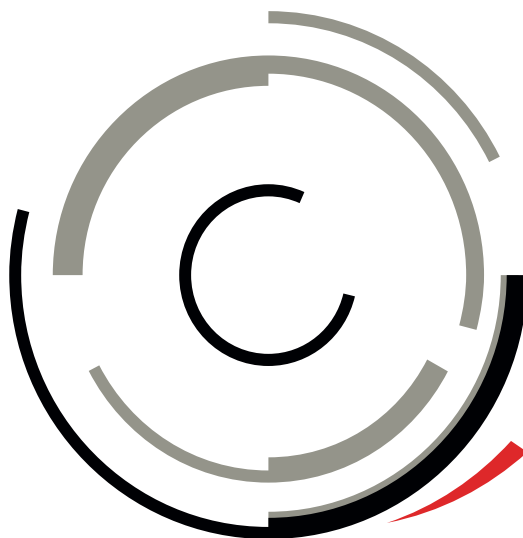



AXLES  
HEAVY HAUL  
SERVICES  
SAFETY  
HIGH SPEED  
HIGH-TECHNOLOGY  
LOW NOISE  
STEEL GRADES  
RESEARCH  
DEVELOPMENT  
LRV  
WHEELSETS  
HIGH-PERFORMANCE



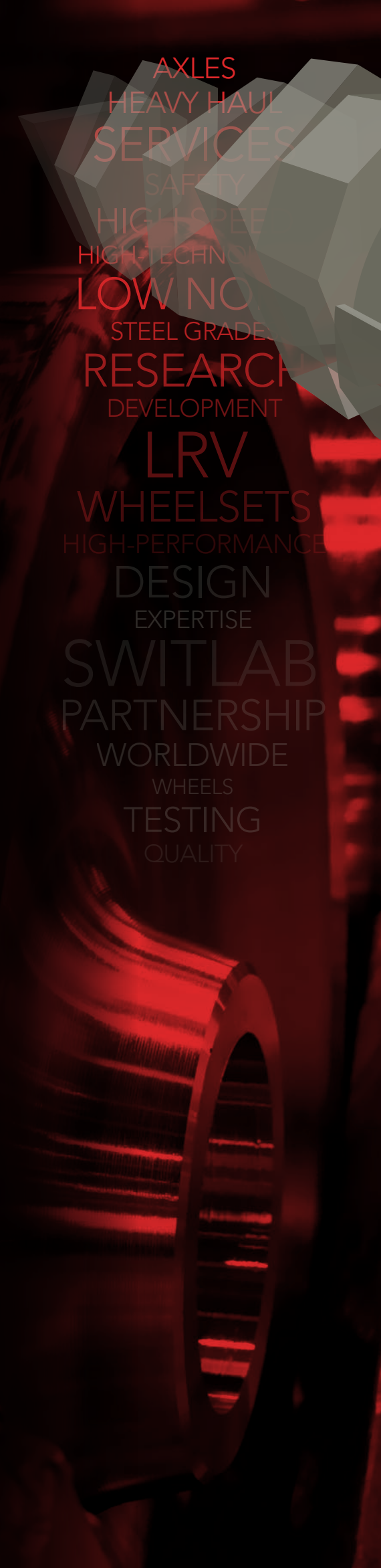
DESIGN  
EXPERTISE  
SWITLAB  
PARTNERSHIP  
WORLDWIDE  
WHEELS  
TESTING  
QUALITY  
FLEXIBILITY

OUR BUSINESS SPIRIT: INNOVATION & PERFORMANCE



“ MG-VALDUNES’  
Business Spirit of Innovation  
and Performance **is founded**  
**upon our company values:**

- respect
- security
- customer satisfaction
- responsibility
- progress //



AXLES  
HEAVY HAUL  
SERVICES

SAFETY  
HIGH SPEED  
HIGH TECHNOLOGY

LOW NOISE  
STEEL GRADE  
RESEARCH  
DEVELOPMENT

LRV  
WHEELSETS  
HIGH-PERFORMANCE  
DESIGN  
EXPERTISE  
SWITLAB  
PARTNERSHIP  
WORLDWIDE  
WHEELS  
TESTING  
QUALITY



- 4 ■ GENERAL PRESENTATION
- 8 ■ WHEELS
- 10 ■ AXLES
- 11 ■ WHEELSETS
- 12 ■ TECHNICAL CONSULTANCY  
& EXPERTISE
- 14 ■ CMF
- 15 ■ KNOW-HOW INNOVATION
- 19 ■ MANUFACTURING PROCESS
- 22 ■ QUALITY CUSTOMER CARE
- 25 ■ CERTIFICATIONS  
& REFERENCES





MG-VALDUNES is **one of the world's leading manufacturers and suppliers** of forged wheels, axles and wheelsets for rolling stock. //



# A RENAISSANCE

The creation of MG-VALDUNES in 2014, following the takeover of VALDUNES by the MA STEEL group, is a new chapter in our long history of wheel, axle and wheel manufacture. **With over 175 years of experience, MG-VALDUNES has a worldwide reputation** for the supply of high performance, high quality products and excellent service.

