



ArcelorMittal

BACKGROUND

ArcelorMittal Europe – Long Products

Long Products Europe is one of the key business units of ArcelorMittal. Employing 10,700 people, with about 12 million tonnes of steel shipped each year and a total of 23 plants in 10 countries, 4 of them serving the automotive industry, it is Europe's leading producer of wire rod, rebar, special and merchant bar, sheet piles and sections. In the pages below, we take a closer look at some of its most successful products.

Bars & Rods

ArcelorMittal Europe – Long Products has a long and rich tradition of producing Bars and Wire Rods in Germany, France, Spain, Poland, Czech Republic, Bosnia Herzegovina and Morocco. Its plants are at the forefront of technical innovation and provide best-in-class customer service, offering a wide spectrum of quality grades and finishing and covering the full range of applications.

ArcelorMittal Bars and Rods are sold to every major market – construction, infrastructure, automotive, mechanical engineering and energy. The group's commitment to reducing the company's carbon footprint is a key element of its development strategy, working alongside its customers to develop lighter and more cost-effective designs. In 2017, ArcelorMittal delivered 6.2m tons of Bars and Rods in Europe, using 20 % of recycled steel through Electric Arc Furnace route.

Key investments

Long Products Europe is continuously improving its product range to meet the evolving needs of the industry.

The group's European mills are making major investments in state-of-the-art equipment and confirms our firm commitment to building a long term, sustainable future for Bars and Rods.

Latest major investments include:

- The modernization of the Wire Rod mill of ArcelorMittal **Sosnowiec** (Poland): This project is providing facilities for producing high-quality wire rods dedicated to high demanding applications, including in Automotive. First phase is occurring in 2018 and the full completion is expected in 2019.
- The intensive upgrade of the continuous casters in ArcelorMittal **Duisburg** (Germany), especially the new blooms format in 320 x 320 mm demonstrated a top-quality level achieved and leading the Duisburg plant to an European reference.
- The commissioning of the rebars in coils line at ArcelorMittal **Zenica** (Bosnia Herzegovina) is a success. The 5 m euros invested in direct inline and fully automatic rebars coiling

facility is keeping all its promises. It supports actively the fast-growing construction segment throughout the region and our customers demand for increasingly higher quality and service.

- A series of projects under implementation that will further enhance our presence in the market:
- ArcelorMittal **Warsaw** (Poland) will implement a new finishing and control line in Q3/2018 dedicated to high quality Bars for automotive and engineering applications
- ArcelorMittal **Veriña** (Spain) implemented an induction furnace on the Wire Rod mill, providing first class product quality for automotive, construction and engineering applications
- ArcelorMittal **Hamburg** (Germany) will be equipped for 2 tons coils

These investments have significantly improved the quality and capabilities of the group's products in the most demanding market segments.

R&D: a worldwide network

With an expanding network of over **1400 full-time researchers in 12 centres in Europe and Americas**, ArcelorMittal Global R&D experts are committed to improve steel processing and engineering and to develop new steel solutions. Some of the most recently developed solutions for Bars & Rods, addressing current and future market needs and already in use, include **bainitic grades for forging (Solam®)**, **high plasticity** and **high strength grades for cold heading (FreeForm®)** and **high machinability grades**.

Main missions of ArcelorMittal Global R&D are:

- To support proactively the future needs of our customers and their markets
- To provide new steel solutions and optimized processes, from the pre-design to the full implementation Support our plants for complex technical issues ArcelorMittal Global R&D has developed sophisticated methods of mapping the steel production processes: from liquid metallurgy to hot rolling and cold forming. This modeling work is connecting the microstructural behavior with the thermomechanical processes to higher steel performances. We are able to offer complete solution to our partners and customers like the forgers or fastener makers for higher product / process robustness.

In addition, drawability and machinability are specific research fields where ArcelorMittal dedicates investments for complex equipment and pilot lines. Therefore, we can provide specific product characterization (at nano- and macro scales), numerical modelling or instrumentation to qualify the equipment efficiency.

Innovating for different markets

Automotive: close partnerships for lighter, safer and fuel-efficient vehicles

ArcelorMittal's customers are under significant pressure to reduce CO2 emissions, primarily related to fuel consumption. ArcelorMittal supports them by providing reliable weight reduction solutions, considering the entire life cycle of the material.

ArcelorMittal continues to invest in delivering high-quality steel for the automotive industry. The new continuous casting equipment at the ArcelorMittal **Duisburg** Steel Shop (320 x 320 mm) is providing higher quality products for application like rotating parts for trucks and cars. The Duisburg site remains a leading supplier of premium quality in alloyed springs and cold heading grades for the automotive industry. The new peeling line and the new quality inspection facility at the bright drawing plant in **Revigny-sur-Ornain** (France) are further strengthening our market position: 75% of the production goes to the automotive segment. ArcelorMittal **Gandrange** and **Warsaw** capabilities are completing the exhaustive product range for automotive segment. The latest investments in the ArcelorMittal **Sosnowiec** and **Veriña** plants (highly homogeneous internal quality, finer diameter tolerances and higher surface defect detection) are contributing to reinforce the company's position in the steel cord market.

