

ArcelorMittal Europe – Flat Products



ArcelorMittal

update

Client magazine | May 2015



- 6 Driving the future with steel
- 10 Standing up to the elements
- 16 Packaging and the circular economy
- 18 Steel bridges set the standard

Contents

4 Connecting the network



ArcelorMittal and Corinth Pipeworks meet strict standards and delivery schedule for new gas pipeline.

6 Driving the future with steel



ArcelorMittal co-engineering approach supports automotive customers every step of the journey.

8 Getting the message out



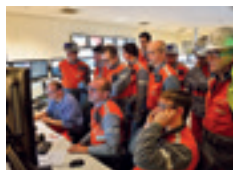
Steel promotion organisations increase steel's share of the construction market.

10 Standing up to the elements



For operators of solar installations, Magnelis® offers more than 25 years of almost maintenance-free support.

12 Investing in Europe's automotive future



ArcelorMittal is continuing its programme of investing in our European assets to create the next generation of steels for automotive.

14 2015 – Another year of innovation from ArcelorMittal



Innovation is at the heart of ArcelorMittal's commercial approach.

16 Packaging and the circular economy



Steel for packaging offers significant advantages in holistic, sustainable approach to resource optimisation.

18 Steel bridges set the standard



New aesthetic high strength steels to inspire creative bridge solutions.

21 Building the foundations of wind energy



ArcelorMittal customer Navantia wins jacket contract for Wiking offshore project.

22 Volkswagen gives ArcelorMittal St-Chély d'Apcher top marks



ArcelorMittal's St-Chély d'Apcher mill achieves an A rating – the highest possible – in two VDA audits conducted by carmaker Volkswagen and Tier-1 supplier Kienle + Spiess.

24 The motor of the machine



ArcelorMittal electrical steels power the motors in Miele appliances.





Each edition of Update features an article from an ArcelorMittal opinion leader. This issue we hear from Philippe Aubron, Chief Marketing Officer of ArcelorMittal Automotive Europe.

The strength of being global

ArcelorMittal's offer for automakers is about much more than just supplying the widest range of steel products for automotive. We also lead in distribution, value, and helping customers to exploit the properties of our products.

Steel remains the most cost-effective and environmentally responsible material automakers can use to save weight in a vehicle. Innovative steels, together with intelligent engineering, enable OEMs to achieve impressive weight savings which match those achieved with competing products, but at a fraction of their cost.

Through our ongoing S-in motion® solution programmes, ArcelorMittal has demonstrated that these weight and cost savings are achievable in production vehicles which take advantage of our advanced steels. We continue to develop new high-end products which offer excellent added value. Recent examples include our Fortiform® range of steels for cold stamping, and new coatings such as Zagnelis®.

One of the first questions customers ask us about these products is: 'Are they available everywhere?' With ArcelorMittal, the answer is an emphatic: 'Yes!' We understand that OEMs need the same products, and the same high level of service, wherever their production facilities are located.

That's why ArcelorMittal has created a worldwide footprint, and why we continue to build and upgrade our production infrastructure in the locations where OEMs need us today.

But ArcelorMittal is about more than just steelmaking. Our automotive division includes almost 600 people spread across our five dedicated automotive development centres. We also have 34 resident engineers who are embedded with automakers in almost every region of the world.

ArcelorMittal's cross-functional teams include people from outside the automotive world. They come from financing, purchasing and logistics, and help us to find new ways to address the different problems our customers face.

Our technology staff provides the expertise customers need to turn our steel solutions into new lightweight solutions for today's vehicles. A recent success of this co-engineering approach is the award-winning steel door ring developed for the Acura MDX by Honda and ArcelorMittal Tailored Blanks with the support of our global automotive and R&D departments. This solution replaces four parts with a single hot-stamped laser welded blank. It is on the road today and represents one of the safest, lightest and most affordable solutions available.

"ArcelorMittal's worldwide presence and innovation culture help carmakers create lighter, safer vehicles."

No other material has steel's track record of innovation. We explore and exploit steel's unique properties like no one else. ArcelorMittal's automotive division is unlocking the possibilities of steel on a daily basis. Above all, we understand the complexity our customers face. That's why automakers invite us to help them create the vehicles of tomorrow.

Philippe Aubron
CMO Automotive Europe



© Corinth Pipeworks

Connecting the network

ArcelorMittal and Corinth Pipeworks meet strict standards and delivery schedule for new gas pipeline

When completed, the Artère de l'Adour gas pipeline will run for almost 100 kilometres from Arcangues to Coudres in the south-west of France. This new pipeline is being constructed by the French gas supplier TIGF. The Artère de l'Adour enables TIGF to improve gas supply in the local region and provides a connection between Spain's Basque Country and the wider European gas network.

The pipe for the new gas line was provided by long-term ArcelorMittal customer, Corinth Pipeworks of Greece. Incorporated in 1969, Corinth Pipeworks is one of the world's leading steel pipe manufacturers for the oil and gas industry and a major supplier of hollow sections for the construction sector.

Limited delivery timeframe

Corinth Pipeworks' involvement in the Artère de l'Adour project began in late August 2013 when TIGF placed an order for almost 100 kilometres of high-frequency induction (HFI) pipe with a diameter of 610 mm. The tight timeframe of the project meant that Corinth Pipeworks had just six months to fulfil the order. This included sourcing the steel, forming and coating the pipes and shipping them to TIGF.

"We immediately contacted ArcelorMittal as we knew from experience that they could supply the quality steel we required," notes Nicholas Sarsentis, hot rolled coil procurement director for Corinth Pipeworks. "We've had very good cooperation for a long time and know that ArcelorMittal is a reliable steel partner."

The choice of ArcelorMittal as the steel supplier ensured that Corinth Pipeworks did not need to wait for approval from TIGF. "ArcelorMittal supplied the hot rolled coils from its mill at Fos-sur-Mer near Marseille in southern France. The fact that they were a reputable and local French supplier was a benefit," says Nicholas Sarsentis. "If we had chosen another steel supplier TIGF may have had to evaluate them first."

To manage the project, ArcelorMittal and Corinth Pipeworks established their own project teams. The ArcelorMittal Fos-sur-Mer team tracked the order continually, providing information to their counterparts at Corinth Pipeworks on a daily basis. The close cooperation ensured there were no major issues during the project.

Demanding steel and pipe specifications

TIGF specified a demanding steel grade which has high tensile strength and excellent toughness at low temperatures. "TIGF's specifications on the steel, finished pipe, and delivery were quite demanding," says Nicholas Sarsentis. As well as specifying that Corinth Pipeworks should ship the finished pipe to ports on the Bay of Biscay coast, TIGF requested that

disruption to local communities and the environment should be minimised during delivery.

The first coils were shipped from ArcelorMittal to Greece in November 2013. "We have deliveries by ship from ArcelorMittal Fos-sur-Mer to the port near Corinth Pipeworks almost every week," explains Nicholas Sarsentis. To meet

Corinth Pipeworks' just-in-time delivery schedule, shipments of coils for this project were made progressively.

The final batch of coils was delivered to Corinth Pipeworks in December 2013. "ArcelorMittal was able to meet our schedule which in turn enabled us to meet the stringent delivery requirements set by our customer," notes Nicholas Sarsentis.

"At the end of the project, ArcelorMittal had a satisfied customer and so did Corinth Pipeworks."

With pipe deliveries now complete, TIGF is finalising the construction of the Artère de l'Adour pipeline. After final testing and approval, the first gas is expected to flow along the line very soon.



The Artère de l'Adour pipeline in figures

Construction period:	2013 to 2015
Pipe delivery:	November 2013 to February 2014
Length:	95 km
Type:	Onshore, gas
Pipe diameter:	610 mm (24 inches)
Coating:	3LPE/3LPP exterior
Flow:	10 km/hour at 85 bar
Start of gas supply:	2015

© Corinth Pipeworks

Finished pipes were shipped directly from the Corinth Pipeworks port in Greece to France.



Corinth Pipeworks uses state-of-the-art equipment to meet the exacting standards for gas pipelines.

© Corinth Pipeworks

More info

For more information about Corinth Pipeworks, please visit: www.cpw.gr

More information about the Artère de l'Adour project can be found at: www.artere-adour-tigf.fr (available in French only).



Driving the future with steel

ArcelorMittal co-engineering approach supports automotive customers every step of the journey

When automotive manufacturers begin to design a new vehicle, they can count on ArcelorMittal to provide the widest range of automotive steel products, and our strong co-engineering support. Together they allow OEMs to develop light, up-to-date, and affordable mobility solutions with excellent consumer appeal.

