



# Always on the safe side

ZF Test Systems for tires





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The requirements placed on today's tires are becoming increasingly diverse. They should be safe and reliable, generate little noise, offer good comfort, produce hardly any abrasion and thus be sustainable.

Velocity and load tests, tests of noise level and comfort characteristics, tread wear tests or measurements of response behavior under different operating conditions are just a few examples of how ZF Test Systems can support tire manufacturers with various test rigs. R&D and production test benches made by ZF offer all kinds of test procedures to ensure a fast development and a certified quality assurance.

Tires and wheels are the most delicate and most severely stressed parts of a vehicle. Great importance is therefore attached to safety and quality. Only consistent testing guarantees that nothing is left to chance and drivers remain safely on the track.



## Types of test rigs:

Characteristic, low speed uniformity balancing, high speed uniformity, high speed / endurance, tire noise, rolling resistance, tire tread wear, spring rate, fully automated test lines, customized solutions

## We test:

Uniformity, runout, rolling resistance, dynamic and static characteristics, tire noise, static spring rate, dynamic spring rate, temperature behavior, endurance, according to your requirements

#### Rolling resistance tester for car tires

The machine measures torque (power), force and deceleration. It offers SAE and ISO tests on reference level with highest precision and a cross talk free sensor hub.

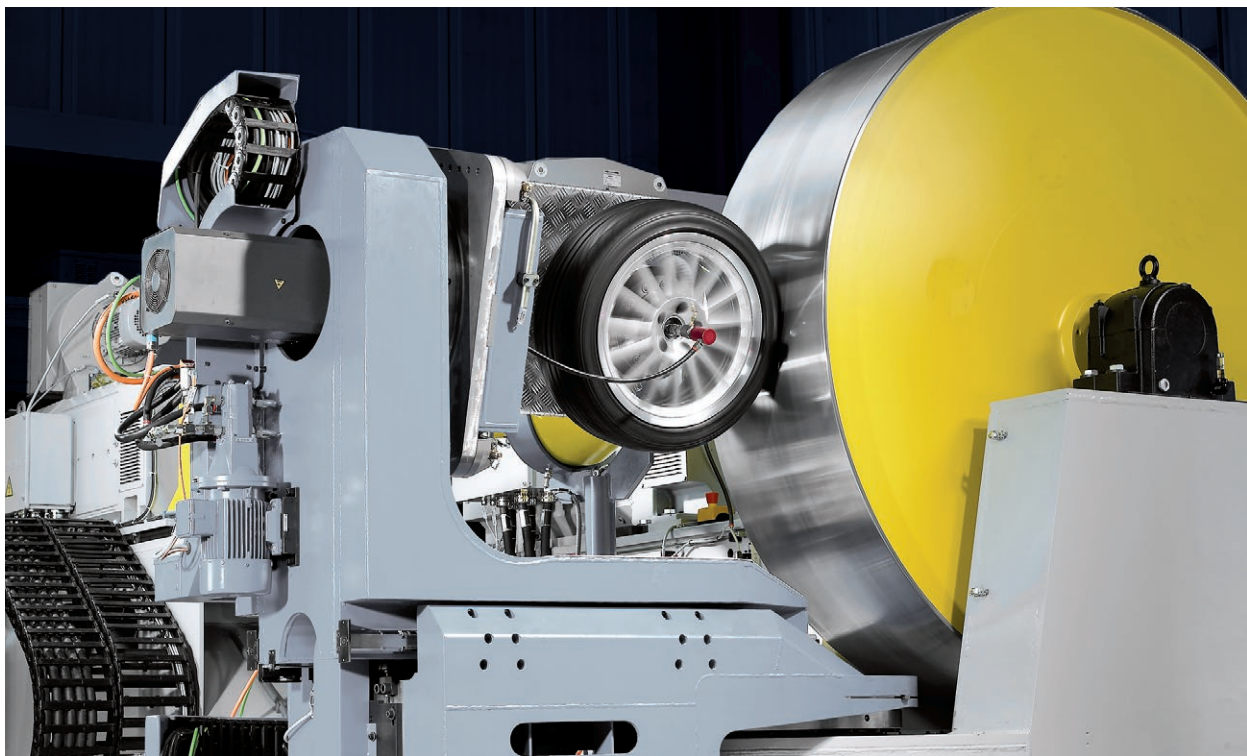
## Tire characteristics: From low to high forces



