

Flat Carbon Europe



ArcelorMittal

update

Client magazine | May 2011

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Every builder has at some point dreamed of a quality gutter that is durable, easy to use, cost-effective and – perhaps above all else – aesthetically

pleasing. It is time to stop dreaming and to discover Granite® Rain, a new range of rainwater systems combining aesthetics with durability, topped off with automatic guarantees.

08 Steel and wind energy



Wind power is an increasingly important part of the renewable energy mix in many countries around the world. ArcelorMittal is uniquely placed to provide the steels and

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As part of the S-in motion project, a detailed study of eight components in the chassis was undertaken. The results reveal that car

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10 Innovative achievements for the packaging industry



The Short Lead Time project demonstrates the importance of an adapted and ambitious change management policy and provides evidence of the

success that comes with innovation AND having a strong partnership with customers. Overall, ArcelorMittal's short lead time and thickness reduction programmes improve service and support.

Cover

Thinner steels for packaging
David Laurent – wide

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- p. 4-5: Philippe Vandenameele
- p. 8: EMEA/Winter
- p. 9: Indar
- p. 9, 17, 19: Jeroen Op de Beeck
- p. 10-11: David Laurent – wide
- p. 12: Van Hool
- p. 13: Christophe Degand
- p. 18: Getty images

Design & production

Geers Offset nv

Editorial responsibility

ArcelorMittal Flat Carbon Europe S.A.
Vanessa Vanhalst
19, avenue de la Liberté
L-2930 Luxembourg
www.arcelormittal.com/fce

Editor-in-chief

Dieter Vandenhende





Brian Aranha

Vice-President, CMO Flat Carbon Europe,
Global Customers & Automotive Worldwide

New Market Landscape

After the shock of the world economic crisis, the new model of raw material pricing has injected further turbulence into an already volatile steel market. In these difficult times, ArcelorMittal is working together with its customers to develop appropriate solutions.

The steel industry has experienced unprecedented changes over the last decade. Over-capacity in the developed economies has led to significant rationalisation of assets and to consolidation. Meanwhile, steel consumption has almost doubled to 1.5 billion tonnes driven mainly by China. This explosive growth is putting stress on raw material supplies with volatility in pricing. Today, the raw material costs fluctuate between 40 and 65% of total revenue. Raw material pricing has also switched from annual pricing to a quarterly system, thereby increasing uncertainty.

Now, the priority is to buy only what can be sold. To ensure steel users secure their supply, alternative pricing formulas have been worked out. The aim is to avoid breaks in the supply chain caused by ongoing price negotiations. With alternative pricing, prices can be revised automatically through linkage to either the public index for raw material evolution or to a recognised market price of finished steel products. A combination of the two is also possible.

Beside the “contract” approach described above, the commodity market continues its commitment to spot deals. Although the volatility of the costs may look easier to manage, the risk of making a poor decision

is very real for both the steel buyer and the steel producer. Buying too much of a raw material during a high cycle could oblige buyers to liquidate costly material during a down-cycle, commonly referred to as the cost-price squeeze. On the other hand, being too prudent in raw material purchasing today could result in a loss of supply when demand returns.

Although there is no ideal answer to this problem of mitigating price risks, the steel market is in need of a range of common solutions that must be put in place by FCE and its customers.

Possible solutions include:

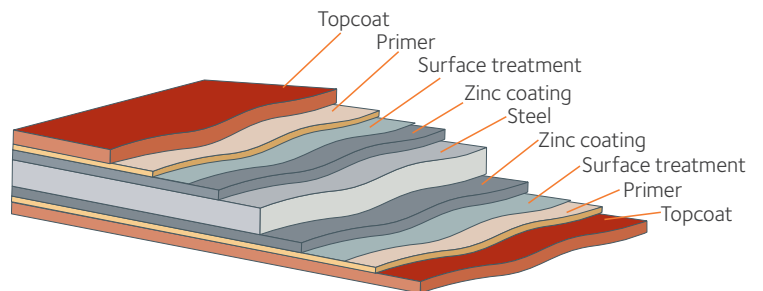
- Institute a network in the steel and raw material markets to promote sharing and discussing the anticipated market scenario. This approach will ensure an optimal material flow for both parties
- Identify areas in the supply chain where flexibility can be implemented
- Continue to prioritise the role of service performance on the FCE side
- Intensify trusting and innovative relationships to create optimal conditions for success

This is the direction that FCE is committed to take. In addition, the investments that the business divisions of FCE have made during the crisis to improve service performance not only provide tangible results today, but also foster a new dimension of supply management through the elimination of an historical factor of uncertainty.

