

Here below a few equipments we recently realized for these Laboratories



WHO IS LEONARDO AND HOW WE OPERATE...

Leonardo in over 20 years of experience is today well-established worldwide with a network of agents and representatives covering the whole Italy and more than 15 Countries in Europe and outside (Asia, South-America...). Our headquarter of 5,000 m² is at Maclodio (Brescia), between Milan and Venice. Our customers are in touch with Leonardo staff from the beginning to the end of the project and our suppliers are also able to provide After-Sales Service.

Once the project has been defined and launched, the various phases all take place inside Leonardo, including:

- 🇮🇹 Engineering, mechanical, pneumatic and hydraulic design;
- 🇮🇹 Electrical and electronic design;
- 🇮🇹 Software development (PC, PLC, NC and HMI operator interface);
- 🇮🇹 Assembly and testing;
- 🇮🇹 After-Sales Service (calibrations, supply of spare parts and maintenance).

Leonardo is one of the first firms in its industry to achieve quality system certification under the UNI EN ISO 9001:2008 Standard.

Products and solutions Leonardo's are:

1. Wheel and tyre measurement and testing: Production line benches (dimensional control, unbalance and leak test) and Laboratory benches (fatigue, duration and qualification).
2. Leak and flow test: Test benches (for leak and flow tests in general), Instruments (leak and flow test by air or tracing gas) and Leak test accessories (master leaks for calibration, gaskets...).
3. Dimensional control: Customized test benches (various measurements, gear testers...), Customized gauges and Master parts.
4. Benches for special applications: Functional testing, Endurance testing and objectified assembly.



Radial Fatigue Test Machine for military vehicle wheels

CVRDE



INTRODUCTION

The machine is suitable for rolling test on tire with radial load and control. The machine can be supplied both for car or truck tire testing.

REGULATIONS:

- 🇪🇺 EUWA standard 3.12 Agricultural wheels;
- 🇪🇺 EUWA standard 3.24 Light construction machine wheels;
- 🇪🇺 EUWA standard 3.28 Motorcycle wheels;
- 🇪🇺 ECR124E Passenger car & their trailers;
- 🇪🇺 GMW 14909 Passenger car & Light truck;
- 🇪🇺 GMW 15120 Passenger car & Light truck;
- 🇪🇺 ISO 3894 Commercial vehicle, Buses & Multipurpose passenger vehicle;
- 🇪🇺 JASO T203-85 Light alloy wheels for motorcycle;
- 🇪🇺 JASO C614 Passenger car, Light truck, Truck and Bus;
- 🇪🇺 JISD4103 Passenger car & Commercial vehicle;
- 🇪🇺 SAE J JASO C618 Tires Passenger vehicles;
- 🇪🇺 SAE J328v002 Passenger car & Light truck;
- 🇪🇺 SAE J1204 Passenger car & Light truck;
- 🇪🇺 LRES 48-01-006 Land Rover;
- 🇪🇺 IS.9436.1980 Passenger car Indian standard.



GENERAL DESCRIPTION

Structure: The mainframe of machine is composed by a stout structure electro-welded steel the “Ring” design of test units ensure high rigidity during test.

Drum: The central drum is built in steel, dynamically well-balanced and supported by an axis on ball bearings. The surface of the drum is particularly cared and the control of the speed of the roller will be realized with a tachometric dynamo on the axis.

Test station: It's composed by a slide in electrically-welded steel on guides that guarantee a big rigidity. Suitable bellows will protect the guides to grant their longest duration. Some interchangeable flanges allow to fit the wheel hub to the various wheel models.

Slip angle rotation axle is in center of wheel-drum contact area; camber angle axle is tangent to wheel-drum contact area.

All moment radial-slip-camber are automatically controlled by hydraulic actuators servo-controlled to ensure high dynamic and precision.



TECHNICAL SPECIFICATION

DESCRIPTION	RR-A Car-Light Truck	RR-B Truck & Bus	RR-C Agricultural
Max Radial Load (KN)	50	150	250
Max Axial Load (KN)	20	60	100
Wheel diameter (mm)	50 ÷ 1100	600 ÷ 1400	800 ÷ 2200
Radial Movement	Yes		
Slip Movement	Yes		
Camber Movement	Yes		
Test Stations	1 o 2		
Drum features			
Diameter (mm)	1700	1700	3000
Width (mm)	500	700	1200
Slip Movement	±15°		
Camber Movement	±25°		
Testing Speed (Km/h)	10 ÷ 130	10 ÷ 110	10 ÷ 100
Machine with 1 station – Sizes	6,5 x 2,5 x 3,5 (h)	6,5 x 2,5 x 3,6 (h)	
Machine with 2 stations – Sizes	8,3 x 2,5 x 3,5 (h)	10,5 x 2,5 x 3,6 (h)	