ArcelorMittal's co-engineering support begins at the initial design phase – up to seven years or more before the new model will appear in showrooms. In the first of three phases in our co-engineering methodology, ArcelorMittal's automotive Global R&D teams sit with the OEM's design team to identify steel solutions which have the potential to save mass while maintaining or improving crash performance.

Phase 1 identifies lightest steel options

In the first phase, ArcelorMittal and the OEM select steels based on the properties required in each part of the car. This enables the manufacturer to choose from the latest, and lightest, steel solutions available. The grades selected take into account factors such as the OEM's

preferred manufacturing process, whether they prefer hot or cold stamping, and local safety regulations.

ArcelorMittal's proposals are based on our in-house engineered solutions called S-in motion®. In continuous evolution since 2010, our S-in motion® projects have identified catalogues of steel solutions for a wide range of parts and for various types of vehicles including smaller cars, pickup trucks, light commercial and electric-powered vehicles. All offer significant weight savings and take into account European and North American crash requirements. All S-in motion® solutions are fully validated and can be implemented with steel grades that are available today.

At the end of the first co-engineering phase, the ArcelorMittal automotive team

uses our in-house database to calculate the preliminary weight saving potential of the solutions selected.

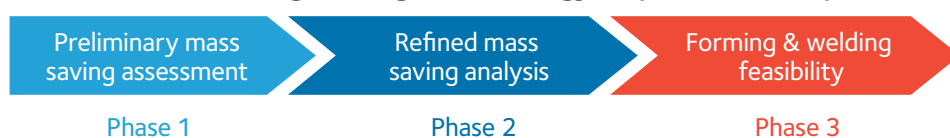
Refining material selection with CAE

The second phase in the methodology aims to refine the possible weight savings using computer-aided engineering (CAE) models. New design solutions are integrated into the CAE model to optimise the vehicle's performance in crash and stiffness load cases at the same level as the baseline model. The customer can also benefit from ArcelorMittal's modelling datasets.

ArcelorMittal's Global R&D team has developed the computational capability and competencies to run more than ten full virtual car crash simulations in less than 24 hours. Each simulation covers around four million elements.

Crash tests, stiffness assessments and other load cases are modelled to test material selection and forming options. Materials and other options can be changed to test the effect of different steel grades and technologies such as laser welded blanks (LWB). At the end of this phase, the OEM has a clear idea of the final weight of the vehicle's body-in-white and hang-on parts.

ArcelorMittal's co-engineering methodology is split into three phases



Practical issues addressed in final phase

In the final stage of ArcelorMittal's co-engineering methodology, the assembly and formability of the vehicle's parts is assessed. The feasibility of using technologies such as LWB and hot stamping are also assessed and optimised.

The detailed assembly analysis uses a three-step strategy to validate the assembly risks for each stack-up. For the most risky stack-ups numerical simulations can be performed using ArcelorMittal's own data for each grade. This enables the OEM to improve their process parameters. Experimental validation may also be carried out on more complex assembly configurations depending on the OEM's requirements.

In the forming assessment phase, the forming feasibility of all new solutions is evaluated through simulations, with different levels of detail depending on the part's complexity. We can examine both hot and cold stamping options depending on the OEM's preferred strategy. In our dedicated automotive applications research centre in Montataire (France), stamping trials are carried out for new grades. From these trials we can propose forming best practices to our customers. We can also carry out trials using the customer's own designs.


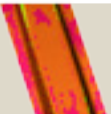
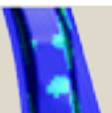


We can run more than 10 full virtual car crash simulations in less than 24 hours. Each simulation covers around 4 million elements.

Our support doesn't end once the final phase of the methodology is complete. For major manufacturers, ArcelorMittal's team of resident engineers are on standby to provide additional support whenever it is needed. Our automotive Global R&D teams can also provide technical advice during vehicle industrialisation and serial production, up to the point where the vehicle leaves the assembly line.

ArcelorMittal's extensive offer of automotive steel grades and our worldwide footprint are already compelling reasons why OEMs contact us for support when developing their new vehicles. Coupled with our proven co-engineering approach, unparalleled in-house expertise and service, these advantages make ArcelorMittal the go-to steel solution supplier for the global automotive industry.

Hot and cold stamping options are examined during the formability assessment

Gradual level of validation Hot stamping

Experimental approach	Hot stamping try out		Cold stamping try out
ArcelorMittal methodology	Pamstamp thermo-mechanical simulation		Outifo spring back control
Incremental approach	Autoform thermo-mechanical incremental		Autoform incremental
One-step approach	Autoform Onestep		Autoform Onestep
Expert validation	Analogy		Analogy



Automotive R&D close to the customer

ArcelorMittal operates 11 research laboratories in Europe and North America. Five are fully dedicated to developing the next generation of steels and solutions for our automotive customers: Maizières-lès-Metz, Montataire, Gandrange (France), Hamilton (Canada) and East Chicago (USA).

Our research centre in Maizières-lès-Metz (France) is the world's largest R&D facility for automotive steels. At any given moment, up to 80 new steel grades are under development.

During 2014, ArcelorMittal trialed and launched new steel grades and solutions that have the potential to further reduce the weight of any car. These 'third generation' steels include Fortiform®, a new range of AHSS for cold-stamping,

which could lead to weight savings of up to 20% in certain vehicle parts. They also include next generation press hardened steels such as Usibor® 2000 and Ductibor® 1000. Some of these grades are able to absorb more energy in a crash, making them ideal for use in structural parts of a vehicle that may be affected during impact.

ArcelorMittal's S-in motion® solutions have been applied to the pickup truck market. The identified solutions make it possible to reduce the combined weight of the vehicle's cab, box, frame and closures by 23% compared to a 2014 baseline vehicle. These solutions meet regulatory standards for vehicle performance. New solutions using third generation AHSS offer the opportunity to make further savings of around 22kg per vehicle.



© C.A. Gavinha

Members of the German steel IPO Bauforumstahl were represented on the organisation's stand at the 2015 Bau trade fair in Munich.

Getting the message out

Steel promotion organisations increase steel's share of the construction market

Independent steel promotion organisations (IPOs) have been created in many European countries. Their role is to emphasise the advantages of steel and to promote its use, particularly in the construction sector. But how do these organisations achieve their aims and how can ArcelorMittal customers take advantage of their services?

The activities each IPO undertakes vary from country to country. They range from an exchange of know-how between members to the establishment of specific technical committees to advocate for steel's inclusion in new national building regulations and standards. Regular IPO activities include the publication of brochures and technical studies, the organisation of seminars and site visits, and running educational programmes for students in higher education. Segment-specific programmes are also offered, covering issues such as corrosion, design, fire and seismic performance, sustainability, and dedicated steel applications such as bridges, roofing and cladding.

Targeting all parts of the construction sector

Let's zoom in on a few of the many IPOs. Infosteel, the steel IPO which covers Belgium and Luxembourg, targets all parties who are active in the decision making and implementation phases of steel construction projects. "That starts with investors and architects, and includes engineers, steel fabricators, steel distributors, and sub contractors," says Philippe Coigné, General Manager of Infosteel.

Most IPOs rely on the support of members to fund most of their activities. Some, such as the Dutch steel IPO Bouwen met Staal (Building with Steel),