Brian Aranha

Granite[®] Rain: the cure for the standard gutter

Every builder has at some point dreamed of a quality gutter that is durable, easy to use, cost-effective and – perhaps above all else – aesthetically pleasing. That is because the problem with gutters is they serve a specific purpose with little interest in anything else. The gutter was born to carry rainwater away from a structure. They are difficult to form, frustrating to use and far too susceptible to corrosion. And we have not even mentioned aesthetics yet! Gutters are either grey or white and could not care less about complimenting your structure. It is time to stop dreaming and to discover Granite[®] Rain.



A new kind of gutter

Granite[®] Rain is all about the unique. It is unique in its double-sided organic coated paint systems. It's unique in that it is intended specifically for rainwater systems and their accessories. Its automatic guarantees against perforation and peeling are unheard of. And the available colour palette that stretches from grey white to copper brown and all the way to jet black ensures it will aesthetically blend in with all components of a structure.

Said simply, quality and cost-effectiveness, outstanding corrosion resistance and colour stability – this is the Granite[®] Rain story.

Extra durable coating

ArcelorMittal set out to create a gutter that can stand up to the elements while maintaining its colour for years to come. To do this, Granite[®] Rain utilises a breakthrough level of paint thickness on each side of the gutter. The thickness of the paint creates an armour-like barrier between the elements and the actual steel, optimising it for weathering resistance.

Granite[®] Rain comes in two variations of thickness. The HDX version offers 55 microns of total paint thickness, while the HDS offering a 35 micron coating ensures that it withstands the ever-present threat of corrosion, perforation and peeling. The

unique paint coat is also a protective layer against the fading effects of UV rays.

Easy to use

The challenge with creating a strong, durable gutter is that you lose flexibility. Here again, Granite[®] Rain breaks from tradition and exceeds expectations.

ArcelorMittal's innovative layered design is remarkably easy to use. Unlike the rigid design of typical gutters, Granite[®] Rain HDX is extremely flexible and can even be processed at low temperature.



New range of rainwater systems combining aesthetics with durability, topped off with automatic guarantees.

HDX or HDS?

Granite® Rain HDX and Granite® Rain HDS correspond to two different coating systems. Their thickness and performance are specifically optimised for rainwater system applications, providing a high weathering resistance and enhanced moisture barrier effect.

So which one is right for your project?

The choice between the two products depends heavily on the environmental conditions of the location to which the product will be exposed. This is a crucial decision and should be made in close collaboration with ArcelorMittal's technical experts and sales teams.

Although both products have shown outstanding performance in weathering tests, as indicated by the classification obtained according to EN 10169 standard, Granite® Rain HDX has some additional advantages. For example, Granite® Rain HDX's unique coating gives the organic coated product a high level of flexibility, even in cold climates.

A palette of colour

Traditionally, gutters are seen as a necessary evil and therefore the design tends to favour durability over the aesthetically pleasing.

Granite® Rain asks 'why can't we be both?'

The answer is 'yes you can', as Granite® Rain comes in a variety of colours to suit every taste and every budget. More so, knowing that no two projects are the same, customisation is also available. All colours have an artistically grained aesthetic appearance and are put through ArcelorMittal's common quality assurance system at the mill, guaranteeing that diversity and originality will be the trademark of every project.

More than just good looks

Granite® Rain's aesthetics is more than just colours. These colours are brought to life with its unique grained texture that not only gives the gutters an artistic touch, but also serves as an additional level of protection. The grained surface texture is designed specifically to resist normal wear and scratching, making it even easier to handle.

The Granite® Rain Guarantee

It looks good, it's durable, flexible and easy to use. What more can you ask from a gutter?

How about an automatic guarantee?

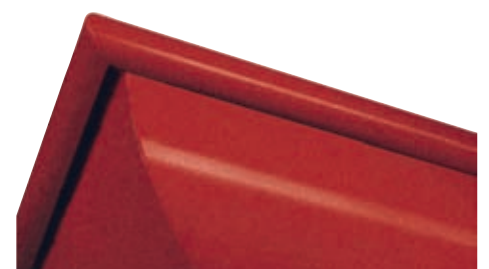
Each product is guaranteed against oxidation-induced perforation of the metal support caused by a material defect and against delamination. ArcelorMittal further guarantees the aesthetic appearance of the exposed side of the product. This guarantee covers uniform ageing of the colour for the same exposure and the same rainwater system element.

If the product shows signs of defect in more than 10% of the total external system within the specified time (10 years for HDS, 15 for HDX), then ArcelorMittal will either replace or reimburse the product or repaint the defective surfaces.

Combining durability with ease of use, flexibility, a guarantee and opportunities in aesthetics, ArcelorMittal's Granite® Rain products redefine rainwater systems – taking it 'out of the gutter' and into the overall design of the structure.



With its beautiful colouring and armour-like resistance, Granite® Rain is the most cost-effective compromise between aesthetics and durability available on the market today.