ArcelorMittal Bars and Rods offers specific and dedicated brand products like:

- **Freeform®: a steel solution** to produce ultra-high strength engine bolts with improved hydrogen resistance. Possible applications in powertrains include screws for con-rod caps, crankshaft bearing and engine flywheel, bolts for cylinder head, differential and pulleys (M6-M10 screws). A bainitic grade can also be used for suspension and transmission bolts (M10-M14).
- **Advanced steel forging grade SOLAM® B11001** with a yield strength of over 1100 MPa, providing weight reductions of 20%, obtaining a 30% performance increase while eliminating costly heat treatment steps. Its many applications include truck front axle beams, steering arms, steering knuckles, etc.
- **Advanced steel grade SOLAM® M2050 S – Cor**, developed for suspension spring to reduce weight by up to 20% by increasing mechanical properties and improving fatigue resistance after corrosion as compared to standard grade 54SiCrV6

¹ **SOLAM** = Steel **SOL**ution of Arcelor**M**ittal for hot forging. B= Bainitic microstructure. 1100 in MPa is the minimum UTS achieved after forging

Mechanical engineering: steel solutions for high precision

We are supplying the mechanical engineering market from **ArcelorMittal Gandrange, Duisburg** and **Warsaw**. Our product range includes Bars and Wire Rods in round and hexagons shapes with a large spectrum of grades and dimensions. Our production equipment includes state-of-the-art sizing block, integrated bars conditioning line and surface and ultrasonic testing.

Besides **Revigny-sur-Ornain** offers a diversified portfolio: from low carbon, high carbon and alloyed steels, to leaded and unleaded free-cutting steel grades, with sulphur, for heat

treatment, case-hardening grades. The mill is producing 80kt per year of cold drawn, peeled and grinded bars and offers a special brand grade **Usimax®**. **Usimax®** is a free cutting steel solution allowing high mechanical characteristics and high level of productivity in machining operations.

Construction and infrastructure

ArcelorMittal **Hamburg**, **Veriña** and **Sosnowiec** are recognized as key players in Europe and Export markets for infrastructure solutions providers. Typical application of our steel solutions in infrastructure and construction are cables & ropes, prestressed concrete, rail clips. The coming extension of the 2 tons coils in **Hamburg** mill will further reinforce our position in the segment.

Energy: innovative solutions for power generation, transport and storage

ArcelorMittal is Europe's leading supplier of high-performance steel products for the global energy industry. ArcelorMittal **Hamburg**, **Sosnowiec** and **Veriña** are leaders in providing Wire Rods for welding applications. Hamburg is specialized in alloyed welding grades. ArcelorMittal is also supplying continuous casted round billets from **Ostrava** with enlarged diameter ranges (130, 200, 270, 350 and 400mm) and **Hunedoara** (Romania) with a complementary range (180, 200, 250, 270 and 310mm) and recently equipped with a new vacuum degassing system. This allows the production of seamless pipes for Oil and Gas applications. ArcelorMittal **Duisburg** is also a key player in providing adequate solution for Oil and Gas flexible pipes whereas **Hamburg** and **Veriña** are specialized for Aluminium Conductor Steel Reinforced cables amount others classical applications like cables armouring wire.

Yellow goods: steels for extreme conditions

Strong and abrasion-resistant steel is required to produce yellow goods, especially for the construction and earth moving equipment, the quarrying equipment or for fork lift trucks or also for the agricultural machinery. The Bars and Rods selection of high-performance steel grades supports the long lasting, sustainable and reliable equipment combined with the most challenging designs. ArcelorMittal **Warsaw** and **Duisburg** are approving the main segment's players for use of their products in the extreme working conditions of excavation, quarrying or even in mining.

Rails

ArcelorMittal, as the steel industry leader in product and process innovation and as one of the leading suppliers of rails worldwide, is fully geared to meet the future requirements of the rail industry. This is made possible by leveraging our research and development capabilities.

ArcelorMittal has rail production facilities in Spain, Luxemburg, Poland and United States that offer a wide portfolio of products, covering rails for subways, trams, trains, light rails, crane rails, crossings, rail accessories. ArcelorMittal Europe – Long Products is a specialist in rails for high-speed network, with over one million tons produced, and is present in infrastructure projects of

over 30 countries. Its high technologic quality allows us to participate in the more demanding tenders all over the world.