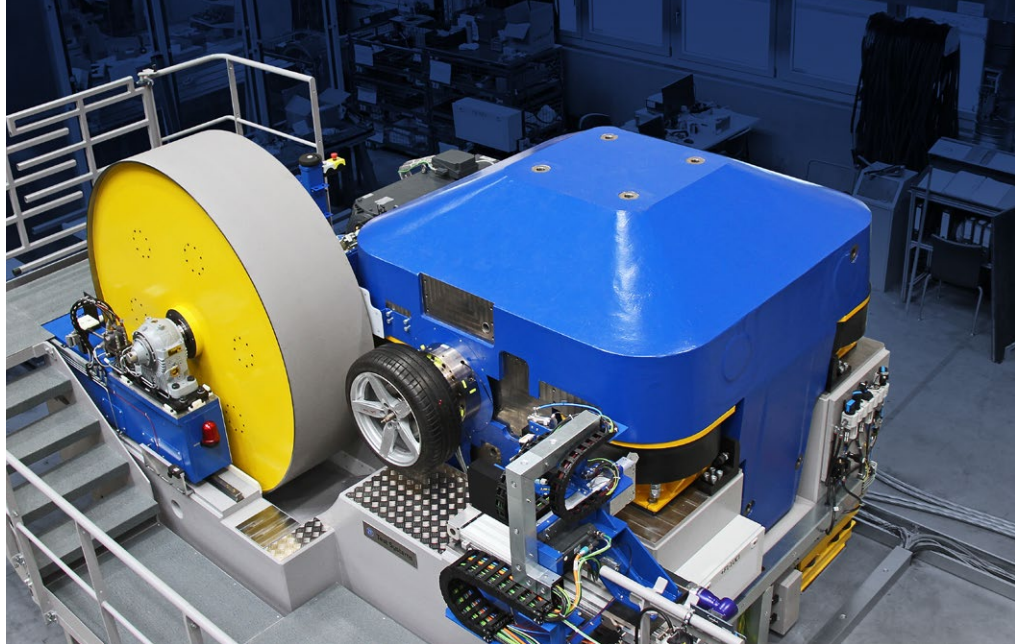
Modern tires must compete in a field of extremes: Good wet grip but creating low rolling resistance forces. Perfect handling behavior but they must show low wear and good tread abilities. ZF Test Systems help tire manufacturer and car makers to verify related conditions and tire values with highest precision and reproducibility. ZF Test Systems rolling resistance machines are used in European reference laboratories and have become well known for its hydrostatic wheel hub. The new force and moment tester can put dynamic drive file verification from the track into the laboratory which saves costs and avoids taking risk of driving on race tracks.

#### Force and moment tester

It is highly dynamic on all axles and allows a very fast positioning at high precision. It offers drive file simulation.



**High speed uniformity machine**  
Offers a very wide measuring frequency range due to the highest natural machine frequency of 580 Hz. The uniformity measuring speed reaches up to 360 km/h.



## Uniformity: From low to high speed

ZF offers for customer laboratories two very precise machines: The ZF low speed uniformity and the ZF high speed uniformity machine. The HSU types allow measuring high speed uniformity values up to 360 km/h with high resolution and with lowest influences from machine resonances which guarantees highest precision and best reproducibility of measuring results. The low speed uniformity machine offers more than just side wall failure detection and uniformity test with or without rim. The innovative automation system ZF Modas provides tailor made data handling and reliable and useful automation of ZF's test systems.



**Laboratory low speed uniformity machine**

Tests on tire and tire/wheel assembly. Uniformity and run out are based on the usual standard uniformity procedure.

#### Endurance tester

Robust and reliable ZF endurance testers are in operation for passenger car tires as well as for truck tires. They provide highest availability paired with precise and wearless mechanic components.

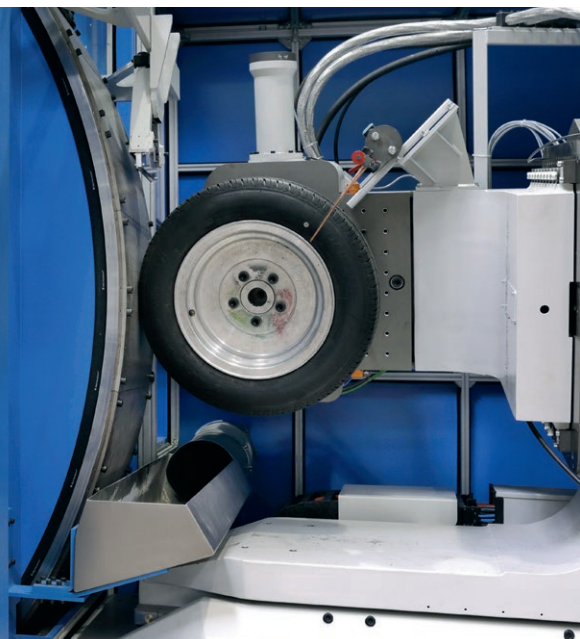


## Basics: Durability and wear

Tread wear and endurance testers are basic test machines for tire manufacturers. ZF offers those machines for sizes of modern passenger car tires as well as for truck tires as standard solutions. Last but not least: Even bigger tires – for example from construction equipment – fit on ZF test systems. Tires can be mounted easily, and the machines offer good access to the testing position. Furthermore, the new ZF Tread Wear Tester for passenger car as well as truck and bus tires is capable to simulate real vehicle tests in a lab environment by drive file operation through its high dynamic servo controlled axles.

