives, lowering costs, supplying direct, and providing initial excellent technical support to enable our factories to be self-sufficient."

Fernando Cadilhe, Global Procurement

### Bridgestone TG, Adelaide

'The Mecmesin instruments are always so easy to use and Mecmesin really understands what is going on in a laboratory like ours.'

Tony Faure, Laboratory Manager

### Nexteer Automotive (Suzhou) Co. Ltd

'Mecmesin's products are a vital part of our quality control system.'

Quality Department

### Bosch Automotive Products (Suzhou) Co. Ltd

'The Mecmesin system is excellent, and simple to operate.'

George Sha, Laboratory Manager

### Yanfeng Visteon Automotive Electronics

'We use Mecmesin equipment for its performance and reliability. It works really well.'

Jacky Zhang, Lead Engineer

### Yanfeng Visteon Excelsior Automotive Instrument Co. Ltd

'Mecmesin's products are of good quality. We have used the equipment for quite a long time and it is very durable.'

Jingyang Tan, Factory Manager



For further information about Mecmesin test equipment, ask for our product-specific brochures, or visit our website [www.mecmesin.com](http://www.mecmesin.com)

# Mecmesin

testing to perfection

## Mecmesin - a world leader in affordable force and torque testing solutions

Since 1977, Mecmesin has assisted thousands of companies achieve enhanced quality control in design and production. The Mecmesin brand represents excellence in accuracy, build, service, and value. In production centres and research labs worldwide, designers, engineers, operators, and quality managers endorse Mecmesin force and torque testing systems for their high performance across countless applications.

[www.mecmesin.com](http://www.mecmesin.com)



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The Mecmesin global distribution network guarantees your testing solution is rapidly delivered and efficiently serviced, wherever you are.



Certificate No. FS 58553

DISTRIBUTOR STAMP

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