Force & Torque Test Solutions

Automotive industry
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
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

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.
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.

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
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.

**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
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.

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

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
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.

**Interior**

**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

**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.

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

A small selection of Mecmesin’s customers

- Behr Thermotronik
- 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.

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

Bosch Automotive Products (Suzhou) Co. Ltd
‘The Mecmesin system is excellent, and simple to operate.’
George Sha, Laboratory Manager

Nexteer Automotive (Suzhou) Co. Ltd
‘Mecmesin’s products are a vital part of our quality control system.’
Quality Department

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

A wide range of products available...

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

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

Testimonials

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

Automotive stalk test using a Vortex-xf torque testing system

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.

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

Bosch Automotive Products (Suzhou) Co. Ltd
‘The Mecmesin system is excellent, and simple to operate.’
George Sha, Laboratory Manager

Nexteer Automotive (Suzhou) Co. Ltd
‘Mecmesin’s products are a vital part of our quality control system.’
Quality Department

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
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

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