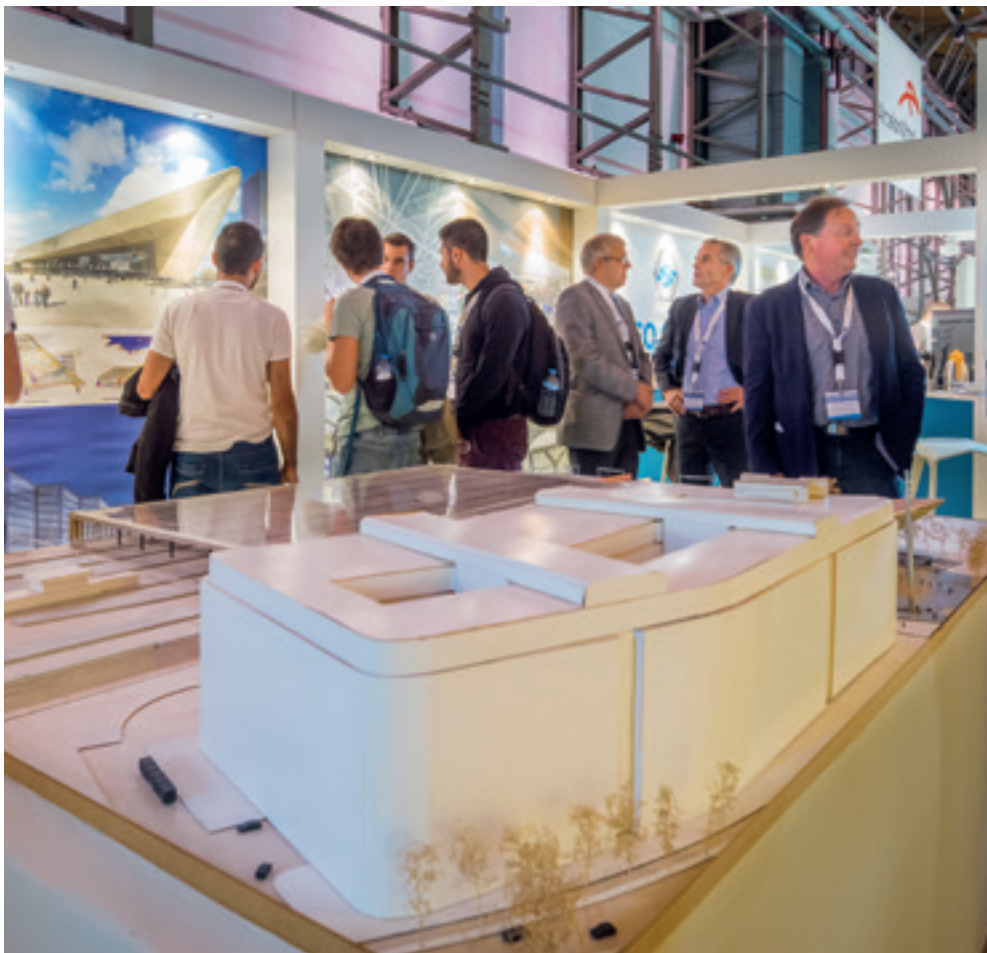
supplement their resources through extensive publishing activities and providing training. "We develop our own publications on subjects ranging from designing with steel to fire engineering," explains Frank Maatje, Director of the IPO. "Lecturers can choose different parts from our publications to create their own prescribed texts for their courses. This limits the cost of buying books for students and provides tailor-made course material for the lecturer."

Information days encourage networking

Both Infosteel and Bouwen met Staal offer information days dedicated to students and professionals in the construction industry. "Our Staalbouwdag (Steel Building Day) is targeted at university and technical college students," notes Frank Maatje. "We bring students together, visit a steel fabricator or construction project, and then take



Steel knowledge courses are an important part of the activities of steel IPOs such as Infosteel.



Bouwen met Staal's information days bring together students and professionals from the building industry.

Get more out of your local steel IPO

Each year, steel IPOs in Europe hold more than 500 events such as seminars and training courses which involve around 30,000 participants. On average 250 publications are delivered annually in local languages and more than one million people, mainly architects and engineers, visit the IPO websites.

Many steel IPOs also operate free help desks which can provide advice to the construction and building industry on local regulations and how steel can be utilised. IPOs such as Bouwen met Staal offer extensive databases of frequently asked questions (FAQ). "It's the most-used section of our website," notes Frank Maatje. "With the advent of Eurocodes, we're working

with other IPOs to create a Europe-wide database of FAQs relating to the use of steel in construction."

It's also possible to get involved in your local IPO. As well as steel producers, membership of an IPO is often open to related businesses and educators such as steel distributors, fabricators, profilers, product manufacturers, designers and professors at technical universities.

You can find the contact details for European IPOs from ArcelorMittal's dedicated steel construction website Constructalia (constructalia.arcelormittal.com). Search under Links or click the Contact button.

them to the event where our student prize is presented." More than 300 students take part every year. Bouwen met Staal also offers dedicated information days for architects and engineers.

Infosteel's Steel Day attracts more than 500 construction professionals for a

day of lectures and discussions around the use of steel in construction. "It enables them to update their knowledge and business network," notes Philippe Coigné. "We also use the occasion to present our steel construction awards which typically feature more than 150 projects."

Addressing local issues

In countries with specific concerns, IPOs are active in those areas. For example, Italy and Turkey are frequently affected by earthquakes. Steel IPOs in these countries actively lobby regulators for changes in building codes which take advantage of steel's exceptional ability to mitigate the effect of seismic events. IPOs also organise technical working groups, educational courses, and undertake the construction of demonstration buildings to prove the benefits of using steel in these regions.

For steel producers such as ArcelorMittal, IPOs provide a way to communicate with a wider audience about our innovative steels and solutions for the construction sector. "We need to increase the level of knowledge amongst regulators, building professionals and the next generation who are currently studying architecture, building and construction," explains Marta Dziarnowska, International Steel Promotion Director for ArcelorMittal. "The IPOs that ArcelorMittal works with are much better connected to their local audience than ArcelorMittal can be as an international steelmaker."



© Solar Projects

Standing up to the elements

Magnelis® adds value to solar projects

Magnelis® is the first zinc-magnesium-aluminium steel coating to be certified for use in marine environments. The distinctive metallic composition of Magnelis® creates a stable, robust and self-healing layer across the entire surface of the metal. For operators of solar installations, Magnelis® offers more than 25 years of almost maintenance-free support.

SP Sitac, an international approval and certification body for the construction sector, has tested Magnelis® and qualified the coating for use in C5-M (marine) environments. This enables Magnelis® to be utilised in coastal areas with high salinity.

Minimising zinc use and runoff

The 3% magnesium in Magnelis® is crucial as it provides a far more effective defence against corrosion than coatings with a lower magnesium content. With less zinc than conventional galvanisation, the coating also protects valuable resources for future generations and reduces the environmental impact from zinc runoff to soil. Magnelis® also performs up to ten times better than galvanised steel.

By selecting a Magnelis® coating for the structural elements, operators can extend the life of their solar farms and maximise return on investment.

"The main reason we use Magnelis® is the quality and durability of the coating," explains Jürgen Wolpert, owner of CWF, a leading producer of mounting systems for open-field photovoltaic installations. "Another reason is the logistical advantage Magnelis® offers. We can fabricate the parts and skip the costly and time-consuming process of batch galvanisation. This saves us a week of processing and enables us to meet the short lead times this sector demands."

Profil du Futur provides Magnelis® coated steel structures for ground-based solar installations.



© CWF

The main reason CWF uses Magnelis® is the quality and durability of the coating.

Magnelis® ZM310 (25 µm) is the most used coating in solar applications and offers a guarantee of up to 25 years. ArcelorMittal recently developed Magnelis® ZM430 which has a thicker (35 µm) coating. ZM430 offers the best possible protection in more aggressive soils and in areas subject to higher abrasion.

Thanks to ArcelorMittal International, Magnelis® can be utilised in solar projects wherever they are located in the world.

Solar Projects adds value to utility-scale projects

Solar Projects, part of ArcelorMittal's Energy Projects business line in Distribution Solutions (Business Division Projects) is a specialised unit which supplies high precision solar steel structures. Solar Projects focuses on the production of pre-fabricated solar trackers and provides co-engineering services, processing, and technical advice.

They work with developers and engineering, procurement and construction (EPC) companies to identify and offer package solutions for concentrated photovoltaic

(CPV) and concentrated solar power (CSP – also known as solar thermal) installations.

"We advise them on the available steels, coatings, geometry, processing options, and dimensional specifications so they can find the optimal solution," explains Sven Van Welden, business development manager for Solar Projects.

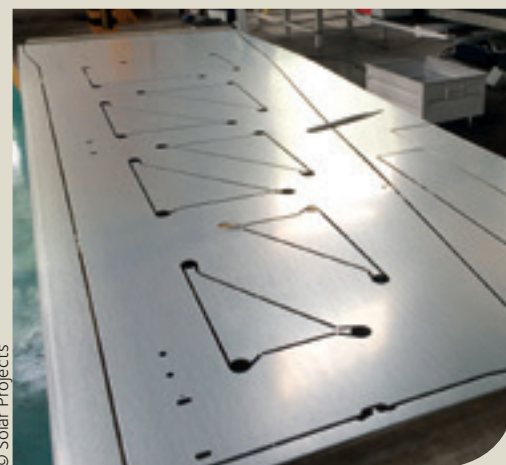
Solar Projects utilises Magnelis® to protect laser cut pieces which account for around 50% of the typical installation. "The laser cut leaves a 6 mm weld which Magnelis®

can bridge and protect thanks to its self-healing properties," notes Sven Van Welden. "Normal welds are too thick for Magnelis® to cover so we advise customers to re-engineer their installations to avoid welding. It removes a step from the process and gains time and money, and reduces complexity for our customers."

