



TEST INDUSTRY



Tire testing presentation

■ The group in numbers

2



150+

Employees

3

Manufacturing plants

3000+

Installed test stands

600+

Customers

33

Countries

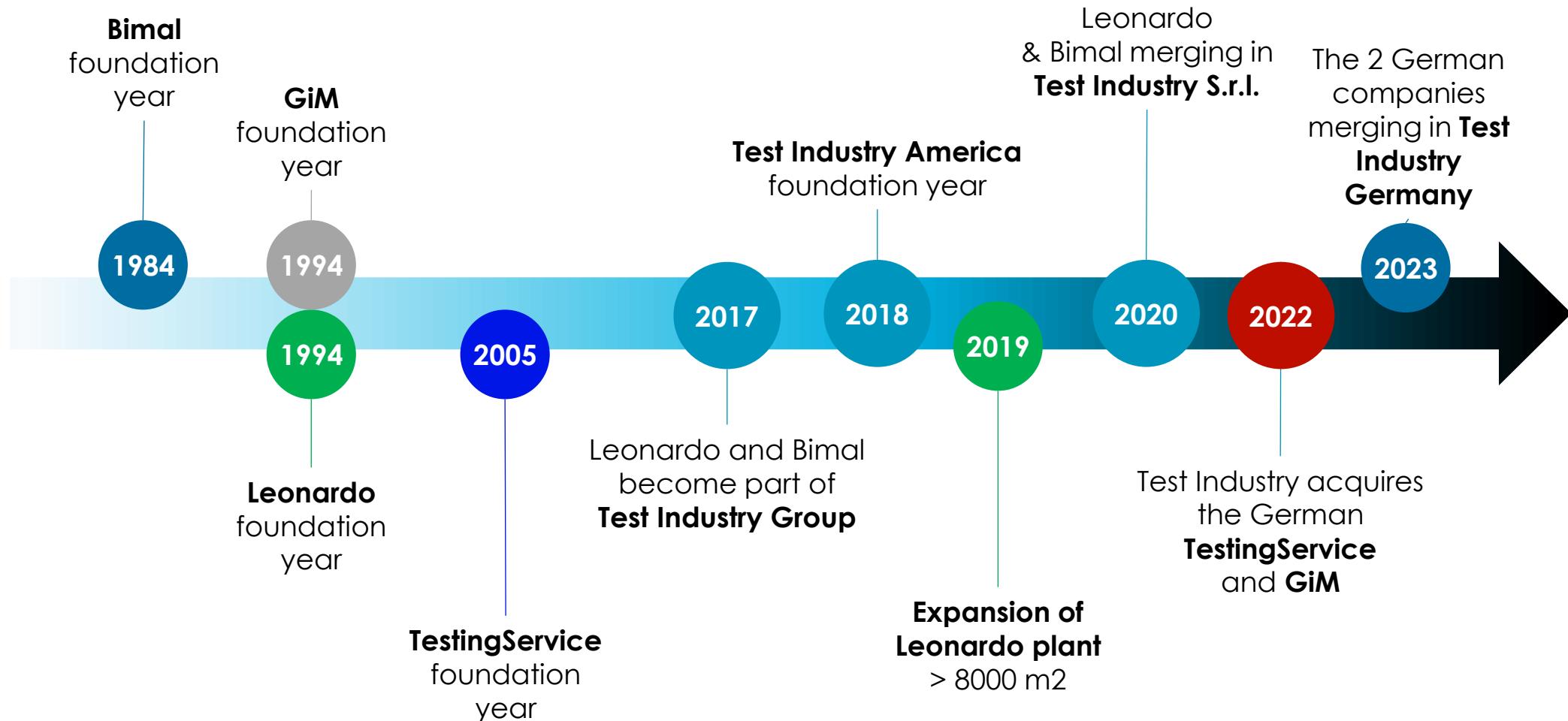


■ Manufacturing plants in Italy and Germany

3



History of Test Industry



■ Turk-key Projects

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**MECHANICAL
DESIGN**



**ELECTRICAL
DESIGN**



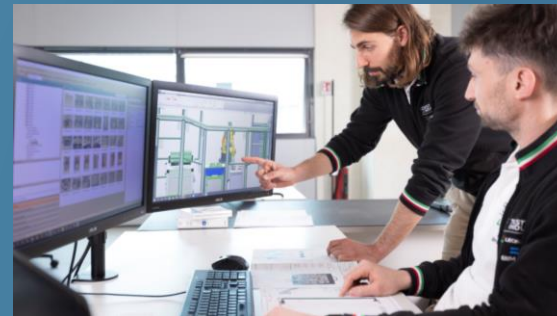
**SOFTWARE
DESIGN**



**QUALITY
CONTROL**



ASSEMBLY



**INSTALLATION &
TRAINING**



■ Main customers in the Tire industry



TRELLEBORG



YOKOHAMA

PROMETON



petlas®



SUMITOMO
TIRES



apollo
TYRES



JK TYRE
TOTAL CONTROL



NEXEN
NEXEN TIRE

MAXXIS®
TIRES

KENDA
SINCE 1962 TIRES



■ Main customers among Tire Testing Laboratories

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Applus⁺
IDIADA



HASETRI



الشركة السعودية للمختبرات الخاصة
Saudi Specialized Laboratories Co.