# FINANCIAL SECURITY

MG-VALDUNES is a fully owned subsidiary of Maanshan Iron and Steel Company (MA STEEL), a Chinese company, quoted on the Shanghai and Hong Kong stock exchanges, and **one of the world's top twenty steel companies, producing over 18 million tonnes of steel per year.** As part of the MA STEEL family, we join with more than 40 000 employees and benefit from the financial strength of a group **with an annual turnover of over 14 billion USD.**

With over 175 years of experience, MG-VALDUNES has a worldwide reputation.



# WORLDS BIGGEST

MA STEEL Wheel is also **the world's biggest manufacturer of forged wheels for rolling stock.** The combined production capacity of MG-VALDUNES and MA STEEL Wheel is over 800 thousand wheels per year and together we can offer the full range of wheels, axles and wheelsets for any kind of rolling stock, to suit any performance, quality, volume and economic requirements.



The combined production capacity of MG-VALDUNES and MA STEEL Wheel is over 800 thousand wheels per year.





## STATE OF THE ART PRODUCTION

The takeover by MA STEEL in 2014 came **with an investment plan, valued at almost 50 mEUR, to completely update MG-VALDUNES manufacturing and R&D facilities** in Dunkirk and Valenciennes in France. This will mean that MG-VALDUNES once again has state of the art equipment and will increase our capacity, improve productivity, reduce delivery lead times and cement MG-VALDUNES position as the rolling stock wheel, axle and wheelset solution provider **giving the best quality, performance, innovation and service.**

## PAST GLORIES, FUTURE SUCCESS, INTERNATIONAL PRESENCE, OUTSTANDING PERFORMANCE

MG-VALDUNES  
products are used  
in over 70 countries  
around the world.

**MG-VALDUNES products are used in over 70 countries around the world**, in every continent and in every possible kind of application, to all international standards and all conditions; from extreme cold to extreme heat, under extreme loads, at very high speeds, **MG-VALDUNES products are world renowned for their outstanding performance and for their contribution to the reduction of overall costs.**

## THE PERFORMANCE OF MG-VALDUNES PRODUCTS HAS BEEN PROVEN INTERNATIONALLY:

- High speed **world records** (574,8 km/h);
- High speed wheel **life record** over 3,5 million km;
- Heavy haul axle load over 40 Tonnes;
- Heavy haul wheel life up to 2 million km;
- Urban transport squealing noise reduction over 10-15 dB(A);
- Freight train noise reduction;
- Heavy haul wheel life **2,5 times higher than other manufacturers;**
- Wheel wear up to 30% lower than other manufacturers.



## CORPORATE VALUES: PERFORMANCE & INNOVATION

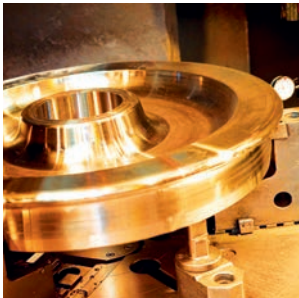
**MG-VALDUNES is focussed on our customers' needs** to provide outstanding performance and innovation. By understanding and anticipating our customers' needs and adapting our offer according to their requirements **we are able to provide them with significant overall cost savings, peace of mind, safety and low risk.**

Our Research & Development and Engineering expertise provide innovative solutions ensuring that customers can rely on consistently outstanding performance from MG-VALDUNES' products. **The values of performance and innovation are deep rooted in the culture of MG-VALDUNES,** and this is reflected in the service that we provide.

Equally MG-VALDUNES is committed to the development and welfare of our employees. The continuous improvement of our highly professional, dedicated team through training and career development is the foundation of our world class quality and performance. Each year we boost our workforce with the recruitment new apprentices and graduates.

**// The values of performance and innovation are deep rooted in the culture of MG-VALDUNES //**





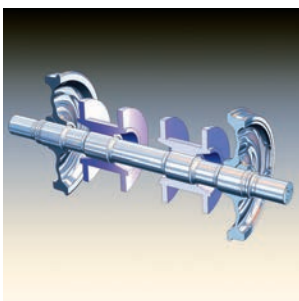
## WHEELS

Wheels for every kind of rolling stock application, designed and manufactured **to give the optimum performance and lowest cost** in consideration of the operational requirements of our customers.

MG-VALDUNES supplies wheels in all shapes, sizes from 400 mm diameter to 1350 mm diameter, and from 145 kg up to 1.2 tonnes. and grades (EN grades : ER6, ER7, ER8, ER8S & ER9 and ER8C, AAR steel grades : Class L, A, B, C & D and alloyed steels).