With in-house production sites in China and Egypt, the business is able to go beyond just supplying Magnelis®. Solar Projects is able to supply structures directly to project owners, offering them a total steel solution.



Solar Projects supplied the complete set of prefabricated steel parts for this CPV project in California (USA).



Solar Projects is able to laser cut, punch, or stamp the Magnelis® coated steel to customer specifications.

Profil du Futur



Profil du Futur is a manufacturer of structural steel applications for buildings and ground-based solar installations. Based in France, Profil du Futur is also a part of ArcelorMittal Distribution Solutions.

"We recommend Magnelis® for nearly every project," explains Pascal Fratta, head of sales for Profil du Futur. "Magnelis® is the ideal coating for ground-based installations as it does not fail, even in support structures which come into contact with the ground."

During 2014, Profil du Futur completed more than 10 large solar installations for operators across France.

Magnelis® unaffected by adhesives

Compared to other zinc-coated steels available on the market, Magnelis® coated steel has shown remarkably consistent adhesion performance in a series of tests conducted by Sika Services, a leading supplier of adhesives to the solar industry.

All tested adhesives showed adhesion build-up on the virgin substrates, independent of the coating type. However, adhesion performance after severe ageing conditions, especially after 1,000 hours of neutral salt spray (EN ISO 9227), showed major differences.



Adhesion tests carried out by Sika showed adhesives used with Magnelis® substrates were unaffected by long-term ageing conditions.

Adhesion to the electrolytically galvanised steel was affected by heavy corrosion creep. "This means the degradation of the zinc coating progressed even underneath the complete bond line," explains Michael Niederfuehr, an engineer for Sika Services who is responsible for solar applications. "This led to complete loss of adhesion after the 1,000-hour salt spray test."

Standard batch-galvanised steel grades showed the first signs of corrosion creep along the edge of the adhesive joint. This slightly reduced the strength of the bonded assembly.

"By comparison, the Magnelis® substrates were unaffected by any of the applied ageing conditions with regard to long-term adhesion performance," notes Michael Niederfuehr. "We only saw typical optical impairments as evidence of the ageing procedures carried out."



© Jeroen Op de Beeck

ArcelorMittal Gent is investing €140 million, for example to install an ultra-modern ladle furnace (photo left) and upgrade the rolling mill stands (photo right), to enable it to produce Fortiform® steel.

Investing in Europe's automotive future

ArcelorMittal is continuing its programme of investing in our European assets to create the next generation of steels for automotive. Recent investments have resulted in the development of a unique jet vapour deposition (JVD) process to improve galvanisation quality. The first JVD line, which will be used to produce ArcelorMittal's new Jetgal® coating, is under construction at ArcelorMittal Liège (Belgium). This plant has also installed a new tension leveller and side trimmer to further improve the quality of our products. ArcelorMittal Gent (also in Belgium) has recently undergone a €140 million transformation to enable the mill to produce Fortiform®, a new range of advanced high strength automotive steels (AHSS) for cold forming.

ArcelorMittal Gent invests heavily in the production of Fortiform®

In 2014 ArcelorMittal introduced a new range of advanced high strength steels (AHSS) for cold stamping. Known as Fortiform®, the steels enable OEMs to make lightweight, cold-formed structural components. These third-generation AHSS grades make additional weight reduction possible thanks to their higher mechanical properties compared to conventional AHSS. The new Fortiform® grades combine higher strength with excellent formability.

Production began last year at our Gent and Liège sites in Belgium. The Gent plant will carry out the entire production process, from molten steel through to finishing of the cold-rolled products, with Liège also taking on part of the latter task.

Ambitious investment programme

To enable it to produce the steel of the future, ArcelorMittal Gent has undertaken a particularly ambitious €140m investment programme spread over several years, easily making this "the investment of the century" for the site. The money has been ploughed into the steel plant, the hot strip mill and the cold rolling mill.

In the steel plant, ArcelorMittal Gent has installed an ultra-modern ladle furnace. This steel-refining unit gives Fortiform® its superior strength and formability properties and ensures a high hole expansion ratio, i.e. high resistance to edge cracking.

In the continuous casting line, where molten steel is converted into slabs, the centre of the slab caster has been fully upgraded by equipping the casting segments with dynamic soft reduction capability. This will ensure superior internal homogeneity of the steel structure.

Advanced high strength steels require the most powerful machines to roll the slabs into coils in the hot strip mill. The mechanisation of the finishing mill has therefore already been upgraded and a new heating furnace will be built by the end of 2015. Two finishing stands are also being upgraded, and a further two improved, to increase rolling forces from 3100 to 5000 tonnes. In addition, the systems controlling thickness, width, profile and flatness will have the fastest digital state-of-the-art processors.

"This investment will ensure that ArcelorMittal Gent's hot strip mill is a leading European supplier of high-quality steel that meets exact specifications and is available in a range of dimensions," comments Matthieu Jehl, CEO of ArcelorMittal Gent.

In the cold rolling mill, the pickling line welder has been modernised and the continuous annealing and processing line (CAPL) has been upgraded to cope with the higher strength of the Fortiform® grades.

JVD accelerates and improves galvanisation process

ArcelorMittal's Global R&D teams, working with the Metallurgical Research Centre (CRM Group) have developed the world's only jet vapour deposition (JVD) process for galvanisation. Due to start full-scale industrial production in mid-2016, the first JVD line will have the capacity to produce 300,000 tonnes of coated steel per year.

JVD allows steel to be coated with zinc (galvanised) at high speed. The process deposits an even coating of zinc on the

steel, ensuring that there are no weak spots where corrosion can gain a foothold.

The JVD line will mainly be used to produce Jetgal®, a brand-new coating for the advanced high strength steels (AHSS) used in the automotive industry developed by ArcelorMittal.

Breakthrough process

During the JVD process, zinc vapour is evenly distributed across a moving strip of steel in a vacuum. The line can be coupled to a high-speed continuous annealing line to increase efficiency.

JVD is a breakthrough process which is REACH compliant. It also requires relatively little energy compared to other galvanisation processes and offers very high zinc yield without losses. "JVD demonstrates the dedication and capability of ArcelorMittal's Global R&D teams," explains Jean-Luc Thirion, head of Global R&D for automotive. "They have been developing JVD over the last eight years, starting with a small lab trial and scaling up to a full industrial solution."

The new line is being constructed by Arceo, a joint-venture between ArcelorMittal and Sogepa, an investment fund which supports the economic and social development of Belgium's Wallonia region. Construction of the JVD line is expected to cost around €60 million.

Liège at centre of steel innovation

"The Jetgal® project demonstrates once more, that the Liège area has always been and will always be a land of innovation in the steel sector," notes Renaud Witmeur, chairman of Sogepa's Executive Committee. "This investment shows the will of Sogepa to contribute to the future of the steel sector in Wallonia through the development of promising new products."

In a second phase, the new coating line will be coupled to ArcelorMittal's existing continuous annealing line. "Liège will be the first site worldwide with this technology," says Bernard Dehut, CEO of ArcelorMittal Liège. "It will reinforce our global leadership in coating technology."



View of the semi-industrial line used to develop and assess the Jetgal® technology

Tension leveller and side trimmer improve quality

A new tension leveller and side trimmer have been installed on the continuous annealing line at Kessales (part of ArcelorMittal Liège) to improve steel quality. The €8.6 million investment was completed in mid-2014, and will enable ArcelorMittal to deliver the flattest automotive steels which are free from internal stresses. The new equipment is undergoing final testing before beginning commercial production in the second quarter of 2015.

The investment meets demands from ArcelorMittal's automotive customers for extremely flat products. OEM requirements for flatness are becoming more stringent, especially on ultra high strength steels (UHSS) with a tensile strength above 900 MPa. Internal stresses can cause the steel to distort when it is cut into sheets.

"This unique tool will allow our customers to use UHSS without being affected by flatness issues which can disrupt cutting, stamping or profiling operations," explains Serge Seron, head of quality and product development at ArcelorMittal Liège. "By resolving these known implementation challenges, we

have opened the door for OEMs to produce new parts with UHSS."

The line in Liège is the first ArcelorMittal line to be equipped with a leveller powerful enough to process UHSS steels. It can be used on a range of grades including

MartINsite® 1500 and Dual Phase 1180. The steels will be utilised by both OEMs and Tier-1 suppliers.

In addition, a new side trimmer will allow ArcelorMittal to deliver UHSS with perfectly smooth and regular edges.