KATECH
자동차부품연구원

المواصفات السعودية
Saudi Standards



Test Industry



THAILAND
AUTOMOTIVE
INSTITUTE
สถาบันยานยนต์



■ Tire testing machines for R&D, Lab and production line ∞



■ Endurance/High-Speed test of MC-PC-LT-TB tires

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- Functional principle:** Endurance and High-Speed Testing
- Application:** Legal testing according to the test procedures of the different countries. Customized endurance / High speed test as per companies test standards
- Test specimen:** Motorcycle, passenger car, light truck, truck and bus tires
- Technical data:** Testing positions: 1 / 2 / 4 / 6 positions
- Drum diameter: 1,7m or 2.0m
 - Drum motor: AC-Motor
 - Radial Load: 1, 2, 5, 10, 15 tons
 - Loading principle: pneumatic, hydraulic, electric
 - Test Speed: 120, 150, 200, 350, 400 km/h
- Test Standards:**
- FMVSS 109 / 119 / 139
 - ISO 10231, ISO 10191
 - SAE J1561, SAE J1633
 - UN ECE R30, R54, R64, R75, R106, R108, R109



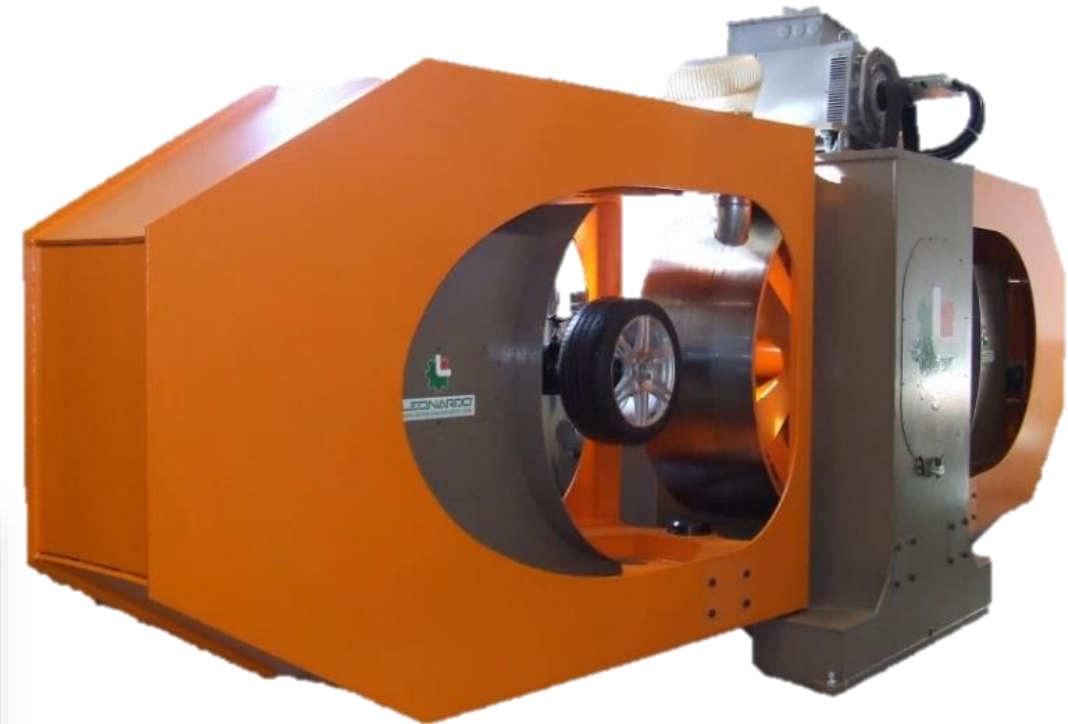
■ Slip&Camber Endurance test of MC-PC-LT-TB tires



Family of machines suitable to perform the Endurance test of tires with the application of Slip and Camber Angles, adjustable in real time during the test.

Main features:

- Slip and Camber angles automatically controlled during the cycle
- High flexibility for cycle setup (Excel steps sequence)
- Ring structure of loading station ensures high rigidity with Slip/Camber applied
- Human Machine Interface (HMI) by PC
- Safety checks like bulges detection, tire pressure and temperature during test