S-in motion lightens the

Significant savings possible on chassis components

S-in motion is an ambitious programme from ArcelorMittal to demonstrate how car makers can achieve significant weight savings in their vehicles utilising advanced high strength steels (AHSS). As part of the S-in motion project, a detailed study of eight components in the chassis was undertaken. The results reveal that car makers can save over 22% in the weight of the chassis, by switching grades and optimising the design of their chassis components.

The goal of ArcelorMittal's S-in motion study was to identify existing material solutions and design concepts that could help car makers lighten the whole vehicle – especially the body-in-white (BIW) – of a typical C-segment car by 20%.

The following components of the chassis were studied:

- Front sub-frame and front sub-frame extension
- Rear twist beam axle
- Anti-roll bar
- Lower control arm
- Chassis system including the front coil spring, shock absorber and steering knuckle

The S-in motion project and demonstrator vehicle is now being shared with leading car makers around the world.



Together these components had a combined weight of 72.5 kg in the baseline vehicle. In the optimised chassis solution, the combined weight of all eight parts was just 56.5 kg, a saving of over 22% on the baseline.

One of the most significant savings was achieved in the front sub-frame where 4.8 kg, 28% of the baseline weight, was saved through the use of high-strength dual phase (DP) steels. The module also exhibited improved crash performance when combined with the new front sub-frame extension.

The sub-frame extension was the only chassis component to be created using hydro-forming technology. While not common in Europe, hydro-forming is a widely used process in the United States.

Brand new steels

A key consideration for ArcelorMittal's automotive R&D team was to ensure that car makers could utilise their existing stamping technology to create the new S-in motion parts – thus avoiding costly retooling.

The S-in motion chassis parts utilise tubes, flat carbon steel products and long products. In some cases, brand new steels were identified and implemented thanks to the intense collaboration between ArcelorMittal's Global R&D teams.

The coil spring is one such example. The baseline coil spring had a tensile strength of 1,900 MPa and a weight of 2.4 kg. With a new advanced high-strength steel, the S-in motion coil spring weighs just 1.9 kg and has 8% higher tensile strength. In addition, the new steel has 10% better corrosion resistance.

Multiple solutions identified

Innovative solutions were also found for the shock absorber and steering knuckle of the front suspension. In the case of the steering knuckle, two forged solutions were identified including one with a press fit bearing and the other with a bolt-on bearing.

Yield strength has increased from 300 MPa in the existing cast iron knuckle, to 840 MPa in the S-in motion knuckle due to the use of a new steel grade – SOLAM B1100. Weight is also reduced dramatically: from 6.37 in the original knuckle to 5.18 kg (-18%) with the bolt-on bearing option and 5.47 kg (-14%) in the press fit option.

Across the entire eight components of the chassis studied, ArcelorMittal has demonstrated that significant weight savings are possible using modern high-strength steels (see table).

The result is a catalogue of advanced high-strength steel solutions for the chassis that can be implemented in production vehicles today and that will help car makers meet weight-saving and emission reduction targets.

In the optimised chassis solution, the combined weight of all eight parts was just 56.5 kg, a saving of over 22% on the baseline.

chassis

Ready for implementation

When identifying potential S-in motion components, ArcelorMittal's engineers were conscious that the identified solutions had to be implementable with today's steels and using processes that car makers already employ.

A functional specification was developed for each chassis component. The specification outlined the design criteria for the component, its functional requirements and the testing that was to be carried out. As each car maker has their own technical specifications, components were validated to a common European automotive-industry standard.

Advanced computer-aided engineering (CAE) tools were used to investigate new design ideas and materials, optimise concepts, and validate the performance of a full vehicle.

Particular attention was paid to the feasibility of manufacturing each part and integrating it into the car-making process. ArcelorMittal's external partner Gestamp, a global provider of metal components to the automotive industry, carried out this testing and verified the cost savings.

Overview of chassis components and potential weight savings

Component	Baseline (kg)	Solution (kg)	Saving (kg)	Saving (%)
Anti-roll bar	4.4	2.7	1.6	37
Front sub-frame	16.7	11.9	4.8	28
Front sub-frame extension	6.0	4.5	1.6	25
Lower control arm (x 2)	5.8	4.4	1.5	25
Front coil spring (x 2)	4.8	3.8	1.0	21
Steering knuckle (x 2)	12.8	10.4	2.4	19
Rear twist beam axle	17.5	14.8	2.7	15
Shock absorber (x 2)	4.6	4.0	0.5	12
	72.5	56.5	16.0	22.1