The main trending topics for railway and ArcelorMittal are:

- **Corporate Social Responsibility:** ArcelorMittal has received the Ecovadis Gold rating. Our company was voluntarily submitted to the Ecovadis auditing process, based on the most demanding international CSR standards, such as the Global Reporting Initiative (GRI), the United Nations Global Compact or the ISO 26000 standard
- **R&D:** ArcelorMittal operates a dedicated rail research and development unit which includes pilot plants and prototyping facilities. Our Rail Excellence Centre also includes a dedicated welding centre which can provide advice and support for our current and future grades for our customers
- **Digitalisation:** ArcelorMittal Rails & Special Sections is extending its 4.0 transformation with the launch of several digital tools, such as our Rails website, our three-dimensional virtual tour and our successful Rail tool app
- **Increasing the length of rails,** in order to provide further track safety, welding, track laying and maintenance cost savings. After the successful extension to 120m length rail in Poland, ArcelorMittal recently invested in Spain to produce 108m high quality rails
- **Increasing the service life of rails,** with the most appropriate solution related to different applications; our LCV (Low Carbon Vanadium) for tramway or new hardness grades for heavy haul applications

During the last 5 years the following investments have been made:

- Successful extension in ArcelorMittal Poland to 120m length, long rails
- Head Hardened line on Transport rails in ArcelorMittal Spain
- Development of Grooved Rails in Luxembourg, in addition to the Polish mill, including group-G tolerance, in all grooved rails
- Improved Low Carbon Vanadium (LCV) Grades for Grooved rail.
- Leaders in product range in Crane Rails

With the investment for the 108 meter long high quality rails in Spain, ArcelorMittal will be the only European rail producer to have a dedicated high quality long rail production in Western and Eastern Europe, perfectly located for supplying both European and export markets

This investment will provide the following customer benefits:

- 108 meter long rails, providing further track safety, as well as cost savings in welding, transportation and maintenance

- Improved surface quality and dimensional tolerance and increased riding comfort for passengers
- High Quality rolling allows faster development of new profiles/grades in order to fulfill customer requirements

Sheet Piling

ArcelorMittal is the world's largest producer of hot-rolled steel sheet piles, cold formed sheet piles, bearing piles and foundation solutions. These are produced at Belval and Differdange in Luxembourg, Dąbrowa Górnicza in Poland (for U-shaped hot rolled sheet piles); 'Palfroid' in Messempré, France (for cold formed sheet piles) and Dintelmond in the Netherlands (steel tubes for foundations). **ArcelorMittal Belval** is the rolling mill of hot rolled steel sheet piles offering the largest product portfolio and has been playing a leading role in the development of piling technology for over 100 years.

Steel sheet piles are used worldwide for the construction of quays and harbours, locks and breakwaters, and for bank reinforcement on rivers and canals. Other applications are the protection of excavations on land and in water and excavation works for bridge abutments, retaining walls, foundation structures, etc.

ArcelorMittal's piling series are especially suitable for building reliable structures rapidly and cost-effectively. They are characterised by excellent section modulus to weight ratios and high moments of inertia.

The group offers worldwide comprehensive services and customised support to all the parties involved in the design, specification and installation of sheet and bearing piles, such as consulting engineers, architects, regional authorities, contractors, academics and their students.

R&D

Since its launching in 2015, the new ArcelorMittal **AZ® XL** Sheet Pile Generation (**AZ®20-800, AZ®25-800, AZ®30-750 and AZ®50-700**) has been widely accepted by project stakeholders as providing cost efficient solutions for the project owners, high design flexibility in terms of tailor-made foundation solutions for the project engineers and high installation performances for the piling contractors: all-in-all a win-win situation allowing ArcelorMittal Sheet Piling to strengthen worldwide leadership in steel foundation solutions, paired with unmatched customer services from concept, design, special finishing works, supply logistics to job site execution. Above product advantages, customer services and close interaction with all stakeholders have been key reasons for ArcelorMittal to secure a most high-profile Flood Protection Scheme in UK:

Case Study: Boston Barrier tidal flood defence scheme under the umbrella of the Environmental Agency; More than 7000 tons of AZ Sheet Pile sections will be the key project part that will protect 14,000 homes and businesses from tidal flooding; this Government investment of £100million will make sure that Boston becomes one of the best flood protected towns in UK, thanks to ArcelorMittal sheet piles.

The Boston Barrier is part of an £229 million invest over the next four years to make sure the risk of flooding to 49,000 homes and businesses in this sea exposed are is significantly reduced; Following in-depth evaluation of different technical solutions, finally the ArcelorMittal tailormade Sheet Pile Flood protection scheme was approved and had been awarded to Bam Nuttall and Mott MacDonald joint venture (BMMJV)
This positive project record will also allow ArcelorMittal to play a key role in the Environmental Agency scheduled investment of 2.5 billion pound across the country, which will see 1,500 flood defences reducing risks to 300,000 homes by 2021.