MG-VALDUNES wheels are **generally recognised for their high performance, long life and above average resistance to wear, defects, ovalisation, flats...**

MG-VALDUNES supplies finished wheels and can also supply "black wheels" (forged, heat-treated and tested blanks) for local finishing and, of course, wheels assembled with axles into wheelsets.



## HIGH SPEED AND VERY HIGH SPEED

MG-VALDUNES is **the only manufacturer to have supplied high speed wheels VHiS® to every continent.**

We are also the proud suppliers of the wheelsets for **9 world speed record breaking trains over the last 40 years** notably in 2007 (574.8 km/h) and also in 1990 (515.3 km/h) and 1981 (380 km/h).

As can be seen MG-VALDUNES has been a specialist in the supply of wheels for high speed and very high speed trains for over 35 years **and has unrivalled experience.**



## PASSENGER CARS

Rail passengers around the world **can travel in comfort and safety thanks to MG-VALDUNES** wheels for passenger cars.

Rail operators benefit from the peace of mind and reduced operating costs assured by MG-VALDUNES wheels' quality, performance, safety and long life.

## EMU/DMUs

Wheels for EMUs and DMUs with holes for wheel mounted brake discs, option for additional noise damping solutions.

## METRO / TRANSIT

MG-VALDUNES wheels and auxiliary safety wheels **are used by many of the leading metros around the world** and are recognised for their high performance and long life.

## RESILIENT WHEELS FOR LIGHT RAIL VEHICLES

MG-VALDUNES VUT™ wheel is the original high resilient wheel design that allows Light Rail Cars manufacturers **to make huge savings on the suspension system, whilst improving passenger comfort and reducing noise and vibration.**

The VUT NEO™ is the next generation of high resilient wheel design from MG-VALDUNES.

The VLR-1060 wheel is a resilient wheel with medium radial resilience and low axial resilience, offering outstanding performance, and low maintenance costs.

MG-VALDUNES can also offer a range of more traditional resilient wheels. Resilient wheels can be supplied as full complete assemblies or in kits for rolling stock maintenance.



## LOCOMOTIVES

MG-VALDUNES supplies wheels for every type of locomotive from shunters to high powered locomotives. **The wheels can be provided in any kind of steel grade.**



## HEAVY HAUL

High performance wheels designed to withstand very high axle loads (up to 50 tonnes) giving high performance and long life. Usually manufactured using MG-VALDUNES **micro-alloyed steel grades.**

**MG-VALDUNES is a world leader in the design, manufacture and supply of these high performance, specialised products.**

MG-VALDUNES VHD™ wheels have been proven to give an extended life, of up to 2 million km and to significantly reduce maintenance costs.



## FREIGHT CARS

A full range of wheels for freight cars, including low stress wheels and **solutions to optimise the wheel's resistance to tread braking.**

## SPECIAL VEHICLES

Wheels for a range of special vehicles, track maintenance machines (ballast cleaner and regulator, track renewal trains), cranes, trolleys, torpedo ladle cars for steel works.

**MG-VALDUNES**  
**manufacture**  
**axles for all rolling**  
**stock applications**  
**and sectors**

## AXLES

**Axles supplied by MG-VALDUNES are also used in all rolling stock applications and sectors;** for trailer cars, with or without seats for brake discs, for motor cars and locomotives with seats for mounting gears, gearboxes or reduction units, with different gauges, with seats for internal mounted bearings. Axles can be provided as rough machined or finished machined.

The axles are manufactured from either forged rolled bar or from forged axle blanks **in accordance with international standards and all steel grades specifications** (EN-EA1N, EA1T & EA4T and alloyed steel grades 42CrMo4 , 30NiCrMo8, 30NiCrMoV12).

- Hollow axles from Ø30 up to Ø110 mm, reducing weight and enabling easy in service ultra-sonic inspection;
- High speed axles with protection against impact;
- Cold rolled axles;
- Protection against corrosion (Painting, Temporary coating, VCI Vapor Corrosion Inhibitor bags).





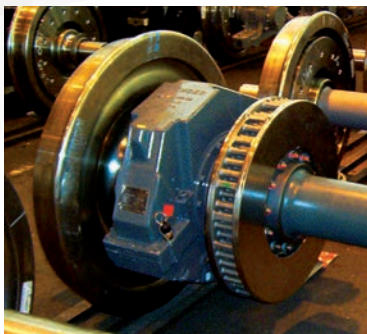
**// Solution  
for complete  
assembled  
wheelsets  
including  
gearboxes  
//**

## WHEELSETS

**MG-VALDUNES assembles wheelsets for all kinds of rolling stock.** Wheelset assembly can include the mounting of gear wheels, gearboxes, reduction units, brake discs on either the axle or the wheels, bearings and axleboxes.