Tensile strengths of utilised steels

Baseline: 72.5 kg

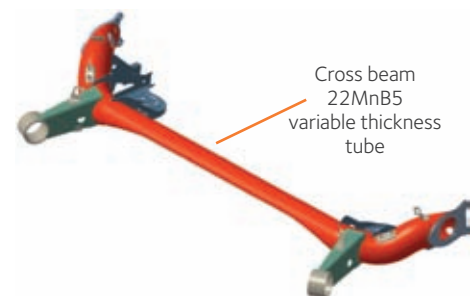
Solutions: -16 kg (-22%)

PHS	≥	1300 MPa
AHSS	≥	1180 MPa
AHSS	≥	900 MPa
AHSS	≥	780 MPa
AHSS	≥	590 MPa
AHSS	≥	450 MPa
HSS		
Mild steel		

Rear twist beam axle from S-in motion

Baseline: 17.5 kg

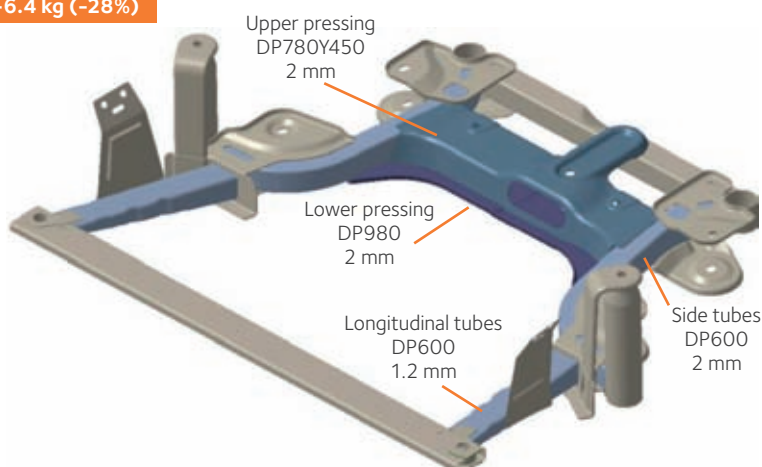
-2.7 kg (-15%)



S-in motion solution for front sub-frame and extension

Baseline: 22.7 kg

-6.4 kg (-28%)



Front Lower Control Arm

Baseline: 5.8 kg

-1.5 kg (-25%)



A photograph of an offshore wind farm at sunset. The sky is a mix of orange, pink, and blue. Several wind turbines are visible, with their towers and nacelles silhouetted against the sky. The water is calm, reflecting the colors of the sky. The text 'Steel and wind energy' is overlaid in white on a dark blue background at the bottom of the image.

Steel and wind energy

Example of an offshore wind farm

How steel is improving the efficiency of wind turbines

Wind power is an increasingly important part of the renewable energy mix in many countries around the world. ArcelorMittal is uniquely placed to provide the steels and logistics to create the support structures and electrical gearing required to realise the full potential of the wind.

As global concerns about climate change grow, wind energy is beginning to make a significant contribution to the world's sources of renewable energy. The United States government has set a goal to produce 20% of energy needs from wind power alone by 2030. In Europe, the target is 20% of energy needs from renewable sources by 2020.

Kinetic transformation

Wind turbines transform the kinetic energy of the wind into electrical energy which can be utilised in the local grid. The turbines consist of the following main parts:

- A platform (base)
- Tower
- Blades
- Nacelle which contains the generator
- Electric-grid connection gear including a transformer

All wind turbines utilise electrical steels in the generator and transformer, while around 85% of all installed wind turbines have a tower that is made from quarto plate, also known as heavy plate.

It takes between 225 and 285 tonnes of steel to build an onshore wind turbine. Grades utilised in the tower range from cast iron to quarto plates. Between 150 and 180 tonnes of quarto plate goes into the tower alone. This includes the body, doors, frames, and the foundations of the structure.

In both the generator and the transformer, high-grade electrical steels are used. The generator at the top can weigh up to 100 tonnes.

Prefabricated for quick assembly

A benefit of steel towers is that they can easily be prefabricated and transported to

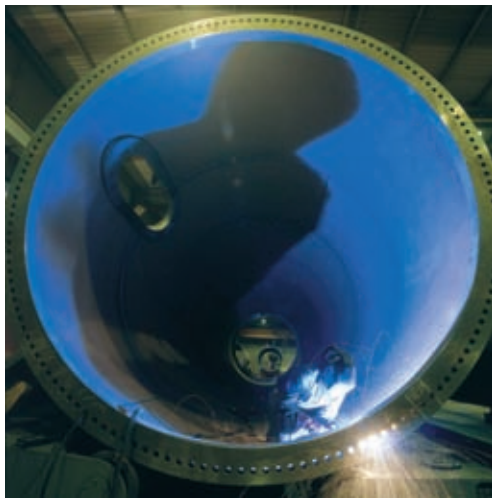
site. Once the foundations and civil work are complete, it is possible to erect an onshore steel turbine tower within one to two days. By contrast, concrete towers can take around a month to erect without a foundation.