#### Tread wear tester

The 2 station units can run with different drum surfaces. Load, camber, slip, lateral force, speed and driving force can be adjusted with high dynamic.



# Quality control: For the tire production process

## Passenger cars

ZF has invented different unique final finishing machines to measure quality. The ZF-LUB5 combines the measuring of uniformity and dynamic unbalancing in one machine, in one cycle, in one test position – adding only 3 seconds to a standard uniformity cycle. Separated they are also capable to act as a line concept, ZF-LU5 and ZF-BAL5. High speed uniformity testing machines are designed and built for high performance tire production lines to analyze also dynamic uniformity behavior as a quality feature.

## Truck and bus

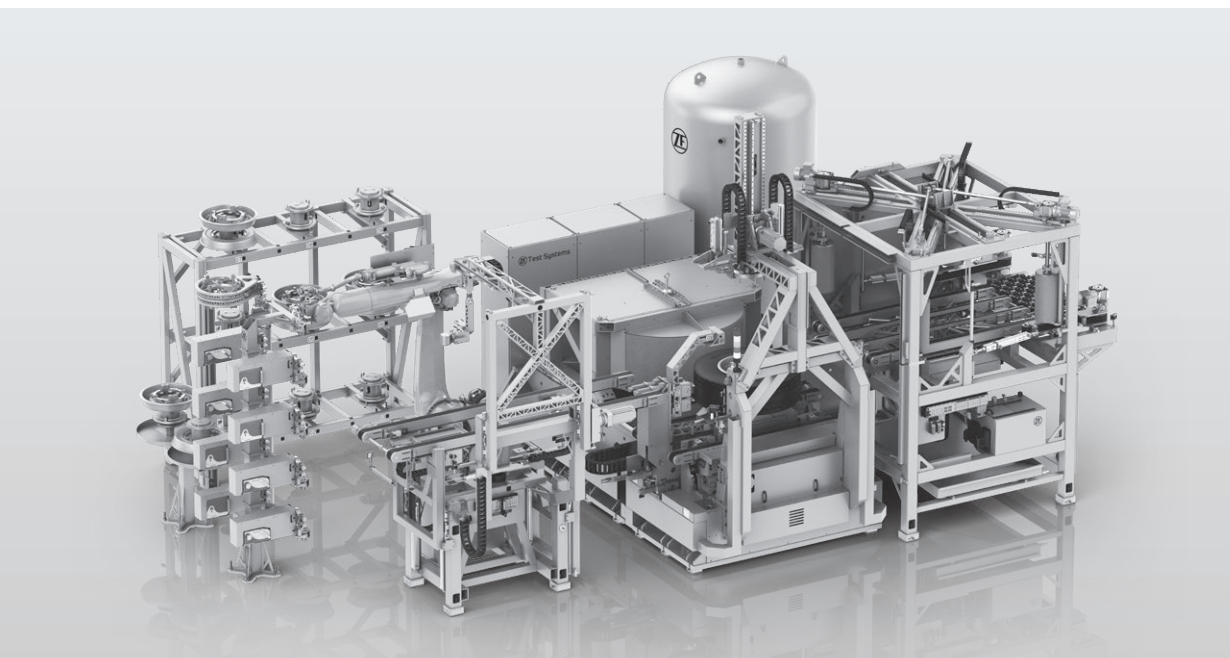
ZF has developed a brand-new test bench – the ZF-LUB6 TBR. This tire test bench is based on the well-known machine types for passenger cars but especially designed for truck, bus and off-highway tires. Using state of the art technology and improving the combined concept even further – with this 6th generation – leads to a measurement performance at a whole new level and this in less than one minute.

All final finishing products are available with optimally integrated options like lubrication or marking. These machines are perfectly suited for existing tire manufacturing plants. For brownfield extensions and greenfield projects, ZF also offers tailor-made solutions with its comprehensive test equipment portfolio.



## Low speed uniformity machine LUB5

The "all in one solution" offering the measurement of low speed uniformity, dynamic unbalancing, and geometry.



## Final finishing machine LUB6 TBR

The ZF-LUB6 TBR is the new final-finish tire test equipment for the inspection of truck and bus radial tires.