© MetalSistem2013

2015

Another year of innovation from ArcelorMittal

Innovation is at the heart of ArcelorMittal's commercial approach

Our innovation cycle is dynamic, multi-pronged and very efficient. It ensures we hear the voices of our customers and tailor our products to your diverse needs. Our dedicated team of 1,300 Global R&D specialists are constantly exploring the boundaries of what steel can do. They are proactively developing solutions which meet both your existing and future needs.

Together with our marketing teams, ArcelorMittal's Global R&D team also offers proximity to the customer. The skills of our R&D teams and their state-of-the-art technology are available to support customers who want to engineer breakthrough products which are both cost-effective and environmentally responsible.

This article covers just some of the many products ArcelorMittal will commercialise or enhance this year as a result of our research programme. Each steel solution offers our customers the chance to add even more value to the applications they create with ArcelorMittal products.

Quenchable boron grades, tailored to your needs



Our selection of quenchable boron grades delivers a unique combination of extreme hardness, internal cleanliness and high strength. They also provide resistance to mechanical loads after heat treatment of finished parts. ArcelorMittal can tailor their properties to your specific needs, enabling you to create welded tubes for automotive and agricultural equipment which offer a longer lifetime and considerable weight reductions.

During 2015, ArcelorMittal Europe – Flat Products will enhance our portfolio of quenchable boron grades to include five new grades which offer full flexibility. Manufacturers of small welded tubes and agricultural equipment will notice effective cost reductions when they adopt these new grades.

© Jeroen Op de Beeck © Forges de Niaux

Amstrong™ extends lightweighting opportunities to new sectors

ArcelorMittal's new Armstrong™ range of ultra high strength steels (UHSS) allows manufacturers to develop lightweight solutions for agricultural, heavy lifting, mechanical engineering, mining, and transportation applications.

The Armstrong™ brand guarantees excellent flatness and cold forming properties for cut-to-length products. The extremely high impact-resistance of the Armstrong™ range makes these steels the right choice in high-performance applications.

ArcelorMittal offers our customers a distinct advantage thanks to the wide range of dimensions available. For example, our Armstrong™ 700MC grade can be ordered in thicknesses from 1.8 up to 15 mm, and widths up to 2000 mm. This flexibility translates into significant productivity gains for processors.

During 2015 we will extend our range with the production of UHSS products. They will offer enhanced mechanical performance and in-use properties. For manufacturers of heavy lifting and crane boom applications, these additions to the Armstrong™ range will provide an excellent, cost-effective alternative.



Granite® range heralds organic coated revolution

Today's architects and urban planners are paying much more attention to issues such as the sustainability and aesthetics of our built environment. Canny investors also realise that beautiful, durable buildings provide better return on investment.

ArcelorMittal has enriched our aesthetic offering of Granite® steels for roofs and facades to suit many of these concerns. We can offer an extensive choice from matt textured surfaces (such as Granite® Deep Mat for roofs and Granite® Silky Mat for facades) to bright finishes such as Granite® Silky Shine (released in April 2015).

Many of ArcelorMittal's recent developments in organic coated coils have aimed to improve the sustainability and corrosion performance of our steels. Granite® Storm, our most popular deep matt coated steel in Europe, has been so successful at both that ArcelorMittal has had to add new production lines to cope with demand.

ArcelorMittal's Solano® is our solution for roofs and cladding in demanding environments. Solano® offers exceptional performance and excellent corrosion resistance. In 2015 we will release Solano® Nature. Like all of the steels in our Nature range (including the Granite® series), Solano® Nature is free of chromates and heavy metals and anticipates European regulations on the use of harmful substances (REACH).

Cost-effective solution for silos and tanks

Grade S390EK was developed by ArcelorMittal Europe – Flat Products as a high strength steel suitable for the two-sided enamelling process used in silos and tanks. The steel provides a fish scale-free enamelling substrate which does not require the use of ground enamels or sub-layers containing adhesive metallic oxides such as nickel or cobalt oxides.

A minimum yield strength of 390 Megapascals (MPa) is guaranteed after enamel firing. This allows customers to reduce the thickness of the steel used. Silo manufacturers can expect to reduce their costs by around 20% with S390EK thanks to its simplified enamelling process and higher strength.



Magnelis® and Optigal™ lead metallic coatings market

Less than a decade after it was first developed, Magnelis® is now recognised as the best performing metallic coating for solar panel structures, safety barriers, building frames and many other applications where corrosion resistance is critical. The inclusion of zinc-aluminium-magnesium coatings in the European norm for continuously hot-dipped coated steel products (EN 10346) will open new opportunities for Magnelis®. For more information about Magnelis® and its use in the solar industry see the article on page 10.

ArcelorMittal's Optigal™ is now offered as an optimised substrate for organic coated products. It provides the corrosion protection and flexibility required for most building applications.

More info

For more information about the products mentioned, please visit industry.arcelormittal.com. To discuss your requirements with Global R&D, contact your local ArcelorMittal representative today. We may already have the steel solution which will help you innovate your business.



Packaging

and the circular economy

Steel for packaging offers significant advantages in holistic, sustainable approach to resource optimisation

The new European Commission, appointed in 2014, is currently examining options to introduce the concept of a circular economy into existing and future European legislation. If adopted, the proposal will affect a number of existing European regulations including the Directive on Packaging and Packaging Waste (94/62/EC). The change to a circular economy is one that ArcelorMittal supports and which is likely to see steel promoted as an integral part of a more sustainable approach to packaging.

A circular economy is one which aims to drive the optimal use of resources. It goes further than traditional sustainability models as a circular economy also requires the preservation of financial, manufacturing, human, social and natural capital.

This is achieved by creating products which are designed to use the minimum of resources and to be reused, remanufactured or recycled at the end of their life. While the packaging industry will need to adapt, steel for packaging already offers many of the attributes required in a circular economy.

Steel for packaging – already part of the circular economy

Waste prevention and eco-design are already hallmarks in the production of steel for packaging. Over the past 30 years, the thickness of steel for packaging has been reduced by 40% by optimising its properties, but without changing its functionality. Because of the advances that have been made, steel packaging still satisfies consumer and manufacturer demands for strong, attractive, and recyclable packaging solutions.

Steel is still the most recycled packaging material in Europe. Around 75% of all steel for packaging is collected and recycled to create new steels. Unlike other materials, all steel can be recycled infinitely, without losing any of its intrinsic properties.

Whatever the origin of the scrap, the steel recycling loop produces new steels which can be used in any market: automotive, appliance, construction, or packaging. This is a major contribution to the responsible management of resources.

Recycling steel packaging reduces resource use

Steel has been designated a permanent material by a number of institutions including the EU. Around 80 to 90% of all the steel ever produced is still in use today. Recycling of one tonne of scrap steel conserves more than twice that amount of resources including:

- 1.5 tonnes of iron ore
- 0.65 tonnes of coal
- 0.3 tonnes of limestone

A tonne of recycled steel reduces energy use by around 70% compared to producing

steel from raw materials. Steel recycling also reduces the environmental impact of steelmaking. Creating one tonne of steel from recycled sources reduces CO₂-equivalent emissions by 1.5 tonnes.

The steel industry as a whole has continued to improve its environmental performance. Between 2010 and 2012, greenhouse gas emissions from the steel industry were reduced by 9% in Europe. In the same timeframe, acidification and eutrophication (an excessive amount of nutrients in water) from steelmaking have also been reduced by 6% and 11% respectively.

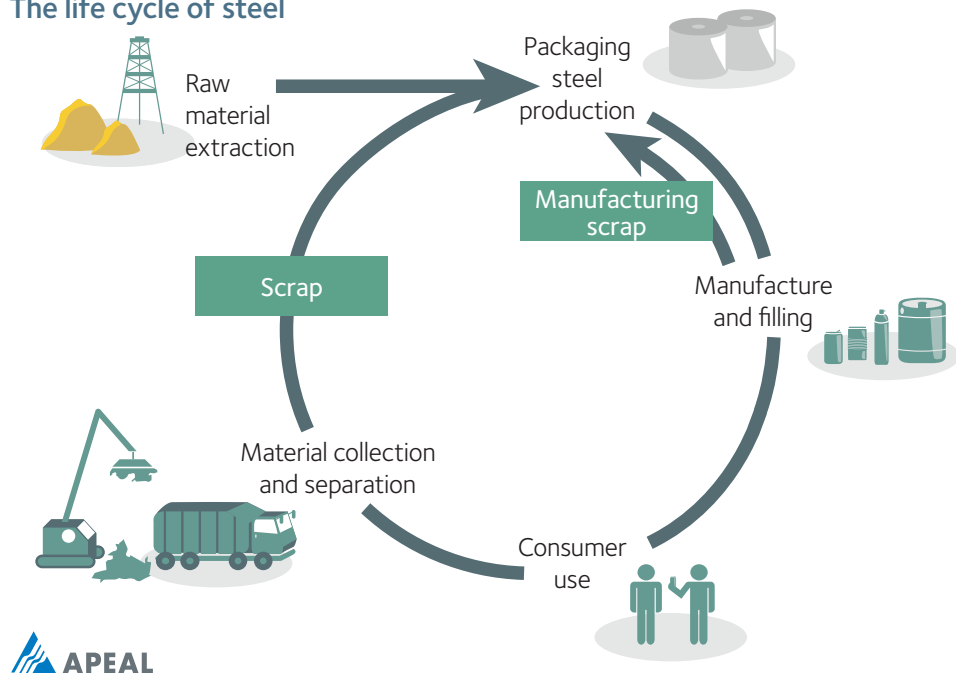
The concept of a circular economy is also reflected in the creation of social and economic models which drive the recycling of steel for packaging. Typically steel packaging recycling happens at the local level using waste generated in the local or regional area.