Tower bodies are almost identical whether they are installed on land, or in vast offshore wind farms. The main difference is that in offshore installations, a foundation is needed to anchor the tower to the sea bed. The type of foundation differs depending on water depth, however, steel is often preferred.

Today the ArcelorMittal Asturias quarto plate mill in Gijón (Spain) is one of the leading suppliers to major wind turbine companies. The mill has supplied plate for more than 3,000 wind turbine towers since 2005. Quarto plates for turbine towers are also produced at ArcelorMittal Galati (Romania).



Wind turbine with steel tower



Steel tower undergoes final assembly before transport to site



ArcelorMittal is actively working with turbine makers to develop new multi-megawatt tower designs.

Future potential of wind

Depending on height and the prevailing wind speed, wind turbines can generate between 0.85 and 3 megawatts of power. New designs are aiming to increase this to 5 MW per turbine and more. The wind turbine industry estimates that each MW of wind power saves around 1,500 metric tonnes of CO₂-equivalent emissions each year of the turbine's life. (Source: Gamesa, Vestas)

ArcelorMittal is actively working with turbine makers to develop new multi-megawatt tower designs. With its global presence, ArcelorMittal is uniquely positioned to supply turbine makers with the steels they require in a timely fashion.

Electrical steels power the future

Electrical steels play a vital role in transforming wind energy into power that can be fed into the local electricity grid. They are typically used in the generator and transformer which are housed in the nacelle at the top of the turbine tower. Each electrical steel is specially tailored to produce certain magnetic properties.

There are two types of turbine: geared and gearless. Each requires very different types of electrical steel.

Geared turbines have a gearbox which enables the speed of the blades to be regulated. As high rotation speeds can be achieved, the generator can be smaller than that in a gearless turbine. Low-loss, non-oriented electrical steels are needed for this type of generator.



An example of a generator (picture by Indar)

Gearless turbines always turn at the speed of the wind. They are beneficial at locations where maintenance is difficult, such as offshore. This type of turbine requires high permeability, non-oriented electrical steels.

Transformers adjust the generated power to a level that is compatible with the electricity grid. They require grain-oriented steels. Once the electricity is adjusted, it is fed into the grid and used in local homes and businesses.

Low-losses key

ArcelorMittal works closely with major turbine producers to develop the next advances in generators. We assist our customers to find the optimal steel grade for their generator development requirements, whether that be higher power levels, generators suited for higher wind speeds, cost reduction or lower weight generators.

ArcelorMittal also works with turbine makers to develop new grades of electrical steels. Virtual prototyping and analytical calculations can be carried out to determine exactly which properties are most beneficial. Whatever the requirements, ArcelorMittal's Global R&D teams will be there to help.

Innovative achievements for the

ArcelorMittal's short lead time and thickness reduction programmes improve service and support

In the food packaging industry, clients are submitted to meteorological factors and seasons. In other words, they have to anticipate when the fruits or vegetables will be harvested and be ready to take opportunities as they arise on a global scale. Therefore, can makers allocate steel volume according to their supplier's ability to offer the most flexible supply chain.

The can makers in the European packaging market have an average technical lead time of one to two weeks. ArcelorMittal Flat Carbon Europe (FCE), the leading steel maker in the European packaging market, has a longer standard technical lead time to deliver its packaging steels to its customers.

In such a situation, the "Customer-Supplier" relationship consumes a lot of energy on both sides, as this offering does not meet the customers' expectations.

It was in this relationship gap that ArcelorMittal saw a real opportunity to develop a service catalogue to optimise the bridges between its supply chain and that of its customers.

The short lead time principles (SLT)

The foundations to this offering include:

- A late differentiation process combined with a product rationalisation on both sides
- A weekly updated review of the forecasts and orders
- Use of IT investments and innovative organisational changes

Excellence in performance

The SLT project is a win-win for everyone involved. It creates common understandings of the inherent complexities found in both the supply chain and forecast management processes while also

facilitating the sharing of best practices. It also boosts customer loyalty and increases intimacy between ArcelorMittal FCE and its customers.

Overall, the SLT project demonstrates the importance of an adapted and ambitious change management policy and provides evidence of the success that comes with innovation AND having a strong partnership with customers.

To congratulate the ArcelorMittal team involved in the project's deployment, in January 2011, ArcelorMittal FCE awarded the project a "Performance Excellence Award" for Customer Satisfaction.

The details

The short lead time project (SLT) aimed to develop a new offer for packaging clients that would cut the lead time by three. To achieve this, ArcelorMittal implemented a transversal alignment and coordination between commercial, customer service and production planning services to adopt common practices and processes.