The components mounted can be supplied as part of MG-VALDUNES scope or free-issued by our customers for mounting.

- High Speed Trains
- Very High Speed trains
- EMU/DMUs
- Metros
- Freight Cars
- Heavy Haul Ore Cars
- Locomotives





MG-VALDUNES' expertise can help you to improve your wheelsets performance





**ExperRail**

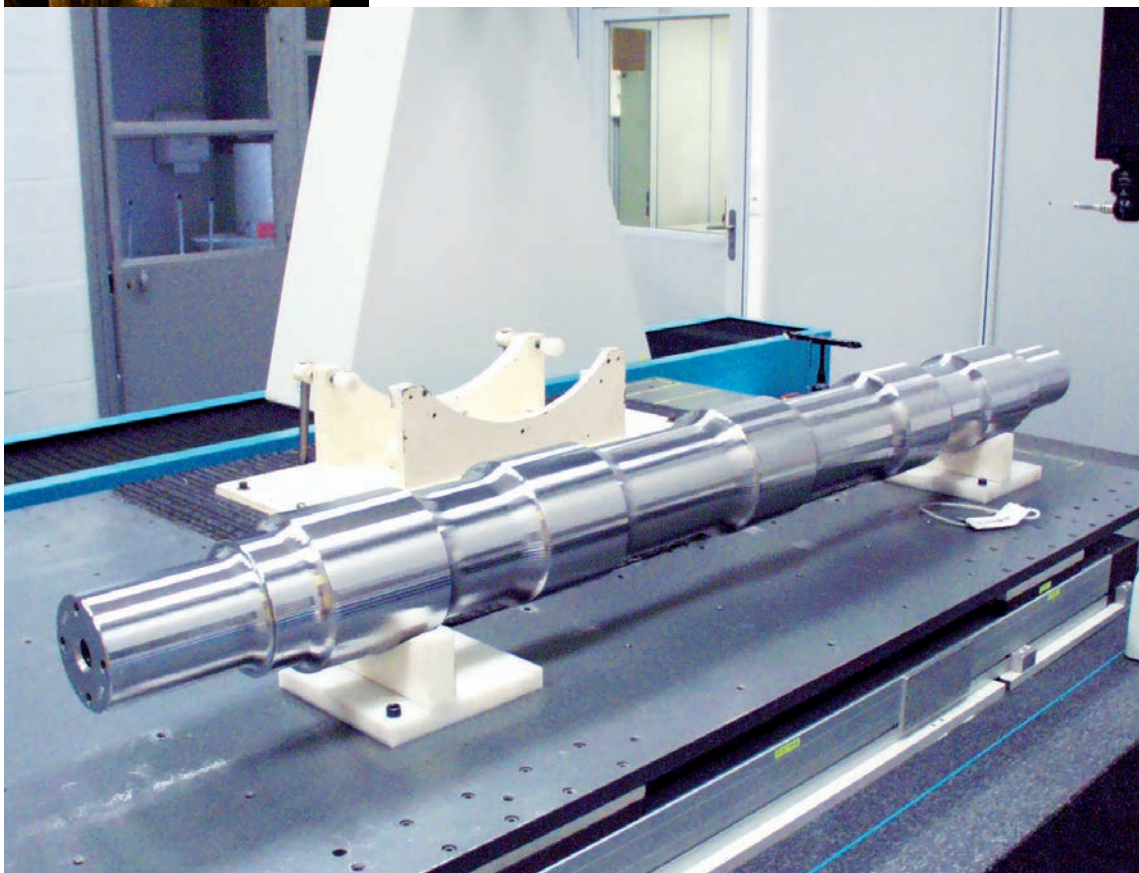
## TECHNICAL CONSULTANCY & EXPERTISE

In addition to the provision of high quality products and maintenance services MG-VALDUNES knowledge and experience mean that **we can offer expertise and advice expertise on operational problems with wheels, axles or wheelsets.**

These consultancy services include:

- The provision of solutions to improve performance;
- Improve defect resistance;
- Reduce noise;
- Reduce wear;
- Reduce weight;
- Increase life;
- Metallurgical analysis and expertise with a complete new Test Centre including material testing and chemical analysis;
- Steel expertise and Steelshop qualification process;
- Wheel, axle and wheelset design, validation and testing;
- Technical support for certification and qualification process;
- Definition of specifications and standards;
- NDT expertise.

*Expertise on  
3rd party wheels.*





CMF products  
are **world renowned**  
for their **exceptional**  
**performance**

## FORGED MECHANICAL COMPONENTS (CMF)

MG-VALDUNES' Forged Mechanical Components:

- Crane wheels;
- Rollers;
- Pulleys;
- Gear blanks;
- Brake discs.