ArcelorMittal, a major player in the circular economy

Establishing a circular economy for the packaging industry is not just about recycling. It requires steelmakers, canmakers and fillers to consider all stages of the packaging's life cycle.

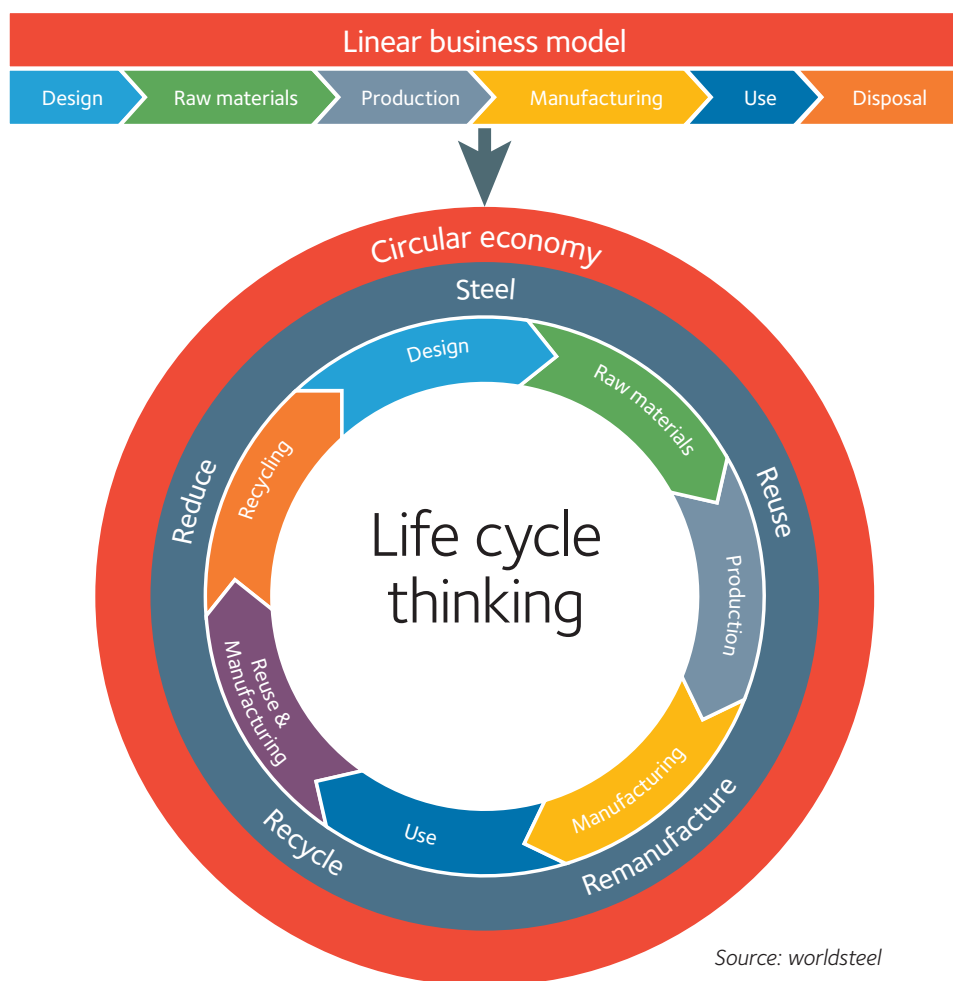
ArcelorMittal actively contributes to creating a circular economy, and industrial ecology forms an integral part of our policy. In France, for example, ArcelorMittal has a long history of

The life cycle of steel



The circular economy: a life cycle perspective

The reduction, reuse and recycling of materials is integral to the global circular economy and a fundamental advantage of using steel.



recovering and recycling post-consumer steel packaging. This provides all municipalities, wherever they are located and whatever their waste tonnage, the opportunity to effectively recycle their steel packaging waste.

As well as acting for the benefit of the environment and the efficient use of resources, this practice involves local stakeholders to process and transport the waste. This in turn creates value in local

ArcelorMittal leads in R&D for REACH compliance

REACH is an EU regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals and entered into force on 1 June 2007. The main aims of REACH are to ensure a high level of protection of human health and the environment, the promotion of alternative test methods, the free circulation of substances on the internal market, and enhancing competitiveness and innovation.

From September 2017, the use of chromates will be banned which will have major consequences for steel for packaging. To ensure we meet the REACH requirements, ArcelorMittal Global R&D has developed an alternative solution with other EU steelmakers and our partner – Henkel. The new product uses an innovative deposition process which helps to reduce waste and the need for waste treatment.

The process has already been optimised through technical cooperation with European steelmakers over the past few years. Over the coming decades, this solution is likely to become the new global standard. Qualification shipments of the new material are scheduled to begin by end 2015.

Whatever the origin of the scrap, the steel recycling loop produces new steels which can be used in any market: automotive, appliance, construction, or packaging.

communities through employment and economic activity.

ArcelorMittal is committed to recycling locally to avoid emissions and reduce the need for raw materials from other countries. We also offer traceability through the whole recycling process as part of our resource efficiency policy.

More info

For more information about the sustainability of our Packaging business, please visit packaging.arcelormittal.com/sustainability

Steel bridges set the standard



© ipv Delft - Henk Snaterse

New aesthetic high strength steels to inspire creative bridge solutions

An update to the European standard for structural steels is likely to be approved by the end of 2015. For bridge designers, the new standard will be a welcome change as it enhances the range of high strength structural grades which can be used in bridge construction. These include aesthetic grades such as ArcelorMittal's Indaten® weathering steel which provides decades of maintenance-free use and excellent life cycle benefits for public projects.

The update to the EN 10025 standard for hot rolled structural weathering steels will add at least two new high strength grades – S420 and S460. Under the existing regulation, just one grade – S355, is allowed. Higher strength steels will enable bridge designers to optimise the structure of their designs and reduce the thickness of the steel plates used. The lighter steel structures which will result can be assembled in larger sections, reducing the time needed for installation and saving significantly on welding.

Whole-of-life costing favours steel

The new standard comes at a time when public authorities across Europe must account closely for every euro they spend. Increasingly, whole-of-life costing and long-term environmental impacts must be considered before any major infrastructure project is approved.

Steel is the most cost-effective and sustainable bridge material, even when regular maintenance is included. Once a steel bridge has been in service for more than 30 years, the major maintenance expense is

painting. This typically costs around €100 per square metre. This cost can double or even triple when environmental regulations are factored in. For example, protective 'wrapping' is required to ensure no paint enters the local environment and that all waste from the process can be collected and treated before disposal.

Unlike other structural steels, Indaten® does not need to be painted for up to 80 years. This reduces its maintenance cost significantly. The trademark purplish brown colouring – the patina for which Indaten® is famous – develops over time as copper in the external layer oxidises. The copper produces a homogeneous and regenerating protective over the steel's surface which slows corrosion and ensures the integrity of the underlying steel. It's also aesthetically pleasing, particularly in

natural environments where it blends into the surrounding landscape.

In Italy, the change to life cycle thinking has led to the specification of weathering steel for almost every new bridge. The only exceptions are iconic projects which warrant the use of another steel or steel coating. In France, some local authorities responsible for infrastructure projects are considering the same approach.

Minimising disruption during replacement

In mature markets, most new bridge projects are for replacement structures

rather than new crossings. This is particularly true in the western part of the European Union (EU) where there are major programmes underway to renew or replace bridges which were built in the period immediately after the Second World War. Many of these structures are now reaching the end of their useful life.