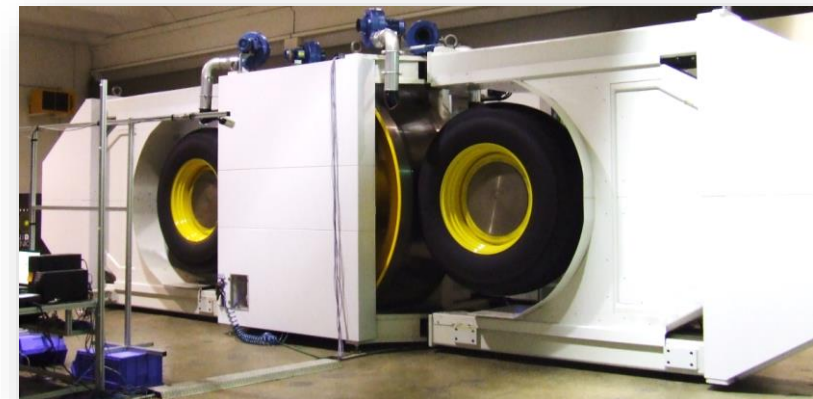
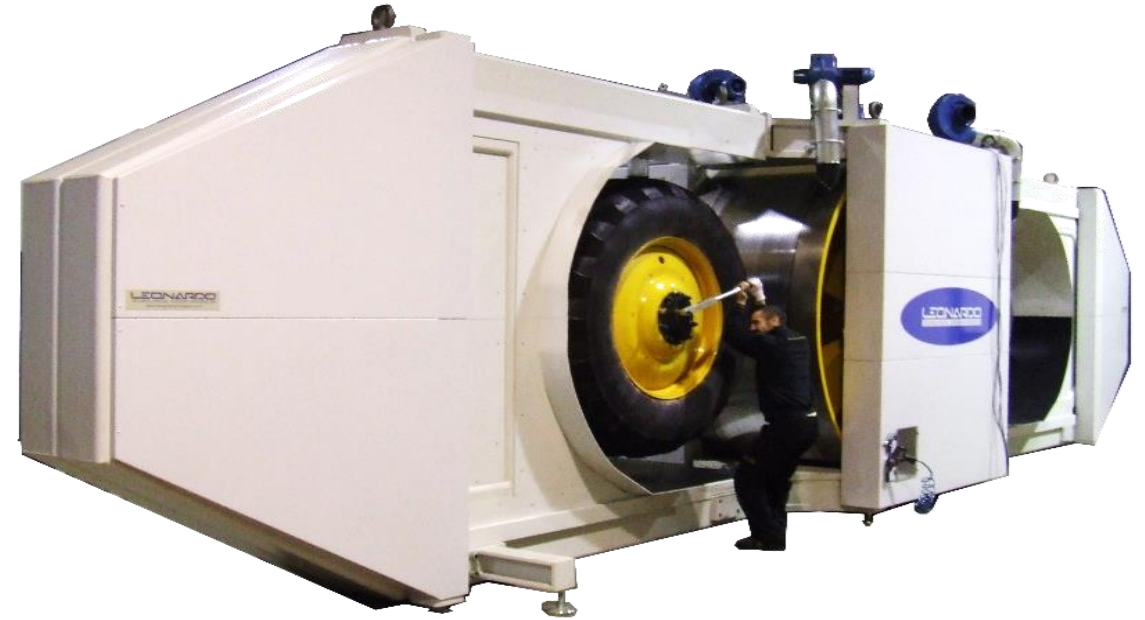
■ Endurance test w/o Slip&Camber and 3m drum



The machine is suitable to perform Endurance test for big Industrial, Agriculture, OTR tires up to 2.5m diameter, according to the main International Standards.

Main features:

- Drum diameter 3 meters
- High rigidity of the structure, supporting high loads up to 50 tons
- Slip and Camber angles automatically controlled during the cycle, if required
- High flexibility for cycle setup (Excel steps sequence)
- User-friendly Human Machine Interface (HMI) by PC
- Real-time safety controls including tire bulges detection, tire pressure and tire temperature during the test



■ Endurance test w/o Slip&Camber and 5m drum

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The machine is suitable for Endurance Testing of very big Agriculture, Industrial & OTR construction machinery and forestry tires up to 4.5m diameter, according to the main International Standards.

Main features:

- Drum diameter 5 meters
- High rigidity of the structure, supporting high loads up to 160 tons
- Slip and Camber angles automatically controlled during the cycle, if required
- High flexibility for cycle setup (Excel steps sequence)
- User-friendly Human Machine Interface (HMI) by PC
- Real-time safety controls including tire bulges detection, tire pressure and tire temperature during the test



■ Endurance test w/o Slip&Camber and 5m drum

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■ Aircraft Tires Dynamometer

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Functional principle:

Aircraft Tires Dynamometer

Application:

Legal testing according to the test procedures of the different countries. Customized take-off and landing test programs available, according to the end-user test methods.

Test specimen:

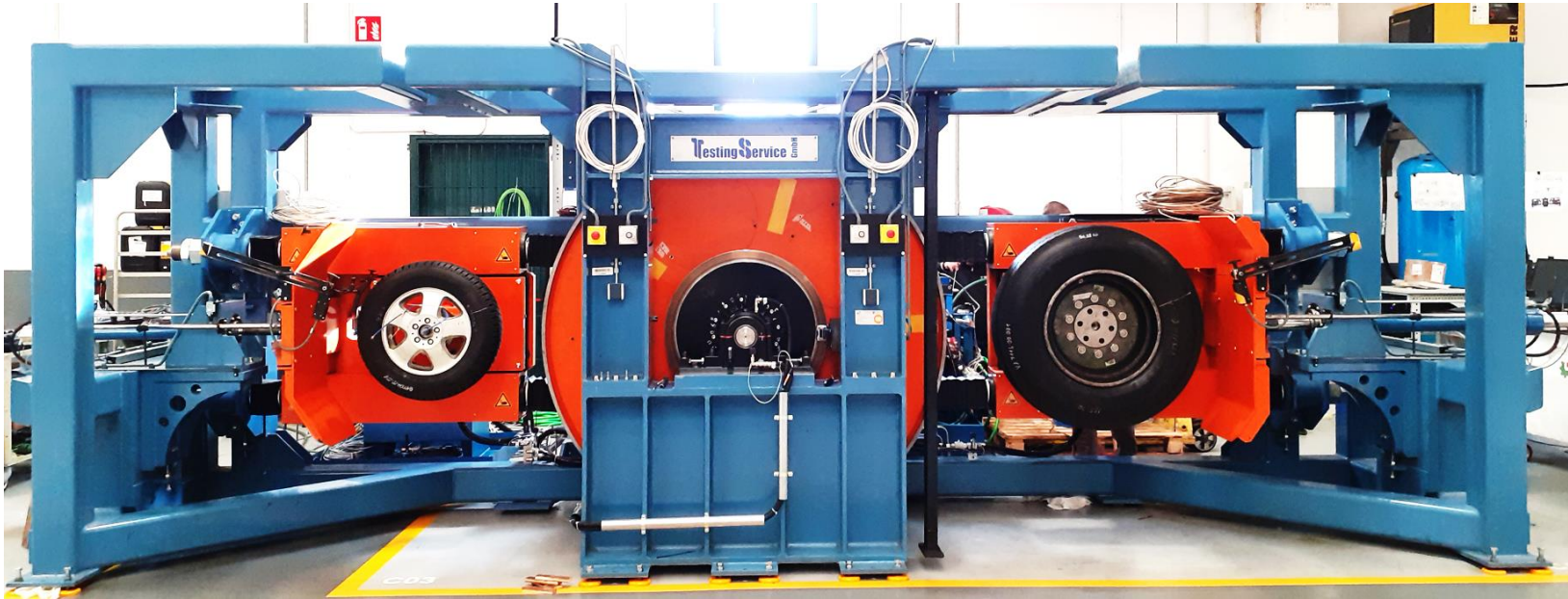
Front & Rear Aircraft Tires

Technical data:

- Testing positions: usually 2 positions
- Test Speed up to 640 km/h
- Acceleration up to 12,5 m/s²
- Drum diameter: 3.0 m
- Drum motor: AC Motor
- Load: 20 tons (1st pos) + 80 tons (2nd pos)
- Slip/Camber Angles: usually $\pm 20^\circ$
- Load principle: Hydraulic
- Loading Speed: 400mm/sec

■ Rolling Resistance Machine for MC-PC-LT-TB tires

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Functional principle: Rolling Resistance (RRC) Measurements

Application: Legal testing according to the test procedures of the different countries. Customized Rolling Resistance test as per the end-user methods

Test specimen: Motorcycle, passenger car, light truck, truck and bus tires

Test Standards:

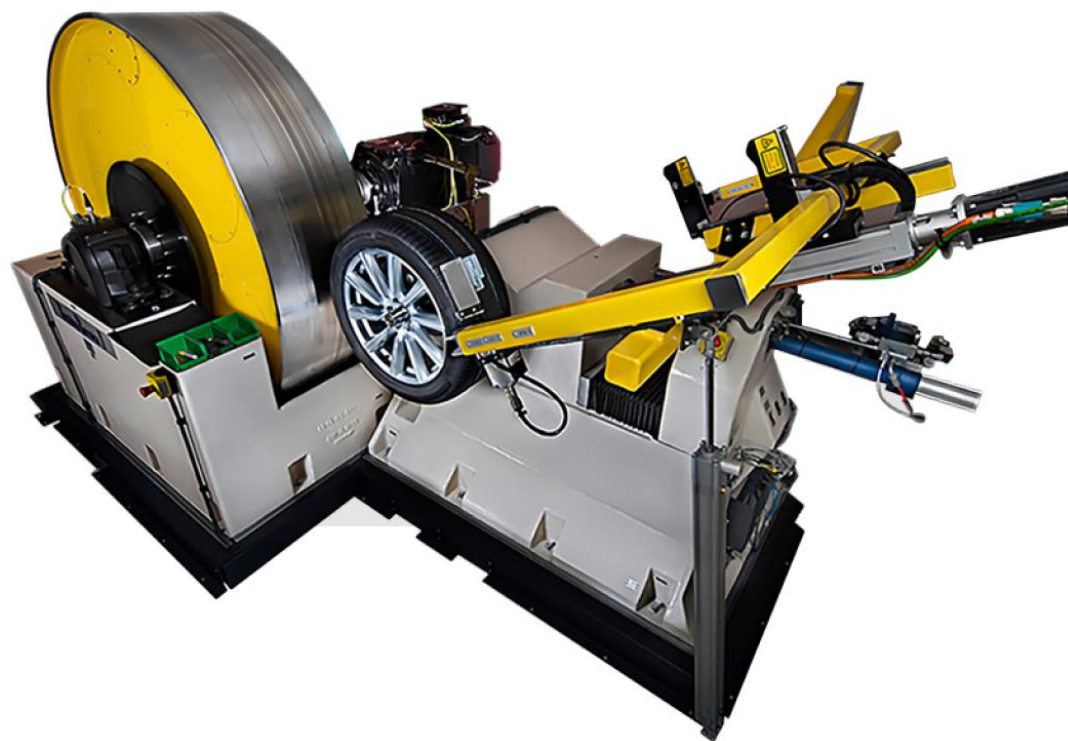
- ISO 28580, ISO 16377, ISO 9948, ISO 1816
- ECE R117, GB/T 29042-2012
- SAE J2452, SAE J1269, SAE J1270