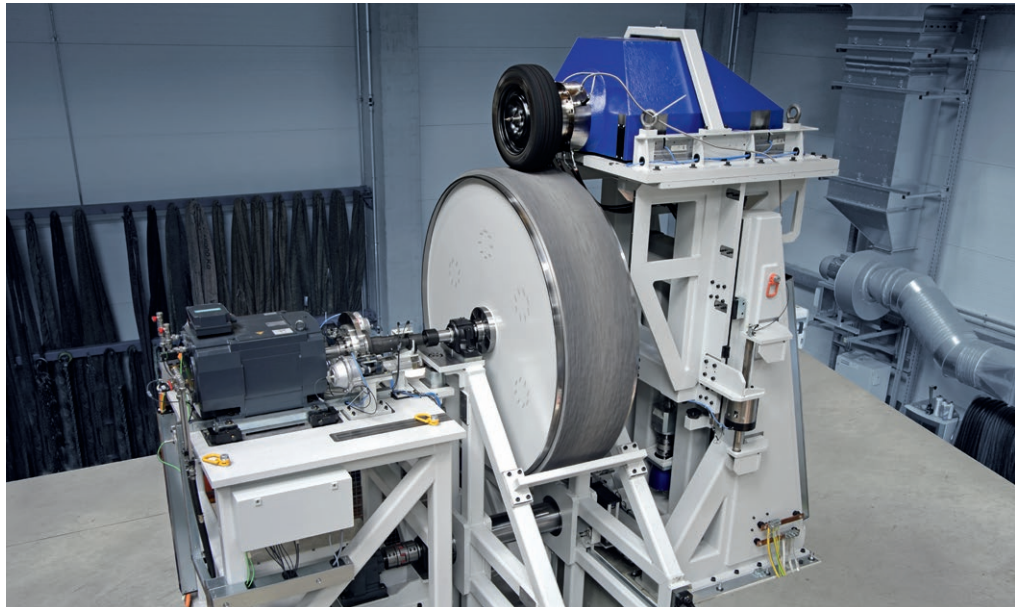
## Even more: From tire to vehicle

Ultimately, the tire is just a component between the road and the vehicle chassis. Therefore, it can be important to qualify all or at least larger parts of the suspension. Thus, interaction between the components can be taken into account and understood better. Besides the driving speed, dynamics can be generated either from the road surface or from targeted changes in load on the wheel. This applies to both NVH and durability aspects.

### **Tire noise / acoustic tester**

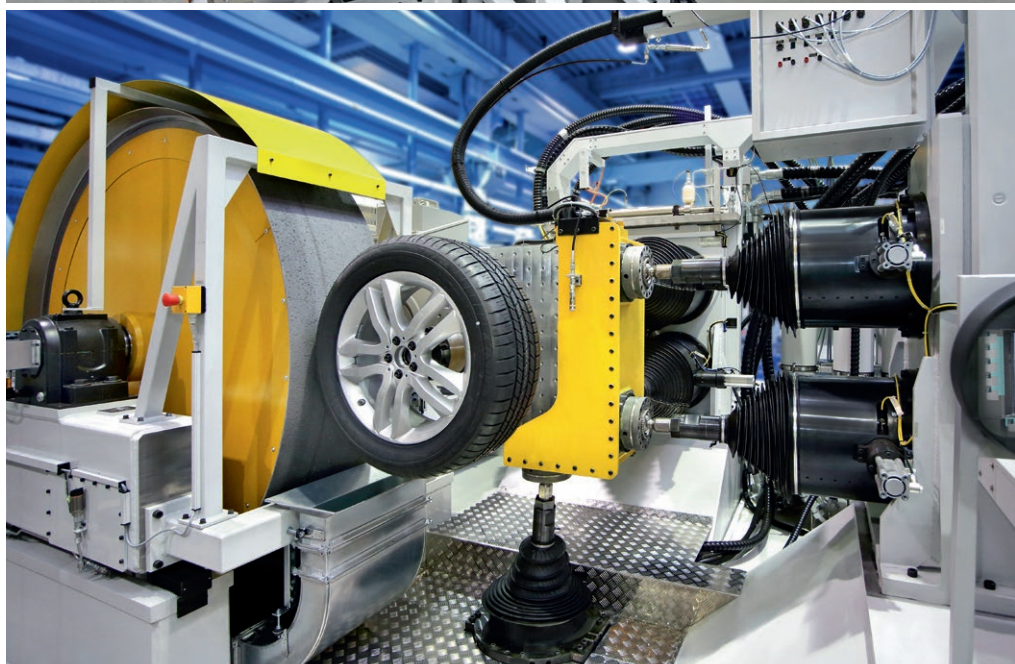
for tires and wheels for passenger cars as well as truck & bus vehicles.

Different road surfaces can be applied to the drum, the change can be done manually or automatically. Possible are structure borne noise measurements at highest frequency range and airborne noise measurement with lowest machine noise emission.



### **Multi axial wheel tester**

The state-of-the-art multi axial wheel tester (MARP) allows extremely realistic simulations of test piece characteristics. As a result, completely new areas in the dynamic response and in the qualification of measured values can be tested.



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