The process has already been successfully implemented in the ArcelorMittal site of Basse-Indre (France) and is now being deployed at the Florange (France), Avilés and Etxebarri (both Spain) sites.

The result of such a project is a significant transformation of the customer-supplier relationship.



Value creation

ArcelorMittal's short lead time innovation offers such benefits as:

- Allows customers to sell additional volume
- Stronger customer loyalty
- Increased credibility as a market leader
- Positive impact on working capital as a result of stock reduction
- Improved hot rolled coil supply management
- Leaner production planning
- Scalability for implementation in other departments and units

packaging industry

R&D leads to thickness reduction

Knowing that technical collaboration is the key to innovation, ArcelorMittal FCE has created ambitious R&D partnerships. Several technical workshops have been developed to underline R&D initiatives – such as the recent Packaging Thickness Reduction Programme.

This programme was challenged with the task of further increasing steel's competitive edge by reducing its overall thickness – which represents a significant cost saving for the end user in the packaging value chain.

Of course, the drive for thickness reduction has been ongoing for over ten years. The initial objective was to homogenise ArcelorMittal's steel offering to provide a standardised product made from the same materials and with the same properties regardless of where it was produced.

Surpassing all limits

Through years of ongoing R&D leading to numerous successes in reducing the product's thickness, it seemed that the limit was about to be reached. Yet, the need for further innovation is as urgent as ever.

Refusing to be satisfied with the 'as is', ArcelorMittal once again turned to R&D to push the standard even further.

The result: new steel grades that combine high strength and excellent formability to further reduce thickness.

Examples of this process can be seen in the Maleis® offering for easy open ends or the tab to open the can that combines double cold reduced (DR) material yield and tensile strengths with the formability of standard single rolled (SR) cold reduced material.

A competitive edge

The thickness reduction programme also has many advantages for ArcelorMittal FCE. For example, ArcelorMittal's innovation makes steel even more attractive and confirms its future position against alternative materials as the

packaging material of choice both here in Europe and in the global market at large. The thickness reduction programme does exactly this.

Most importantly, as a result of this programme, new trials with a steel thickness of 0.10 mm are already available. And simulations for a 0.09 mm thickness are on track!



The advantages of innovation

Reducing the thickness of the packaging steel has many advantages for the entire packaging chain:

- Reduces the packaging chain's carbon footprint
- Decreases the packaging's cost for both the can maker and the end user
- Opens opportunities to meet technical challenges, such as new sterilisation processes

Trailtech: next generation trailers

New high-strength, low-alloy grades offer spectacular lightweight potential

ArcelorMittal's Trailtech has been developed as a generic lightweight solution for trailer chassis applications. Using a combination of high-strength, low-alloy (HSLA) grades, Trailtech enables trailer makers to significantly reduce both production and operating costs.



Trailtech enables trailer makers to produce lighter trailers while significantly reducing both production and operating costs

The impetus for Trailtech came from one of ArcelorMittal's clients who asked Flat Carbon Europe (FCE) to explore new solutions for the chassis of their transportation trailers. The goal was to develop a chassis that was 30% lighter than the reference structure (see box) and that saved at least 20% on production costs.

The client set the Global R&D team some challenging targets including fuel savings of around 700 litres a year and a reduction in CO₂-equivalent (eq) emissions of 900 kg each year compared to the existing chassis.

Basic functional requirements for the Trailtech chassis included the ability to withstand distributed loads of up to 21 tonnes, and concentrated loads of up to 24 tonnes while mounted on a tractor. Acceleration, deceleration and cornering behaviour were also tested.

New, thinner, lighter steels

The Trailtech solution utilises two HSLA steels (S500MC and S700MC) and the carbon-manganese steel (S275JR) which is utilised in the reference chassis. The S275JR is used only in the wheel base and is used for several types of trailer.

The new S500MC and S700MC HSLA grades combine high-strength, good formability and guaranteed low temperature toughness. The guaranteed high yield strength of both grades makes it possible to achieve a significant decrease in thickness.

For example, by utilising S500MC it was possible to reduce the thickness of the bottom cross-beams of the chassis from 8.6 mm to 4 mm. Grade S700MC was used for the exterior beams where

thickness was reduced from 4 mm to 2 mm.

Thinner, lighter steels result in lower processing costs as the thinner steel can be welded faster. Charges for transporting finished trailers are also reduced.

Results demonstrate Trailtech benefits

Overall, ArcelorMittal's engineers were able to create a trailer chassis that weighed just 1.5 tonnes, a 39% reduction compared to the reference chassis. Material costs were 29% lower as less steel was used to create the chassis. The high-end Trailtech solution also has the same technical performance as the reference chassis.