Technical data:

Testing positions: 1 or 2 positions

- Drum diameter: 1.7m or 2m
- Test methods: Torque and/or force method
- Drum motor: AC Motor
- Radial Load: 1, 2, 5, 6.3, 10 tons
- Loading principle: hydraulic or electric
- Test Speed: 120, 150, 250, 350 km/h
- Coastdown test available as per SAE J2452

■ Low/High Speed Uniformity Test for PC-LT-TB tires



Functional principle: Low / High Speed Uniformity for PC, LT and TB tires

Application: OEM testing according to the test procedures of the automotive companies. Customized High Speed Uniformity testing to the tire manufacturers internal test standards:

- Tire radial, lateral and tangential (fore-aft) HS Uniformity
- Tire radial and lateral RunOut
- Tire static and dynamic unbalance
- Cleat testing for tire modelling
- Conicity and Plysteer
- 1st to 20th Harmonics analysis

Test specimen: Motorcycle, passenger car, light truck, truck & bus tires

Technical data:

- Testing positions: 1 or 2 positions
- Drum diameter: 1,7m / 2 m
- Measurement system: Kistler Measurement hub
- Radial Load: 1, 2, 2.5 tons
- Test Speed: 150, 250, 350, 400 km/h
- Highest natural frequency up to 320Hz

Test Standards:

- ISO 13328, ISO 23671 SAE J2730, SAE J332, SAE J2731

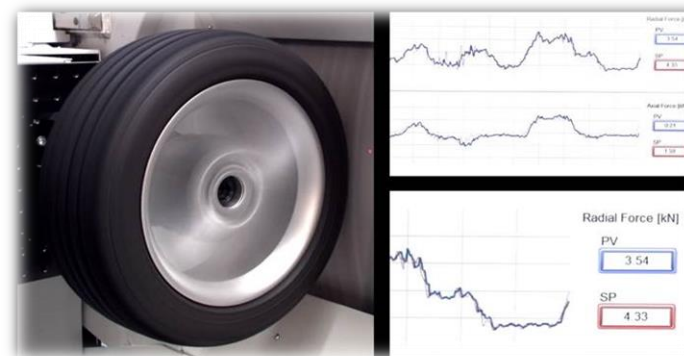
■ HS Force&Moment / Road Simulator for PC-LT-TB tires



The machine is a Multiaxial Test machine (Radial & Axial loads with Camber & Slip angles controlled in real-time) for road simulation and Force&Moment test on PC, LT and TB tires.

Main features:

- Special compact design to ensure high rigidity and high dynamics
- Measurement platform for 3 forces (F_x , F_y , F_z) and 3 moments (M_x , M_y , M_z) measurements
- Possibility to test wheels and tires with original hub & original brake
- High speed (up to 400 Km/h) + acceleration & deceleration
- Track profile real simulation up to 100 Hz dynamic control
- High dynamic Slip and Camber Angles adjustment
- Driving/braking torques available
- Force and moment tests like Steady State Free Rolling F&M, Dynamic Free Rolling F&M, Driving and Braking Force Tests with Spindle Drive, Slip Ratio Sweep Test, Sweep tests and many more
- Integrated cover on the machine structure to collect brake powder and tire particles and allow a good thermal control
- High speed data collection and evaluation

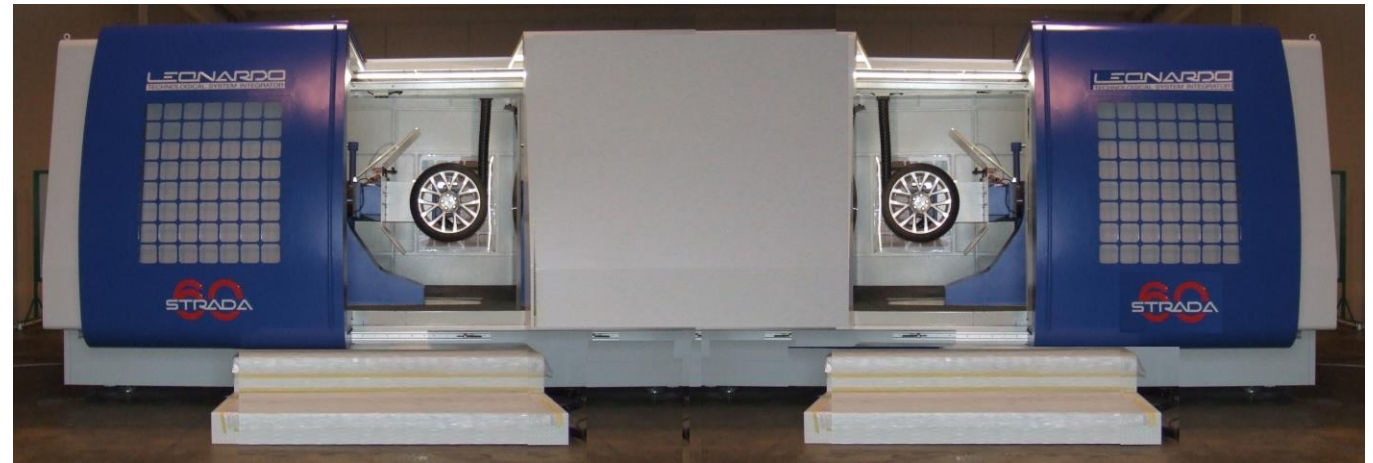


■ Tire Tread Wear Test Machine for PC-LT-TB tires

The machine, available for both PC-LT or TB tires, has been developed for simulating the generation of tyre and road wear particles (TRWP).

