

Overview of test benches

IFM / Components
Wheels / Tires





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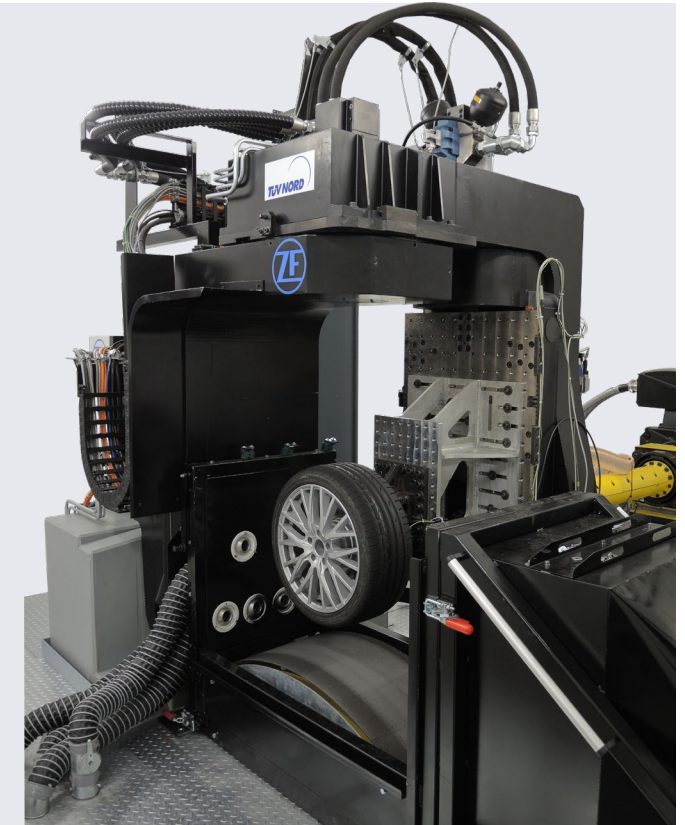
DYNAMIC DRIVING HALF AXLE TEST BENCH



DYNAMIC DRIVING HALF AXLE TEST bench

Features:

- ✓ Drum and wheel drive up to 550 kW possible
- ✓ High dynamic due to short adjustment times, e.g. 5°/s
- ✓ Comprehensive data acquisition system
 - Data acquisition frequency 1,000 Hz
 - Optional extra channels:
16 strain gauge , 32 voltage, 8 temperature channels
- ✓ Universal mounting system permits the possibility for individual test setups, as well as for mounting the half axle including the suspension strut





DYNAMIC DRIVING HALF AXLE TEST BENCH

Application:

- ✓ **Simulation of real time driving cycles**
 - Race track profiles
 - Step profiles
- ✓ **Combined testing of wheel assembly**
- ✓ **Biaxial Wheel Fatigue Test according to:**
 - AK-LH 08
 - PTL 15001 , PV5608, SAE J2562
 - BLNV - Operating load simulation test
- ✓ **Strenght determination of the wheel assembly**
- ✓ **Measuring of noise generation**
- ✓ **Testing of thermal influence of braking parts to wheels, wheel bolts and further axle components**

Technical data:

Test speed	Up to 300 kph
Drum diameter	2,000 mm
Max. wheel load	45 kN
Slip angle	± 20°
Camber angle	± 5°



ROTATING BENDING TEST



ROTATING BENDING TEST

Features:

- ✓ Simple wheel mounting with fast clamp system
- ✓ Different testing modes for steel or aluminum wheels
- ✓ Determination of wheel resonance curve
- ✓ Recording of test parameters and results
- ✓ Evaluation of test result by crack detection methods like dye penetrant inspection or zinc oxide glycerin paste
- ✓ Parallel tests are possible, 9 test benches are available





ROTATING BENDING TEST BENCH

Application:

- ✓ Component of type approval tests
- ✓ CoP - Conformity of production
- ✓ Testing of wheel spacers or wheel adapter systems or center lock wheels
- ✓ Test according to:
 - Räderrichtlinie
 - Manufacturer specifications
 - Individual requirements

Technical data:

	Passenger car BUP	Truck BUP
Test machine type	BUP 760	BUP 1000
Max. rotation speed	2,200 rpm	1,500 rpm
Bending rod length	760 mm	1,000 mm
Max. bending moment	16 kNm	80 kNm
Rim diameter	10 to 23"	16 to 38"
Rim width	3 to 14"	5 to 36"



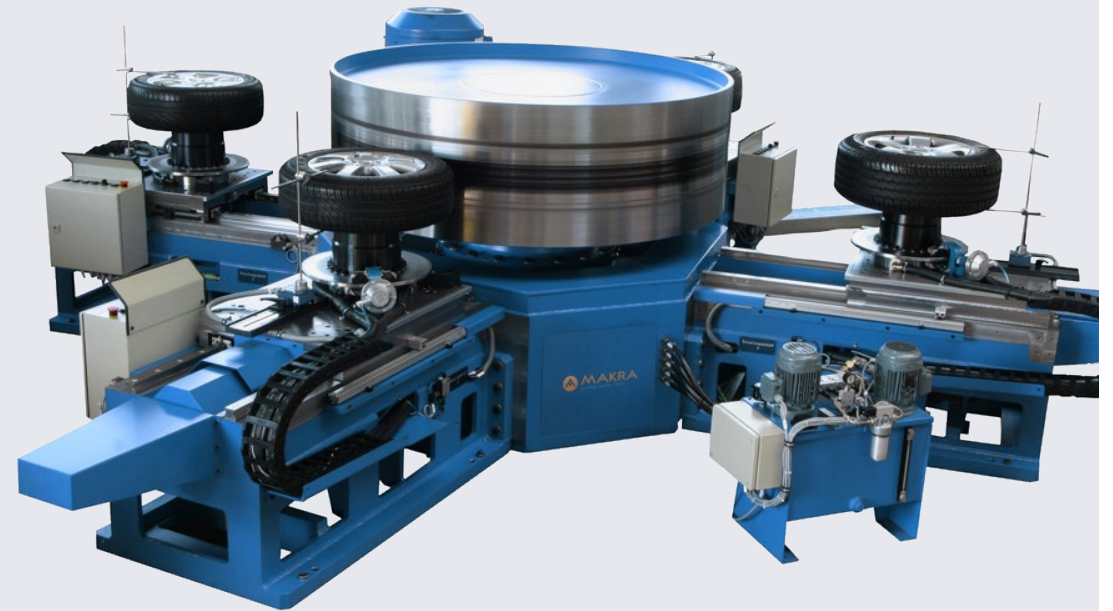
RIM ROLLING TEST



RIM ROLLING TEST BENCH MAKRA

Features:

- ✓ Testing monitoring of buklet- and burst control
- ✓ Cleat-test possible
- ✓ Parallel tests because of 4 stations possible
- ✓ Measuring due to load cycle, distance or time
- ✓ Evaluation of the result by dye penetrant testing





ROLLING TEST BENCH MAKRA

Application:

- ✓ Part of tests for granting the type approval
- ✓ Test for the continuous inspection of vehicle wheels and tires
- ✓ Determination of tire parameters
- ✓ Test according to:
 - §30 StVZO
 - SAE J328
 - NBR 6752
 - ISO 28580
 - AK-LH08
 - ECE-R 30/54/75/106/108/109
 - Individual requirements

Technical data:

Manufacturer	Makra
Rotation speed	Up to 400 1/min
Test speed	10 to 120 kph
Test load	Up to 50 kN
Tire diameter	400 to 1,400 mm
Tire width	Up to 350 mm
Offset	-60 to +100 mm



ROLLING TEST bENCH leonardo

Features:

- ✓ Movement-, bukle- and burst control
- ✓ Cleat-Test possible
- ✓ Parallel tests at 2 car and 2 truck stations possible
- ✓ Measuring due to load cycle, distance or time
- ✓ Evaluation of the result by dye penetrant testing
- ✓ Air pressure change during the test possible
- ✓ Air pressure and temperature monitoring





ROLLING TEST bENCH Leonardo

Application:

- ✓ Part of tests for granting the type approval
- ✓ Test for the continuous inspection of vehicle wheels and tires
- ✓ Determination of tire parameters
- ✓ Test according to:
 - §30 StVZO
 - SAE J328
 - NBR 6752
 - ISO 28580
 - AK-LH08
 - ECE-R 30/54/75/106/108/109
 - Individual requirements

Technical data:

	Car wheels	Truck wheels
Manufacturer	Leonardo	Leonardo
Rotation speed	Up to 1,050 1/min	Up to 400 1/min
Test speed	10 to 350 kph	10 to 120 kph
Test load	Up to 40 kN	Up to 120 kN
Tire diameter	400 to 1,400 mm	400 to 1,400 mm
Tire width	Up to 350 mm	Up to 450 mm



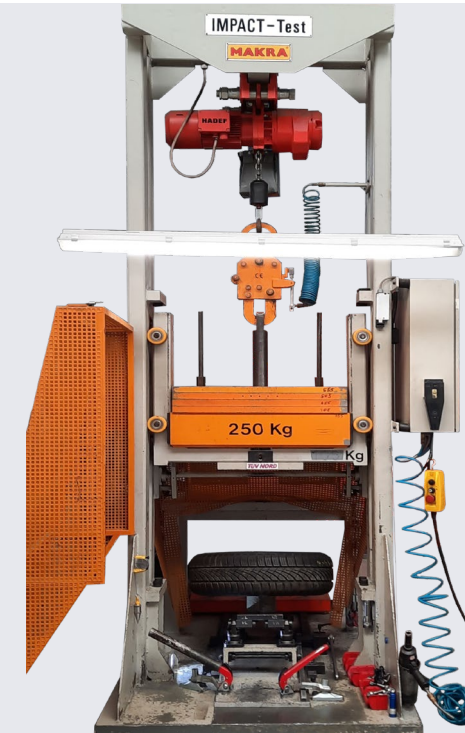
IMPACT TEST



IMPACT TEST

Features:

- ✓ Different wheel mounting devices
- ✓ Different impact angles, -plates, and -wedges
- ✓ 13° and 90° Impact possible
- ✓ Testing with original swivel arm and wheel bearing possible





IMPACT TEST

Application:

- ✓ Part of tests for granting the type approval
- ✓ Test for the continuous inspection of vehicle wheels
- ✓ Test according to:
 - ISO 7141
 - Manufacturer specifications, e.g. Renault

Technical data:

Manufacturer	Makra
Max. falling mass	1,050 kg
Max. drop height	450 mm
Tire diameter	Max. 890 mm
Tire width	Max. 320 mm



BIAXIAL WHEEL TESTING



BIAXIAL WHEEL TESTING

Features:

- ✓ **Burst control**
- ✓ **Monitoring and measurement the deflection depth of the tire**
- ✓ **Monitoring of the limit values**
- ✓ **Tire cooling**
- ✓ **Pre- damage of the test object possible**





BIAXIAL WHEEL TESTING

Application:

- ✓ **Implementation of fatigue tests**
- ✓ **Determination of tire parameters**
- ✓ **Test according to:**
 - AK-LH08
 - PTL 15001
 - Manufacturer specifications
 - Load simulation trails

Technical data:

Manufacturer	Makra / Klock
Speed	10 to 180 km/h
Lateral wheel forces	-50 to +50 kN
Vertical wheel forces	0 to 50 kN
Drum diameter	920 mm
Wheel diameter	10 to 21"



RADIAL IMPACT TEST



RADIAL IMPACT TEST

Features:

- ✓ Different wheel mounting devices
- ✓ Different impact angles, –wedges
- ✓ Optional data recording incl. Graphical evaluation
- ✓ Measurement of the impact velocity, -time and wheel deformation





RADIAL IMPACT TEST

Application:

- ✓ **Test for deformation of the rim flanges when driving over an obstacle**
- ✓ **Test according to:**
 - AK-LH08
 - Manufacturer specifications, e.g. Ford
 - Individual requirements

Technical data:

Manufacturer	TÜV NORD
Max. falling mass	335 kg
Max. drop height	1,700 mm
Max. Impact energy	5,500 J
Angle	0 to 4,5°