Sections and Merchant Bars

The business segment counts 10 mills in 5 European countries and relies on a large sales and marketing network present in 60 countries worldwide. ArcelorMittal Europe is by far the number one producer of sections in Europe. It has a long tradition and renowned worldwide leadership in the production of heavy structural shapes, also known as Jumbos and very high strength quality steels, branded **Histar**[®]. Its mills offer the widest range of structural shapes, merchant bars and steel grade qualities.

Main application fields of sections are non-residential construction and civil engineering. Main sectors are halls/ factory buildings and building framing (multi-storey), offices, shops, car parks, public infrastructures. In civil engineering, the sections' main applications are found in short- and medium span bridges for roads and railways, as well as in foundation works. Last but not least the energy industry is also counting among the consuming sectors of sections and merchant bars.

The group works increasingly with the products and projects specifiers, influencers and customers to evolve into more cost-competitive and lighter design solutions that meet the criteria of safety, performance and sustainability.

For this aim the group strengthened its worldwide technical advisory services, supporting all the parties involved in the design, processing and installation of sections, -- such as structural engineers, fabricators/contractors, architects, construction/project managers, real-estate developers/owners, public authorities, code making bodies, structural design software companies, academics and their students.

2016 saw the launch of the **Orange Book of ArcelorMittal**: The "**Orange Book**" is the essential aid for the design of modern steelwork for buildings and general structures. It gives comprehensive tables of member resistances for sections in S355/HISTAR355 and S460/HISTAR460.

This heightened care to induce and capture more project sales includes a customized project follow-up and order fulfillment. Most important performance excellence goals are just-in-time and in-full delivery as well as complete customer satisfaction.

Ongoing and past years key achievements are for instance:

- For Europe's tallest building, -- the LAKTHA Center in St.Petersburg, The supplies of heavy sections for processing to cross-columns in steel Histar 460 Russia
- For South America's first recent tall building in steel: The supplies of heavy sections in Histar / A913 Grade 50 is.
- For South East Asia's tallest building: The KL 118 in Kuala Lumpur. Supplies of heavy sections in HISTAR 460

Key investments

To guarantee and grow the performance of **Differdange** mill as worldwide leader in heavy sections, some 35M€ have been invested in 2017 to very significantly **upgrade the finishing facilities of the Grey-rolling mill.**

Main benefits for our customers:

- Faster shipment
- Improved reliability of delivery
- Better consistency of straightness and geometrical tolerances
- Improved "look & feel" of the sections
- Ultimate reference for architects and structural engineers across the Globe for heavy shapes

Key features of the invest:

Roller-straightener from Danieli – World's largest ever built for sections: 2500 cm³ modulus. 9 rolls, double supported.

- Gag press from Röcher
- Cold saw from Danieli
- Marking robot by Ronmas

Timing:

- In October 2017 the new gag press has been brought in service.
- The roller straightener will be put in operation during the second quarter of 2018.

Eurostructures Beam Finishing Centre, one of the ArcelorMittal finishing facilities in Luxembourg has upgraded its services offer in the frame of a renewed strategic engagement. A new very heavy gag-press has been put in operation. Equipments for more efficient beam cutting, coping, drilling and end-milling has been brought in service.

R&D

Aiming to strengthen the promotion of structural steel vs competing materials in building framing, a comprehensive effort is underway. High-added value products and solutions of ArcelorMittal are focused with priority. Launch and deployment of that initiative is intended in selected markets in Europe in 2018.

Digitalisation

ArcelorMittal Europe – Long Products resolutely engaged in a digitalization program designed to support customer business needs.

It recently reengineered Net Steel, its customer dedicated web platform, offering various services

- View on available Stocks for its Sales from stock program
- View on Rolling planning
- Orders status of open orders
- Retrieve of Commercial documents (Order Confirmation, Order Responses, Dispatch advice, Certificates and invoices)

All functions support customization on user preferences, interactive queries and on demand export to .xlsx format.

ArcelorMittal also develops its EDI services to automate data flows from and to customers.

Messages for Order Entry, Order Response, Dispatch Advice, Certificate and Invoice are already implemented and can be exchanged over virtually any connection and file format.

Regarding Certificates, a twofold solution is implemented, addressing business specific needs:

- Bars & Rods customers benefit from an EDI message forwarding the full content of the Certificate
- Sections and Merchant Bar customers are being proposed a tailored PDF distribution

Both solutions enable automatic Certificate management on customer's ERP system and should help to significantly reduce workload as well as process throughput time.