Main features:

- Drum diameter: 3 m
- Testing positions: 1 / 2 positions for PC or TB tires
- Tire Loading: up to 15 ton depending on type of tires
- Loading principle: Hydraulic or Electric
- Speed: up to 400 km/h depending on type of tires
- Slip angle & Camber angle automatically adjustable
- Interchangeable replica shells for the drum
- System for talc dosing and suction
- Runout laser measurement as an option
- Tire axes with driving / braking torque application



Indoor Tire Noise Test for MC-PC-LT-TB tires

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Functional principle: Tire Noise Measurements

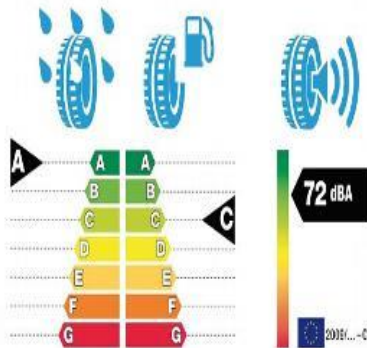
Application: Noise testing according to the test procedures of the automotive companies and standard procedures

Test specimen: Motorcycle, passenger car, light truck, truck & bus tires

Technical data:

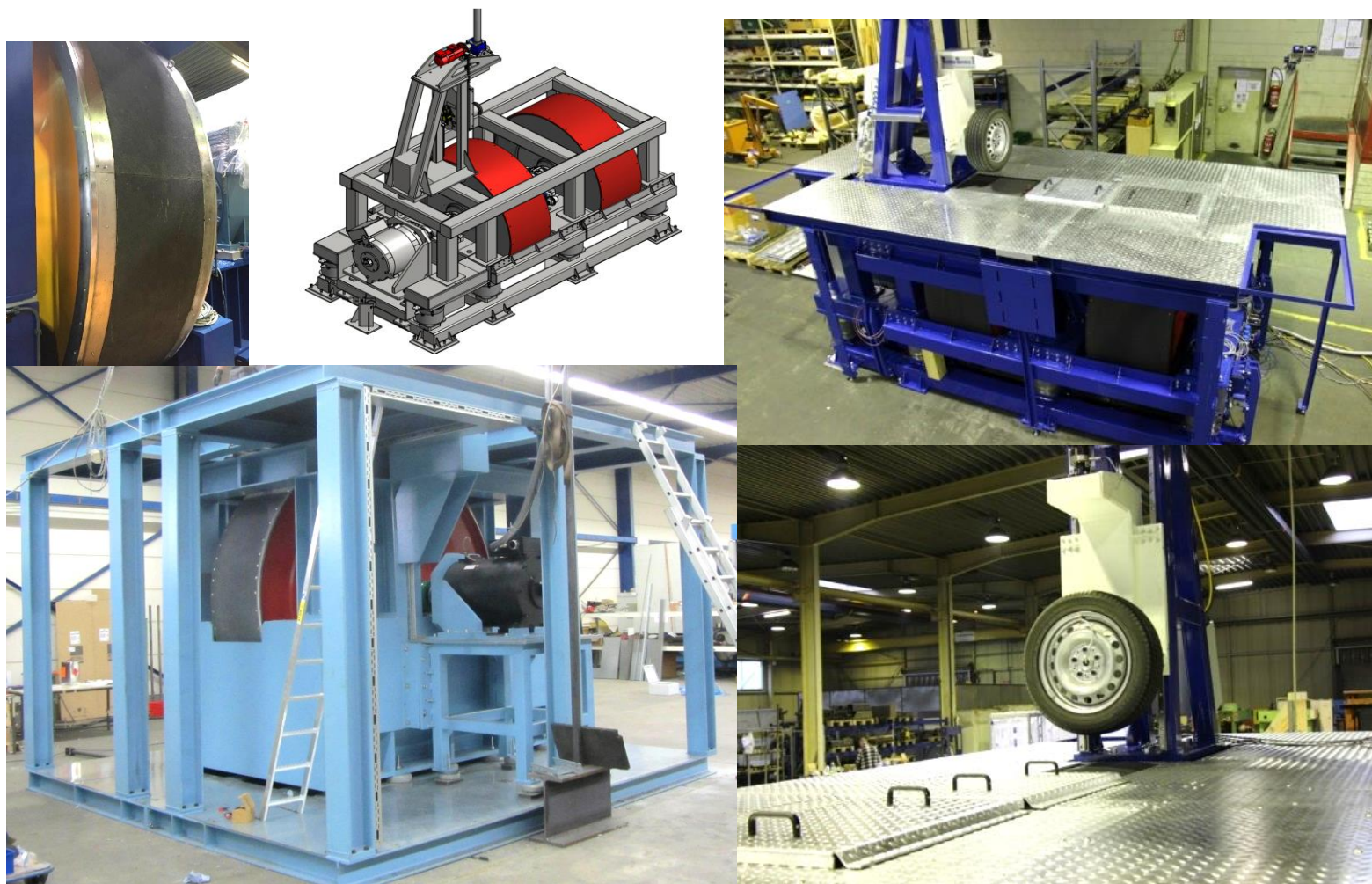
- Testing positions: 1, 2, 4 positions
- Drum diameter: 1,7m, 2m and 3m
- Force measurement device: Measurement platform (optional)
- Tire Loading: Up to 25 tons
- Loading principle: Hydraulic or electric
- Drives: Servo drive with oversized DC Motor
- Speed: Up to 300km/h (with replica shells speed up to 200 Km/h)