Assuming that the trailer does an average of 150,000 km per year, ArcelorMittal estimates that the new trailer solution will provide direct fuel-savings and lower CO₂-eq emissions due to the lower tare weight of the trailer.

Fuel savings have been estimated at between 0.4 and 0.6 litres per 100 kilometres, while CO₂-eq emissions have been reduced by between 1.0 and 1.6 kg/100 km. These savings are in-line with the overall target to save operators around 700 litres of fuel and 900 kg of CO₂-eq emissions a year.

Overall, operators will save around € 4,500 a year in operating costs by utilising the Trailtech solution. ■

Weight was reduced 39%, while material costs were 29% lower than the reference chassis.



The newly developed S700MC grade is not only suitable for trailers. Typical applications for S700MC include telescopic cranes, tippers and truck chassis.

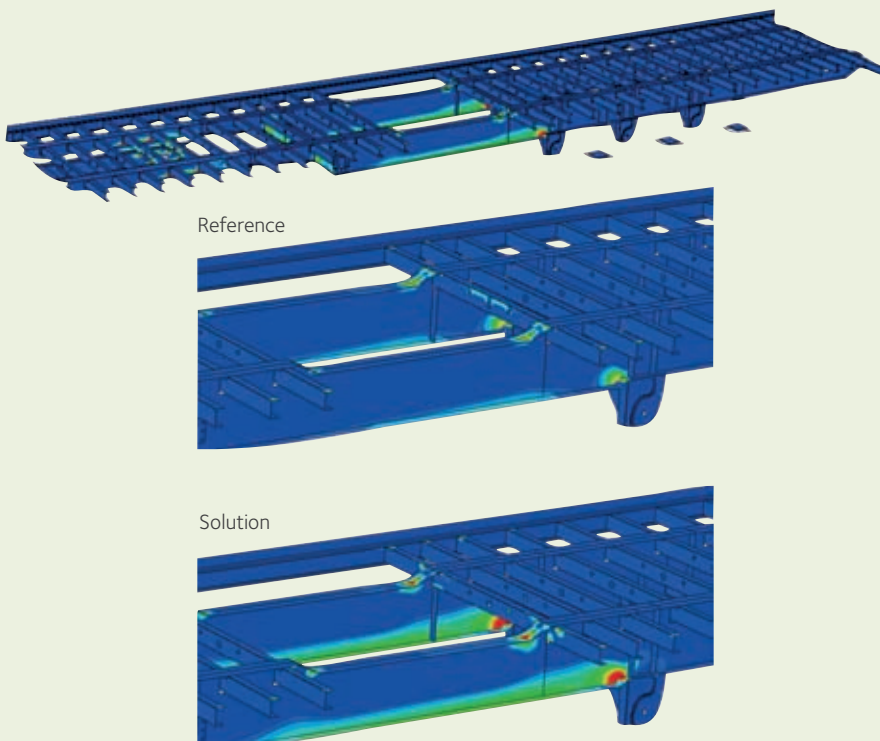
S700MC: The new standard for industrial applications

S700MC is an ultra-high strength low-alloyed steel from ArcelorMittal. Thanks to its high yield strength, S700MC is finding wide use in structural load-bearing applications. The steel has a fine grain structure, low carbon content for good weldability, and controlled internal purity.

A guaranteed yield strength of over 700 MPa enables the thickness of the steel to be reduced whilst maintaining overall performance and safety. As a result, substantial weight reductions are possible.

Typical applications for S700MC include telescopic cranes, tippers, and truck and trailer chassis. S700MC is available in a range of thicknesses from 2 to 12.7 mm, and can be supplied in rolled or pickled condition.

Higher stresses are possible with more advanced HSLA steel grades



Load cases – scale 100–400 MPa

Trailtech is ArcelorMittal's new generic lightweight solution for trailer chassis applications.

Reference chassis

The results of the Trailtech analysis were compared to a typical existing chassis design on the European market. The reference chassis has a weight of around 2.4 tonnes and is made from grade S275JR – a carbon-manganese steel with good yield and tensile strength, and satisfactory ductility.

The reference chassis is typically used as the base of trailers used for the transportation of dry and refrigerated freight. It also has applications in tipper trucks, platform (flat bed) and curtain-wall trailers.

Further information

Additional technical information about Trailtech (including the full range of tested loading scenarios) is available from your ArcelorMittal representative. Dedicated testing programmes can be arranged to meet your specific requirements.

You can find out more about our HSLA steels in our product document centre on www.arcelormittal.com/fce. Click through to Products & Services > Product document centre Industry and select HSLA steels.

Partners all the way



The S-in motion demonstrator

Why the world's leading car makers turn to ArcelorMittal's Global R&D teams for support

The new models of cars that we will be driving in five years are on the drawing board today. But did you know that ArcelorMittal is already proposing product solutions that will help car makers ensure their new vehicles will be safe, light, and as environmentally friendly as possible? ArcelorMittal's involvement typically begins at least five years before a new vehicle is launched and continues well after the first vehicles roll off the production line.