MG-VALDUNES metallurgical expertise and experience has resulted in unique steel grades and manufacturing processes that mean that **our CMF products are world renowned for their exceptional performance.**

Applications:

- Overhead cranes;
- Gantry and port cranes;
- Rotary furnaces;
- Funicular;
- Locks and ship lifts;
- Shipping and railway transmissions and reducers;
- Piston heads for diesel engines.

### **Safety, reliability, durability**

Our customers can safely rely on MG-VALDUNES crane wheels to carry hundreds of tonnes of liquid steel without breaking down or needing to be often replaced.



## R&D / ENGINEERING

**Based on its experience and network, MG-VALDUNES has established a research laboratory call SWITlab** (Science for Wheelset Innovative Technology) in collaboration with universities in northern France (Université des Hauts-de-France), LaMcube and LAMIH.



**The laboratory is dedicated to the search for the optimization of manufacturing processes and the dimensioning of rolling components including the real material properties.** Numerical models associated with the characterization of steels make it possible to optimize the design before full-scale test phases. The project is supported by the Haut-de-France region, which welcomes French Railway cluster, I-Trans.

**This task force is focus on our customers operations** so that we can develop solutions which are appropriate to the market and which will bring genuine benefits in terms of:

- Operational performance;
- Overall cost reduction - Production, LCC and maintenance;
- Improved safety;
- Sustainable development.

**The result of the MG-VALDUNES' R&D** are illustrated by the realization of the following project:

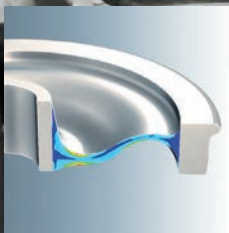
- VMS™ low stress wheel, high resistance wheel to drag braking;
- VALD25; VALD22 and VALD20 optimized freight wheelsets capable of replacing the majority of European freight axles on the market, for 25T, 22,5T, and 20T per axle with an increased margin of safety;
- VUT™, VUT NEO™ and VLR1060™ resilient wheels dedicated to urban transport safety and confort - low noise - low vibrations;
- VHD™ Micro Alloyed Steel dedicated to LCC improvement in severe conditions of loading and weather conditions;
- VLN™ MG-VALDUNES Low Noise associated to sustainable development;
- VHiS™, Very High Speed wheels for high performance at high speed.



**Develops solutions which bring genuine benefits //**







## DESIGN & MODELLING

MG-VALDUNES engineering team has unrivalled expertise in the design of wheels, axles and wheelsets. The team uses state of the art design support tools and techniques to model product behaviour **in order to optimize the performance and safety of our designs:**

\\ **A holistic approach to product design optimization** //

Finite Element Modeling, wheel/rail interface modeling, fatigue analysis using mono & multiaxial criteria, 3D modelling, thermal behavior modelling, press fitting and contact modelling, noise calculation using STARDAMP software (Deufrako project)...

These tools enable product designs to be validated to ensure their safe, reliable and enduring operational performance.



**\\ Innovator  
of micro-alloyed  
and ultra clean  
steel technologies  
for rolling  
stock wheelsets  
//**



**METALLURGY**

With its heritage in steel making, **MG-VALDUNES** has superior expertise in wheel and axle metallurgy.

Our metallurgical innovations, such as the VHD micro-alloyed steel grades for heavy haul applications, have been proven, in service, **to give MG-VALDUNES products exceptional performance with reduced wear, increased resistance to defects, reduced maintenance costs, longer life, increased safety and subsequent significant reductions in overall life cost.**