BURSTING PRESSURE TEST



Bursting pressure test

Features:

- ✓ Preparation of the wheel (Drilling of a second valve hole)
- ✓ Determination of the bursting/ or deformation pressure
- ✓ Accoustical burst monitoring possible
- ✓ Variable pressure holding times possible
- ✓ Graphical evaluation of the test





Bursting pressure test

Application:

- ✓ Test to check the plastic deformation in the area of the rim bed
- ✓ Test according to:
 - Manufacturer specifications, e.g. Porsche
 - Individual requirements

Technical data:

Test medium	Water
Max. pressure	900 Bar



MATERIAL TEST



MATERIAL test

Features:

- ✓ Accredited materials testing laboratory
- ✓ Manufacturing of round tensile specimens
- ✓ Manufacturing of material grindings for macroscopy
- ✓ Possibility to record the macroscopy through high resolution camera
- ✓ Implementation of a spectral analysis
- ✓ Brinell hardness test





MATERIAL Test

Application:

- ✓ **Tests for the determination of mechanical parameters of the material**
- ✓ **Tests according to:**
 - Räderrichtlinie
 - PTL 15001
 - Individual requirements

Technical equipment:

Hardeness testing machine	Wolpert Dia Testor 2Rc
Tensile testing machine	Galdabini Quasar 25
Grinding machine	Metkon Forcipol 102
CNC-Lathe	EMCO Emcoturn 25
Light microscope	WILD Makroskop M420



Scope DAkkS



Deutsche Akkreditierungsstelle GmbH

Anlage zur Akkreditierungsurkunde D-PL-11109-01-00
nach DIN EN ISO/IEC 17025:2018

05	Räder, Reifen
05-01	Prüfung der Reifen
05-01-01	92/23/EWG (Anhang II) *2005/11/EG
05-01-02	97/24/EG Kap.1 (Anhang II) *2006/120/EG
05-01-11	UN-R 30 AS02
05-01-12	UN-R 54 AS01
05-01-13	UN -R 64 AS03
05-01-21	UN-R 75 AS00
05-01-22	UN-R 106 AS00
05-01-23	UN-R 108 AS00
05-01-24	UN-R 109 AS00
05-01-25	UN-R 117 AS02 (Anhang 5)
05-01-26	UN-R 117 AS02 (Anhang 6)
05-02	Sonderräder
05-02-21	UN-R 124 AS00
05-02-99	Prüfverfahren im Prüfumfang für Genehmigungen und Marktüberwachung nach nationalen Vorschriften und zu neuen Techniken und Konzepten



Scope KBA

Kraftfahrt-
Bundesamt



Benennung

Das Kraftfahrt-Bundesamt bestätigt hiermit, dass

TÜV NORD Mobilität GmbH & Co. KG

IFM - Institut für Fahrzeugtechnik und Mobilität
Schönscheidtstraße 28
45307 Essen

die Forderungen der einschlägigen

**Genehmigungsrelevanten Rahmenrechtsakte
aus dem EU-, UNECE- und deutschen Rechtskreis
und die Benennungsregeln des KBA**

einschließlich der Normen DIN EN ISO/IEC 17025:2018 und DIN EN ISO/IEC 17020:2012
erfüllt.

Die oben genannte Stelle wird vom KBA als Technischer Dienst der Kategorie A, B und D
benannt. Der Scope ist in der Anlage zur Urkunde aufgeführt (bestehend aus 16 Seiten).



Scope Tisax

Successful TISAX auditing in the following points:

ASSESSMENTS

ID ↑	Overall Assessment Result	Overall Maturity Level	Valid until	
AXFN87-1	Conform	2,92	26/01/2025	▼

LABELS

TISAX Label ↑	Valid Until	Foreign Assessment
Data Protection according to EU-GDPR Art. 28 ("Processor")	26/01/2025	No
Information with High Protection Needs	26/01/2025	No
Information with Very High Protection Needs	26/01/2025	No
Protection of Prototype Parts and Components	26/01/2025	No

TÜVNORD