Steel enables new erection techniques which significantly cut installation time. For road bridges, traffic disruption can be reduced from 18 months to just 6 months or less. As lighter structures are possible with the latest high strength steels, existing foundations and piles can often be reused.

The techniques are easy to implement and avoid long delays. The same processes can be applied to rail bridges, where disruption to traffic can be as little as a few hours.

With its relatively low cost, significant life cycle benefits and quick, simple construction techniques, steel continues to be the material of choice for road and rail bridges. The new European standard for structural steels is set to continue this advantage long into the future.

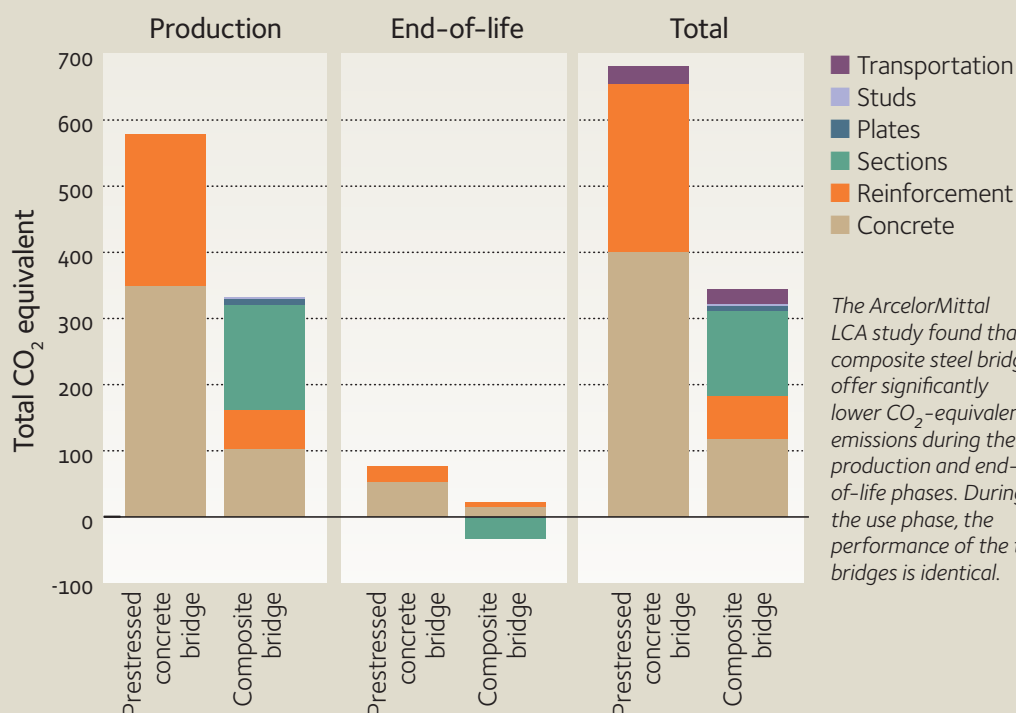


© ipv Delft - Henk Snaterse

Steel bridges offer lower emissions over their life cycle

A recent study commissioned by the Dutch government has found that steel road bridges are more than twice as sustainable as bridges constructed with composite materials. Compared to concrete bridges, steel also performs very well. Carried out by Beco (part of Ernst & Young), the study confirms the results of a similar ArcelorMittal project which used life cycle assessment (LCA) to compare the performance of a composite steel bridge with one made of pre-stressed concrete.

Eleven indicators were used in the ArcelorMittal study to quantify the environmental impacts of both types of road bridge. Across all 11 indicators, the impact of the composite steel bridge was lower than that of the pre-stressed concrete bridge. The difference varies from 40% for indicators such as primary energy demand



The ArcelorMittal LCA study found that composite steel bridges offer significantly lower CO₂-equivalent emissions during the production and end-of-life phases. During the use phase, the performance of the two bridges is identical.

and ozone depletion potential, to 70% for water consumption, freshwater usage, and human and marine toxicity potential. The

results have been presented to a worldsteel LCA expert group and a number of LCA conferences.

Hovenring improves safety for cyclists and pedestrians

With the rising popularity of cycling, more attention is being paid to developing road infrastructure which minimises interactions between cyclists and vehicles. One of the latest and most striking is the Hovenring bicycle and pedestrian bridge in the southern Dutch city of Eindhoven.

The bridge sits above a busy intersection at the entrance to Eindhoven. Growing traffic volumes inspired the city's authorities to develop a bridge which would keep bicycles and cars apart. Tunnel solutions were rejected as being too risky for cyclists and pedestrians, particularly at night.

Architecture firm ipv Delft came up with the Hovenring – a circular bicycle roundabout which hovers above the busy roads below. The level of the road for vehicle traffic was dropped by more than a metre to ensure pedestrians and cyclists had an easy gradient when accessing the Hovenring.

Hovenring includes 24 steel cables, a circular bridge deck and a landmark 70-metre high pylon which supports the structure and creates a landmark entrance to the city. More than 1,000 tonnes of ArcelorMittal steel was used in its construction.



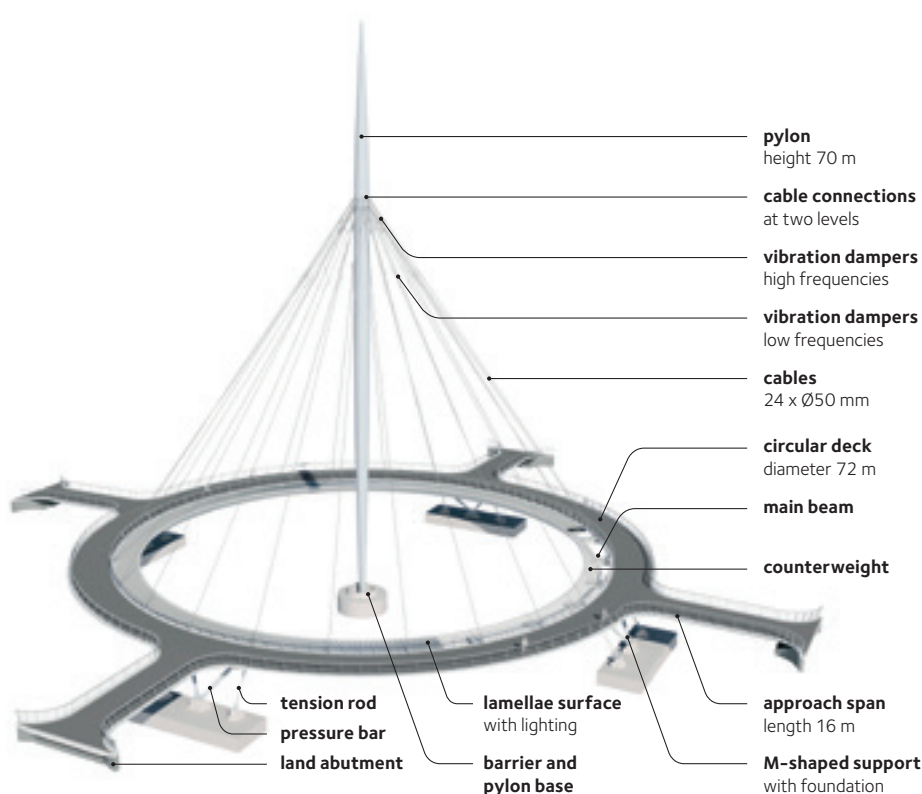
© ipv Delft - Helbeeld.nl

Hovenring was one of three finalists in the 2013 Dutch Design Awards in the Spatial Exterior category. In 2014, the bridge won the International Category of the Belgian Steel Construction Awards thanks to the involvement of Belgian steel fabricator Victor Buyck. The company was responsible for producing and building the steel structure of the circular cycle bridge.

Hovenring is a steel bridge which is designed to keep pedestrians and cyclists safe as they cross a busy intersection in Eindhoven (the Netherlands).



© ipv Delft - Helbeeld.nl



For more info about the Hovenring project, please visit www.hovenring.com



© Navantia

Building the foundations of wind energy

ArcelorMittal customer Navantia wins jacket contract for Wikingier offshore project

The Wikingier offshore wind farm will be constructed in the Baltic Sea, about 75 kilometres off the northern German coast. When complete in 2017, the wind farm will supply clean, renewable energy to more than 350,000 households. ArcelorMittal partner Navantia has been commissioned to produce jackets and piles for 29 wind turbines and an offshore substation which will control the energy flowing from Wikingier. ArcelorMittal will supply around 23,000 tonnes of heavy plate for the project between March 2015 and March 2016.