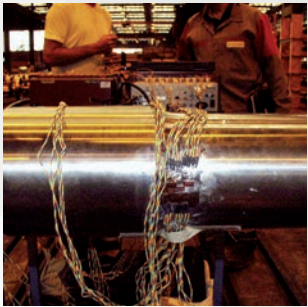


## DESIGN VALIDATION & TESTING

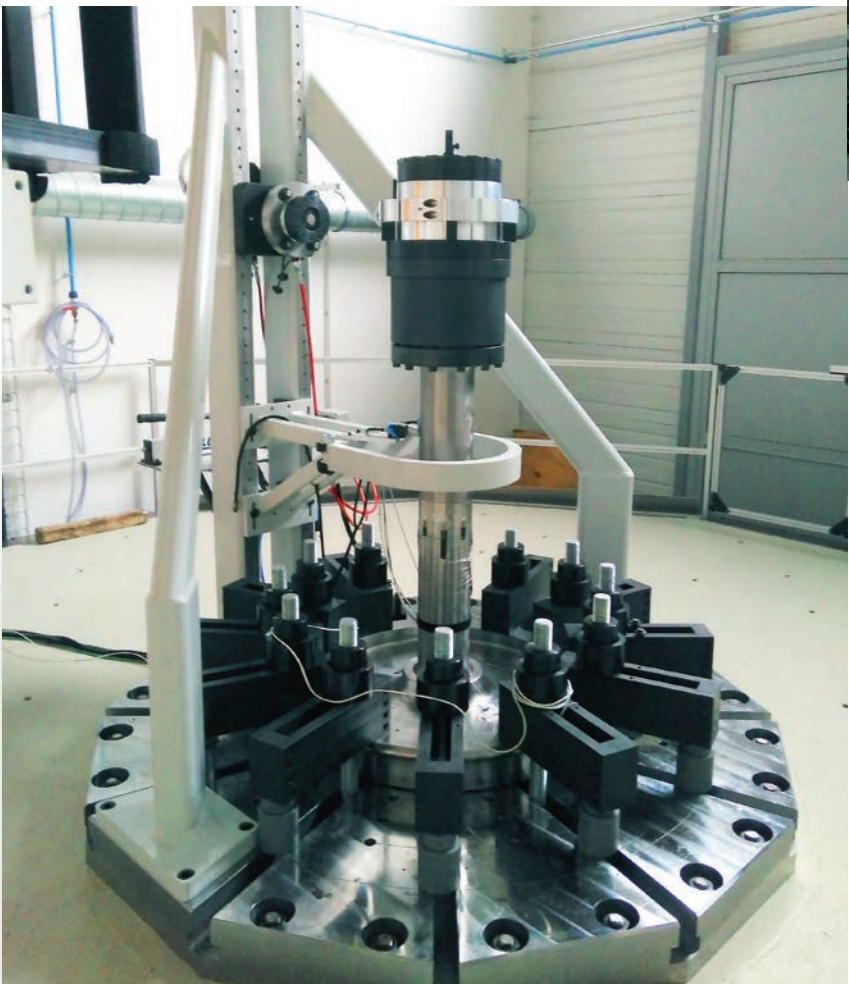
In addition to the modelling of designs and metallurgy, products are validated and proven by physical testing which is done **in MG-VALDUNES internal testing** facilities such as the MTC and our acoustic testing laboratory or by the independent test centres SWITlab and various partners such as the Eurailtest facility in Paris and the DB testing and research facilities in Minden, Germany.

**Our products and our metallurgy are subject to continuous review and improvement.** We encourage feedback about the operational performance of our products' from all our customers and establish close relationships with them to conduct field studies to measure and compare performance.

**These studies provide the evidence of our products' improved performance and the data needed for further improvement.**



**MG-VALDUNES,**  
the centre of  
all R&D activity  
of the MA STEEL  
group into  
wheels, axles  
and wheelsets





## PROCESS

Vigorous control of the entire manufacturing process **is essential to maintain MG-VALDUNES high standards of quality and performance in forging, heat-treatment and protection against corrosion and impacts.**

## STEEL

The steel used by MG-VALDUNES **is sourced from carefully selected and approved suppliers** and is manufactured to MG-VALDUNES specifications written and controlled by MG-VALDUNES expert metallurgists **to ensure that the end products give the required performance.**

In using a panel of different sources we are able to ensure the security of supply of steel, to use the most appropriate source to give us the exact steel that we require. MG-VALDUNES benefits from the economies of scale in manufacture, ongoing investment in state of the art steel making that our suppliers are able to generate.



**// The steel is sourced from carefully selected and approved suppliers //**



## FORGE

MG-VALDUNES fully automated wheel forging line at Dunkirk has long been the bench mark for wheel forging technology and produces forged blanks with first rate dimensional accuracy with minimal material usage. The facility comprises a 6000T press for upsetting and forming the shape of the wheel, a fully automated, computer controlled rolling mill, a 5000T dishing press and a controlled cooling line.

**The agreed investment in the plant will improve productivity and ensure continued excellence in accuracy and steel consumption.**

The forge is capable of producing pieces from 140 kg up to 3 tonnes, and from 600mm diameter up to 1360 mm diameter.





## HEAT TREATMENT

The Heat Treatment line at Valenciennes is also fully automated, with computer controls to manage furnace temperatures, quenching duration, water temperature and pressure.

The facility uses work instructions written by MG-VALDUNES expert metallurgists **to ensure that MG-VALDUNES wheels have consistently excellent mechanical characteristics deep into the wheel rim.**

After heat treatment all wheels undergo an automatic rim hardness test.