Test standards: ECE R117, OEM and customer specific test standards



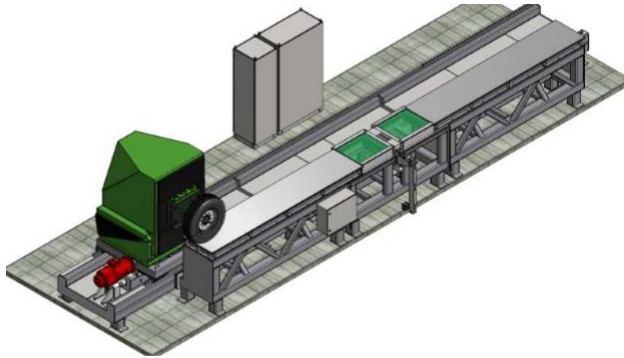
■ Indoor Tire Noise Test for MC-PC-LT-TB tires

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■ Dynamic Footprint Test for PC-LT-TB tires

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Functional principle:

Dynamic Footprint and Force and Moment Tester for PC, LT and TB tires

Application:

SAE, ISO Standards and custom testing according to the procedures of the end-user methods:

- 3D forces in the contact patch
- 2D movement in the contact patch
- 2D movement of the tire body
- Grip on different surfaces

Test specimen:

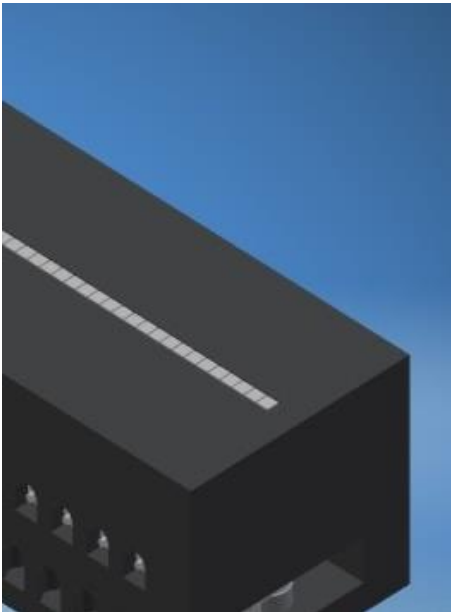
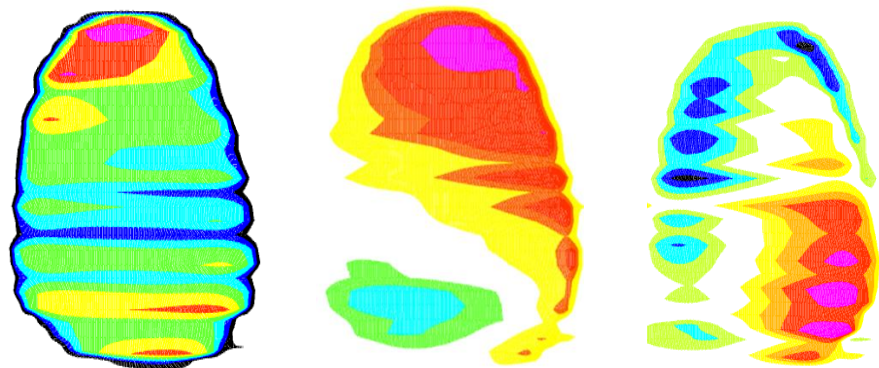
Motorcycle, passenger car, light truck, truck tires

Technical data:

- Testing positions: 1 position
- Force measurement platform
- Tekscan & XSensor Footprint Systems available
- Tire Loading: by AC Motor
- Tire Loading: up to 10 tons
- Loading principle: Electric
- Speed: Up to 10 Km/h (more on request)
- Parameters: Slip angle, Camber angle, drive torque
- Drives Electric
- Customer specific test Standards

Test Standards:

Dynamic Footprint Test for PC-LT-TB tires



■ Dynamic Growth Measurement machine for MC tires

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Functional principle: Dynamic Growth Test Machine for MC tires

Application: The Dynamic Growth test is a test for motorcycle tires, according to ECE R 75 Rev.02

Benefits of our machine are:

- Compact system structure
- Remote service software

Test specimen: Motorcycle tires

Technical data:

- Testing positions: 1 position
- 3 x Line LASER units
- Tire diameter range: from 300 to 1.000 mm
- Test Speed: up to 350 km/h
- Speed accuracy: 0,5 Km/h

Test Standards: ECE R 75 Rev.02

■ Plunger & Bead Unseating test for PC-LT-TB tires

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The machine is suitable for Plunger and Bead unseating test of tires, according to the most common Standards, such as ISO10191, SAE J918 and GSO 53/07.

A complete series of fixtures can be supplied with the machine to cover all the International Standards.