BIAXIAL MACHINE FOR TRUCK WHEELS

TÜV SÜD



INTRODUCTION

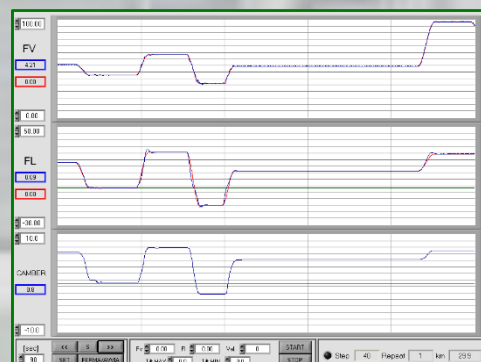
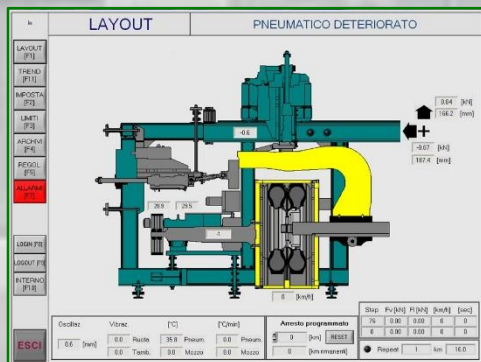
The Biaxial machine by Leonardo is manufactured for the fatigue simulation of wheels for industrial vehicles in perfect agreement with Eurocycle Standard program or with test programs the Customer can freely customize. The facility is capable of realistic simulations of all service stresses to the complete wheel-hub assemblies, thus proof of adequate service life of such assemblies and their components may be established.

The Biaxial wheel test machine replaces both of today's standard wheel tests, the rotating bending test and the rim roll test. Both these tests are considered necessary today although they have severe limitations, they are time-consuming and require separate test rigs. This is so because only specific structural areas of the wheel can be addressed in each test.

None the less, the results of these tests must be further supported by road testing.

This machine will comply to the following main international Norms:

- 🇮🇹 SAE J2562 Passenger car & Light truck;
- 🇮🇹 GMW 14340 Passenger car & Light duty truck;
- 🇮🇹 EUWA Standard "Biaxial Fatigue Test for Truck Wheels" ES 3.23, dated May 2006.



TECHNICAL SPECIFICATION

Sizes	8.500 mm x 4.000 mm, h=4.500 mm
Wheel sizes (max)	D= 1.600 mm, w= 750 mm
Radial max load	250 KN
Axial max load	100 KN
Max deflection angle	15°
Testing speed	From 10 to 130 Km/h
Drum	Diameter 1.800 mm Internal width without rings 960 mm
Programs	<ol style="list-style-type: none">1. Euro-cycle standard2. Freely configurable

CORNERING FATIGUE TEST

(BENDING MACHINE)

Applus Idiada



INTRODUCTION

The machine is for rotating bending test (cornering fatigue test) for wheels. These machines are suitable to be placed into a test laboratory and can test wheels for pass cars, motorbikes, industrial vehicles, heavy trucks and tractors.

There are 3 different models are available, according to the different loads to apply to test the wheels. This machine is in agreement with all the main International Standards.

1. Bending Machine **5-10-12 kNm** (Passenger car, Light truck & Bus), follow some reference regulations:
 - IS9436-1980 Passenger car;
 - SAEJ328 Passenger car;
 - SAEJ1204 Passenger car & Light car;
 - JISD4103 Passenger car & Commercial vehicle;
 - AK LH 08 Passenger car;
 - JASO C614 Passenger car, Light truck, truck & Bus;
 - ECR124E Passenger car and their trailers;
 - GMW 14341 Passenger car & Light truck/Truck.

2. Bending Machine **30-60 kNm** (Passenger car, Light truck & Bus and Commercial vehicle), follow some reference regulations:
 - IS9438-1980 Commercial vehicle;
 - SAE J267 Truck & Bus;
 - JISD4103 Passenger car & Commercial vehicle;
 - JASO C614 Passenger car, Light truck, truck & Bus;
 - ECR124E Passenger car and their trailers;
 - ISO3894 Commercial vehicle, Buses & Multipurpose passenger vehicle;
 - GMW 14341 Passenger car & Light truck/Truck.

3. Bending Machine **80-105-110-130 kNm** (Commercial vehicle and agricultural wheels), follow some reference regulations:
 - EUWA 311 Truck wheel;
 - EUWA 324 Agricultural wheels;
 - ABNT NBR 6751 Truck.
 - GMW14341 Passenger car & Light truck/Truck;
 - EUWA 312 Agricultural wheels;
 - SAE J267 Truck & Bus.



**CORNERING
FATIGUE TEST
5-10-12 kNm**



**CORNERING
FATIGUE TEST
30-60 kNm**



**CORNERING
FATIGUE TEST
80-105-110-130
kNm**

TECHNICAL SPECIFICATION

	<i>FR10</i>			<i>FR20</i>		<i>FR30</i>			
Maximum Moment (KNm)	5	10	12	30	60	80	105	110	130
Minimum Moment (KNm)	0,2	0,5	0,5	1,5	4	4	5	5	6
Working Speed (rpm)	600 3.000		600 3.000			500 1.800			
Wheel Diameter (inches)	8''-24''			13''-30''		17''- 38''			
Rim Width (inches)	1 - 13			5 - 15		5-25			
Basement Diameter (mm)	1.400			1.800		2.100			
OPTIONAL									
Universal standard tool	13''-24''					/			