\\ Consistently  
excellent  
mechanical  
characteristics  
//

## METALLURGICAL TEST CENTRE

MG-VALDUNES' Metallurgical Test Centre (MTC), opened in 2012 after an investment of over 1 m EUR, **performs the required routine metallurgical and mechanical testing on wheels as well as expert technical services and tests for R&D purposes.**

The work of the MTC enables MG-VALDUNES to ensure the consistently outstanding quality of its products, to continuously improve and refine steel grade specifications and heat treatment parameters and to support the R&D team **in producing innovative solutions for the operational performance issues of our customers.**



## MACHINING

MG-VALDUNES wheels and axles are precision finished using CNC machines, giving an excellent surface finish and dimensional accuracy. Significant investment will ensure that the machining capacity is much increased. The new, fully automated, machining lines are organised according to the Lean Manufacturing concept, and **will improve productivity, reduce throughput time and delivery lead times.**

## INSPECTION, QUALITY CONTROL

After machining wheels and axles are thoroughly inspected. **Automated ultra-sonic and magnetic particle NDT lines control for internal and external defects,** dimensions are validated using precision instruments and the external aspects of the products are scrutinized.

## WHEELSET ASSEMBLY

**We have two press fitting lines to assemble wheelsets,** including the mounting of brake discs, bearings, axleboxes, gears, gearboxes and reduction units according to our customers' wishes. Wheelsets are fully inspected after assembly including dynamic balancing. The components mounted can be supplied as part of MG-VALDUNES scope or free-issued by our customers for mounting.

## PROTECTION & PACKAGING

All of MG-VALDUNES wheels, axles and wheelsets are appropriately painted or protected against corrosion according to our customers' wishes before being packed and shipped. MG-VALDUNES is using the experience of main railways and academic experts for the improvement of coating conditions.

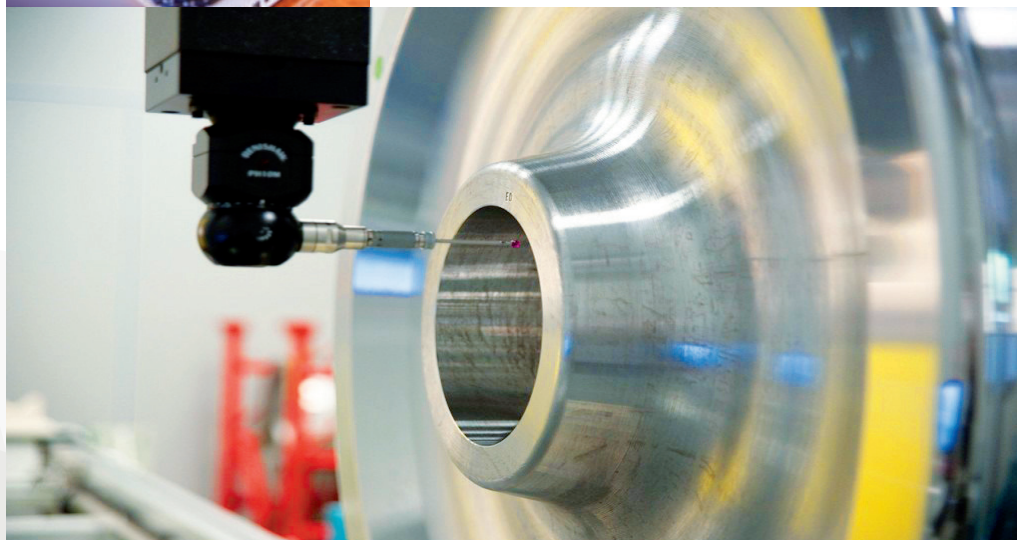
**MG-VALDUNES was a member of the Euraxles (European funded research programme) working group for the improvement of axle protection against corrosion.**

Shipments can be arranged by our dedicated logistics team to any location around the world according to the agreed Incoterms (FOB, DAP, CPT, CIF, DDP etc.).

**Modern facilities for complex machining operations :**  
turning, milling, boring, drilling, grinding and cold rolling



\\ Our outgoing commitment to the highest quality standards permits our customer, the users of our products and their clients and passengers complete peace of mind //



## QUALITY & SAFETY

**The essence of MG-VALDUNES ongoing success is quality.** At MG-VALDUNES, we are dedicated to ensuring the continued excellence of our products, our processes and our services.

MG-VALDUNES products are used in extreme operations: at over 320 km/h, with axle loads of over 40 tonnes, with intense braking conditions, in arctic or desert environments.

In all cases the products that MG-VALDUNES supplies are critical to the safe running of the rolling stock to carry its load or its passengers to their destination.

Our ongoing commitment to the highest quality standards permits our customers, the users of our products, and their customers and passengers complete peace of mind.

**MG-VALDUNES Quality Management System is certified according to the usual international quality standards: ISO9001, IRIS, RISAS, ...**

In addition MG-VALDUNES has approval from major customers, rail operators and car builders around the world, including: AAR, SNCF, DB Q1, RATP, OBB, SBB, SNCB, IRB, Alstom Transportation, Bombardier Transportation, Hyundai Rotem, ...