Main features:

- Stout and rigid structure
- Easy machine setup for different tests
- Integrated protection enclosures for the total safety of the operators
- Force-Displacement measurement & energy calculation
- Data acquisition and HMI by PC



■ Radial Stiffness test & Footprint Analysis for PC-TB tires

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The machine can perform Radial Stiffness Test and Footprint analysis of TB tires. The machine is ready to accept electronic Footprint devices.

The tests are performed in accordance with the main international Standards as: ISO 10454-1993; FMVSS 119; GB/T 4501:2016; ASTM F414-15; ASTM F870; GSO 646/2009; GSO 647/2011; IS 15636:2012.

Main features:

- Stout and rigid structure
- Possibility to integrate footprint acquisition devices like Tekscan and XSensor systems
- Automatic wheel rotation for multi-angle test
- Easy machine setup for different tests with sliding platform
- Integrated safety fences for total protection of the operators
- Data acquisition and HMI by PC



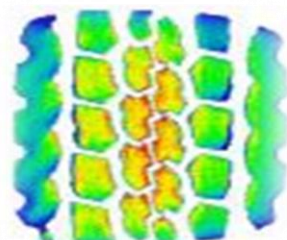
■ 5-Axes Stiffness test & Footprint analysis for PC-LT-TB tires

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The machine for multiaxial stiffness test and footprint analysis for PC-LT or TB tires. Tests are performed according to SAE J2718-2010 Standard or according to specific OEM requirements.

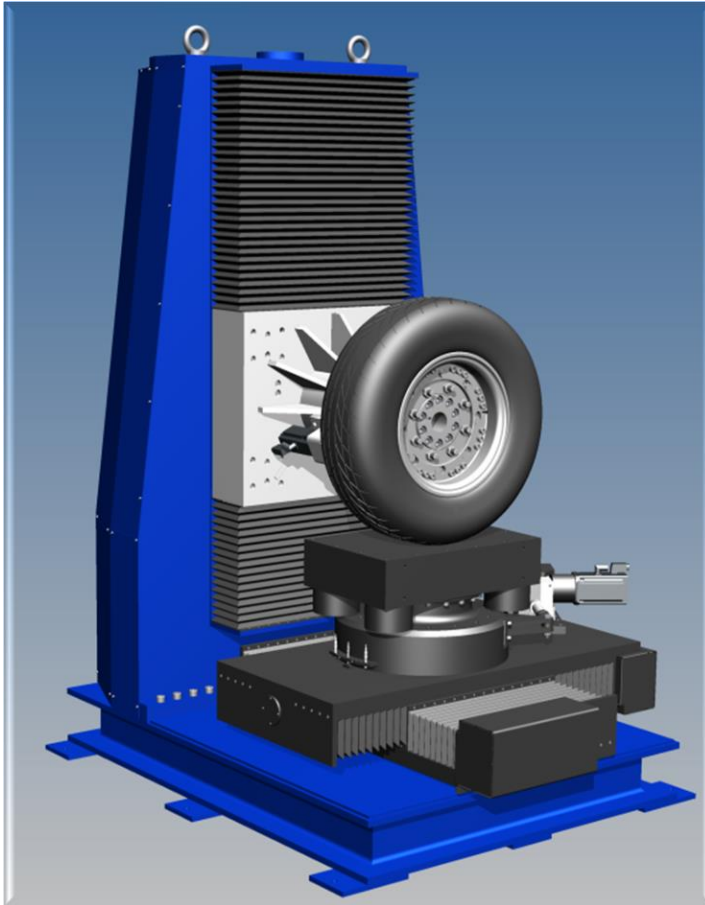
Main features:

- 2 different machines for PC-LT tires and TB tires available
- Radial-Axial-Longitudinal and Torsional movements controlled
- Radial-Axial-Longitudinal and Torsional stiffness measurements
- Automatic camber angle regulation
- Tire inflation pressure automatically controlled
- Possibility to integrate footprint acquisition devices like Tekscan and XSensor systems
- HMI user friendly by PC
- Integrated safety fences



■ Universal Static Test Machines for PC-LT-TB & OTR tires

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Functional principle: Universal machines for several different static tests on tires

Application: Legal testing according to test procedures in the different countries. Custom stiffness testing as per the end-user test methods for:

- Tire radial, lateral, longitudinal and torsional stiffness
- Pressure map
- Footprint characteristics
- Loaded contour
- Bead unseating
- Plunger
- Electric conductivity
- Pitch cut test

Test specimen: Motorcycle, passenger car, light truck, truck and bus, agriculture and OTR tires

Technical data:

- Testing positions: 1 position
- Table: Measurement platform
- Radial Load: up to 10 tons
- Loading principle: Electrical
- Loading speed: 50 mm/sec



■ Universal Static Test Machine for PC-LT-TB tires

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■ Standard rims for tire testing

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Characteristics

Full range of wheel that follows the EUWA standard, is available. Steel structure to permit tire fatigue test without damage on wheel. The wheel is composed by a rim & a disc. Rim realized by a single piece turned in steel with a rim's profile that covers the most common standard shape as per EUWA & ETRTO standard, Disc made by steel and screwed to rim; same fixing hole dimensions are applied (all the wheels can be fixed at same flange).





TEST INDUSTRY