The Wikingier wind farm is being developed by the Spanish electricity producer Iberdrola. In December 2014, Iberdrola awarded the contract for the foundation jackets and piles to a joint venture formed by Navantia and Windar Renovables (Daniel Alonso Group). Together the partners will produce 116 piles and 29 type-B jackets which will be installed at depths ranging from 36 to 39 metres below sea level.

In addition to the jackets, Navantia will also produce the Wikingier offshore substation at its facility in Puerto Real (near Cadiz, Spain). "These commissions represent the first offshore wind projects built by Navantia," notes Raúl Rico, Navantia's Wikingier project manager. "However, Navantia has been involved in several onshore renewable energy development projects including wind farms and hydroelectric installations."

To create the piles and jackets, Navantia and its partner will utilise heavy steel plates produced at ArcelorMittal in Gijón. "The primary steel grade we will use is S355NL in thicknesses ranging from 19.1 up to 60 mm," explains Raúl Rico.

Most of the steel structural parts have a protective coating to prevent corrosion in the offshore environment. Some jacket elements which will sit below the water have additional cathodic protection.

Logistical advantage of proximity

Gijón is very close to Navantia's and Windar's facilities in the north of Spain. "This gives us a serious logistic advantage, as it makes it possible to reduce the delivery schedule," says Raúl Rico.

ArcelorMittal has supported Navantia with technical advice from early stages of the tender process. "Wikingier represents the continuation of more than a quarter of a century of cooperation between ArcelorMittal and Navantia," notes Raúl Rico. "For this project, ArcelorMittal has provided us with extensive advice about relevant tests, technical aspects, and logistics."

To create the piles and jackets, Navantia and its partner will utilise heavy steel plates produced at ArcelorMittal in Gijón.



© Navantia

About Wikingier



When complete, the Wikingier wind farm will have 70 Areva M5000-135 wind turbine generators. Each generator has a rated power of 5 megawatts (MW). Overall Wikingier will produce approximately 350 MW of energy annually, covering the energy needs of more than 350,000 households in Germany – and helping to save nearly 600,000 tonnes of carbon dioxide emissions a year. Wikingier covers an area of approximately 35 square kilometres.

More info

For more information about Navantia, please visit www.navantia.es

For more information and a video about our offer for wind turbines, please visit industry.arcelormittal.com/windtowers



Volkswagen's new e-Golf utilises ArcelorMittal's iCARE® range of innovative electrical steels.

Volkswagen gives ArcelorMittal St-Chély d'Apcher top marks

ArcelorMittal's St-Chély d'Apcher mill achieves an A rating – the highest possible – in two VDA audits conducted by carmaker Volkswagen and Tier-1 supplier Kienle + Spiess

ArcelorMittal's iCARE® range of innovative electrical steels for the automotive market are produced at our state-of-the-art mill in St-Chély d'Apcher (France). The mill was recently audited by two of ArcelorMittal's German automotive customers and passed with flying colours on both occasions. The audits were carried out by carmaker Volkswagen, and Kienle + Spiess, a leading supplier of vehicle components to the German automotive industry.



The new e-up! from Volkswagen also relies on ArcelorMittal's iCARE® range.

High quality requires high standards

German automotive manufacturers have very exacting standards. It is one of the reasons why the country is renowned for its high-quality vehicles. To maintain this level, many automakers require their suppliers to comply with international standards (such as ISO 19001 and ISO 16949) in addition to the German industry's own standard known as VDA 6.3 (see box). VDA 6.3 was developed by the German Association of the Automotive Industry, known as VDA.

While ISO standards typically focus on ensuring that the proper rules are followed, VDA 6.3 ensures that compliance takes place on the shop floor. "During the audit, a VDA assessor will discuss procedures with the people who are carrying them out, such as operators and lab technicians," explains Hugues Oberlé, ArcelorMittal's Global Technology Coordinator for Volkswagen. "The goal is to prove that ArcelorMittal's people understand what they are doing, and why."

Two 'A' results in three months

The Volkswagen audit was carried out during July 2014. Volkswagen was the first customer to conduct a VDA 6.3 audit at ArcelorMittal St-Chély d'Apcher. The audit took place while the mill was at full capacity, producing

Related links:

Volkswagen e-mobility:
emobility.volkswagen.com



Kienle + Spiess:
www.kienle-spiess.de

The results are very positive and confirm that ArcelorMittal St-Chély d'Apcher is continuously achieving the highest level of excellence required by today's automotive industry.

electrical steels for Volkswagen's new e-up! and e-Golf electric vehicles. "We achieved an A rating from Volkswagen – the highest possible," notes Hugues Oberlé. "Seeing the fruits of our efforts to accomplish this result makes us proud."

The Kienle + Spiess VDA 6.3 audit occurred in September 2014. Again, ArcelorMittal St-Chély d'Apcher achieved an A rating. "The results are very positive and confirm that ArcelorMittal St-Chély d'Apcher is continuously achieving the highest level of excellence required by today's automotive industry," says Hugues Oberlé.

About VDA 6.3

The Verband der Automobilindustrie (Association of the Automotive Industry or VDA) was established in Germany in 1901. Today the VDA counts more than 600 automobile manufacturers and suppliers as members. The organisation's goals are to research and produce clean and safe automotive solutions for the future.

An independent assessor audits the supplier. Manufacturers who pass the audit receive an A, B or C rating depending on the level of compliance achieved. B and C ratings indicate that the organisation has room to improve its performance.

For more info about VDA, visit www.vda.de



iCARE® range offers solutions for electric mobility

ArcelorMittal's innovative range of iCARE® electrical steels for automotive includes three product families which enable carmakers to develop the electrical and hybrid vehicles of the future. The iCARE® families are:

- iCARE® Save – Reduces iron losses from the stators of synchronous machines. This family of electrical steels is particularly useful for electric traction machines, and generators which extend the range of electric vehicles.
- iCARE® Torque – Assists flux generation which allows the motor to develop more mechanical output. If mechanical output is not an issue, permanent magnet or copper winding can be reduced to save on costs.
- iCARE® Speed – Developed for very high-speed rotors, iCARE® Speed grades maintain a high level of magnetic performance. They allow the machine to be more compact and produce a higher power density.

For more information about our iCARE® offer of electrical steels for automotive, visit automotive.arcelormittal.com/icare



The motor of the machine

ArcelorMittal electrical steels power the motors in Miele appliances

Everybody uses washing machines and vacuum cleaners and baking ovens. But what do they all have in common? They cannot work without their electric engines. Electric engines make sure that the laundry is fresh, the carpets are clean, and your pizza is crispy. And steel is integral to the efficient operation of these electric motors.

At our mill in Eisenhüttenstadt, Germany, ArcelorMittal produces steel for one of the most famous household appliance manufacturers in the world: Miele. Miele is well-known for its high degree of vertical integration. Almost all of the motors used in their washing machines, dishwashers and vacuum cleaners, are developed and produced at Miele's own motor factory in Euskirchen.

For this premium manufacturer, ArcelorMittal Eisenhüttenstadt produces high-quality electrical steels which are used in the electric motors of Miele's appliances. Since 2013, ArcelorMittal St-Chély d'Apcher, France, is also supplying electrical steels for the latest generation of motors used in Miele washing machines.

"We are constantly adjusting to Miele's special needs for its motor manufacturing process and we have achieved an excellent position," says Rolf Stiller who is responsible for electrical steel business development and technical support for Miele. "Our steel is used in almost all the devices produced by Miele."

The non-oriented (NO) electrical steels, both the fully-processed and the semi-processed types, are well-suited for Miele's washing machines and dryers. The high permeability of these grades in particular has a positive effect on the efficiency of these domestic appliances.

Cooperating for more than 20 years

The cooperation between ArcelorMittal and Miele started more than two decades ago. In order to fulfil the high quality standards Miele demands, ArcelorMittal has continuously improved the properties of our electrical steels.

ArcelorMittal's electrical steels have tailor-made grade and surface properties

which are finetuned for each customer and application. They are indispensable steels and used in all types of electric machines including engines and generators.

In Europe, ArcelorMittal operates two of the very few specialised mills which are able to manufacture electrical steels to the quality level Miele requests. We guarantee the defined magnetic and mechanical properties which are required for the smooth and efficient transmission of electrical energy. These key properties are achieved thanks to our specific iron-silicon alloys and the thermomechanical processes used in their production.

ArcelorMittal's electrical steels have tailor-made grade and surface properties which are finetuned for each customer and application.



More info

For more information about Miele, please visit www.miele.com

For more information about our range of electrical steels, please visit industry.arcelormittal.com/electricalsteels