## ENVIRONMENT

It is well known that rail travel is amongst the most environmentally friendly means of transport. MG-VALDUNES is glad to be at the heart of this environmentally friendly industry and to make our contribution to reducing the impact of modern society on the environment. **MG-VALDUNES has the ISO14001 certification.**

The majority of the raw materials we use are manufactured from recycled materials. The outstanding performance and extended life of MG-VALDUNES' products assure that the use of resources is optimised. **At the end of their life our products can be 99% recycled.**

We are dedicated also to contributing to the creation of a better environment through our development of solutions to reduce noise and vibration using resilient wheels and noise damping devices. In our industrial processes **we have a continuous improvement plan to reduce emissions and to reduce consumption of resources.**

**The values of performance and innovation are deep rooted in the culture of MG-VALDUNES**





## AFTERSALES SERVICE

Our Quality Department Aftersales Service **provides solutions to our customers to resolve any problems they might encounter.**

Our Aftersales Services' aim is to provide:

- Fast, reliable and competent customer support;
- Assistance with Ongoing training qualification of operators and maintainers;
- Diagnosis and troubleshooting of customers operational problems associated with wheels, axles and wheelsets;
- Prompt and effective spare or replacement parts supply.

Our close support of customers in the field enables us to feed back their experiences to our R&D team, enabling us to maintain our core corporate values of outstanding performance and innovation.

**Aftersales service : fast, reliable and competent**





CERTIFICATIONS

MG-VALDUNES Quality Management System is certified according to the usual international quality standards:

- ISO9001
- IRIS
- RISAS
- ...

In addition MG-VALDUNES has approval from major customers, rail operators and car builders around the world, including:

- SNCF
- DB Q1
- AAR
- RATP
- OBB
- SBB
- SNCB
- IRB
- Alstom Transportation
- Bombardier Transportation
- Hyundai Rotem...

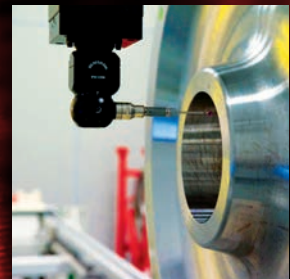


REFERENCES

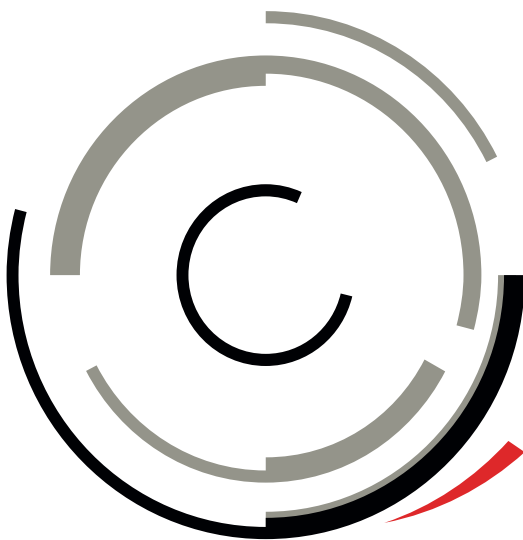
- SNCF
- DB
- RATP
- Vale
- GE
- Alstom Transportation
- Bombardier Transportation
- BHP
- Arcelor Mittal
- Transnet
- Progress Rail
- Renfe
- Transdev
- Veolia
- Korail
- Hyundai Rotem
- GHH Radsatz
- ONCF
- SNTF
- TCDD
- STC
- VIA RAIL
- CRRC CORPORATION

AXLES  
HEAVY HAUL  
SERVICES  
SAFETY  
HIGH SPEED  
HIGH-TECHNOLOGY  
LOW NOISE  
STEEL GRADES  
RESEARCH  
DEVELOPMENT  
LRV  
WHEELSETS  
HIGH-PERFORMANCE

MG-VALDUNES  
*is focussed on  
our customers'  
needs to provide  
outstanding  
performance  
and innovation.*







AXLES  
HEAVY HAUL  
SERVICES  
SAFETY  
HIGH SPEED  
HIGH-TECHNOLOGY  
LOW NOISE  
STEEL GRADES  
RESEARCH  
DEVELOPMENT  
LRV  
WHEELSETS  
HIGH-PERFORMANCE

## CONTACT INFO

MG-VALDUNES

Rue Gustave Delory - 59125 - Trith Saint Léger - France

Tel: +33 (0)3 27 23 62 62 - E-mail: [info@valdunes.com](mailto:info@valdunes.com)

[www.valdunes.com](http://www.valdunes.com)

DESIGN  
EXPERTISE  
SWITLAB  
PARTNERSHIP  
WORLDWIDE  
WHEELS  
TESTING  
QUALITY  
FLEXIBILITY