As one of the world's leading makers of automotive steels, ArcelorMittal is constantly working with its partners and suppliers to develop new steels for automotive applications.

Those steels are then used to design, build and test generic automotive structures that car makers can adapt to their own needs. S-in motion is one of ArcelorMittal's largest such projects and it has created a catalogue of new lightweight solutions for the body-in-white (BIW) and chassis parts of a typical C-segment vehicle.

But designing and creating new parts with the latest steels is one thing. Making sure they work and are affordable in the real world is another. For help with that challenge, global car makers can take advantage of the rigorous testing and validation undertaken by ArcelorMittal.

Design phase

During the early stages of new vehicle design, car makers are seeking to find a balance between the weight, cost and performance of the materials that will go into the vehicle. Initial advice on the most appropriate grades can be provided by ArcelorMittal's Global R&D teams. They have a deep understanding of the mechanical properties of existing automotive grades, and the new advanced high-strength steels (AHSS) that are coming to market.

In-house computer-aided engineering (CAE) systems are available to carry out performance and weight-saving assessments to ensure manufacturer's requirements for crash protection, stiffness, strength and fatigue can be met. Where possible, the car maker's own

geometry data is used to adapt potential solutions.

Major automotive customers can be given access to ArcelorMittal's e-Rheol database which contains details of all of the company's industrial steel grades. During the product design and feasibility phases, this invaluable resource enables manufacturers to examine a range of performance, fatigue, joining and welding test data to help them finalise their material selection.

Feasibility

With expertise in a range of industry crash standards such as Euro and Japan NCAP and US IIHS, ArcelorMittal is able to help car makers to refine the material selection and the weight saving of their chosen solution. This is especially true for laser-welded blank solutions that will be hot stamped. ArcelorMittal's Global R&D teams can evaluate the benefits of utilising AHSS steels such as Usibor® 1500P or Ductibor® 500P for a particular application.

The use of hot stamping to create parts has found wide acceptance in the automotive industry over the past few years. The

process enables manufacturers to increase the tensile strength of the part, making thinner and lighter parts a reality.

ArcelorMittal is able to undertake experimental hot stamping trials so car makers can assess formability. Using its proprietary Finite Element (FE) simulation software, a specially adapted version of PamStamp2G, ArcelorMittal is able to simulate the hot stamping process.

FE utilises models that are based on experimental procedures carried out by ArcelorMittal. The models are able to accurately predict the behaviour of Usibor® at high temperatures. Accuracy of the simulation software has been validated in a range of hot stamping trials carried out in-house, and in the press shops of customers.

Assembly

Manufacturers select an optimised mix of AHSS grades that meet their requirements. However, the combination of materials may result in weldability issues such as low weld strength or limited weldability range.

ArcelorMittal's predictive welding tools enable different material combinations to be validated using data such as the grade, thickness and coatings of the AHSS sheets. The tools make it possible to develop a risk analysis for all material combinations within a very short timeframe.

Once the initial assessment is complete, more precise FE modelling (using ArcelorMittal's own material database) can

be performed on combinations that the initial assessment identified as risky. With this approach, the workload is focussed on material combinations that are the most difficult to weld, saving both time and cost.

Without access to these tools, each car maker would need to validate all combinations themselves. Alternatively, some combinations may be rejected as there would not be enough time to validate them all. That may result in the rejection of steels that could potentially lead to weight reductions or crash-safety improvements.

Production

Once the materials have been selected and welding and forming have been validated, the focus switches to manufacturing. ArcelorMittal's Global R&D teams can provide support during the final steps before production, such as prototyping. This may include strain measurement on parts, testing of parts on the fatigue bench, or assessing how an assembly behaves in a crash. ArcelorMittal can also provide advice and assistance when it comes to the serial production of the vehicle.

Throughout the process of manufacturing a new car, from inception to completion, ArcelorMittal has a range of solutions to help its automotive clients create light, strong and safe vehicles.

Typical feasibility study of a hot stamped part

Customer design



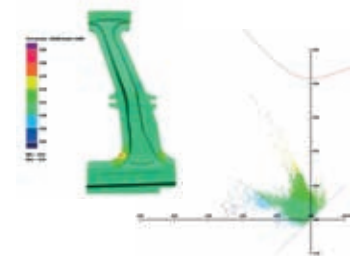
Process design



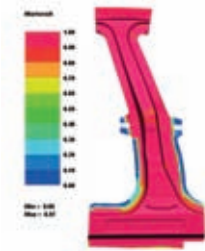
Blank shape optimisation



Feasibility analysis



Process validation



Prototyping



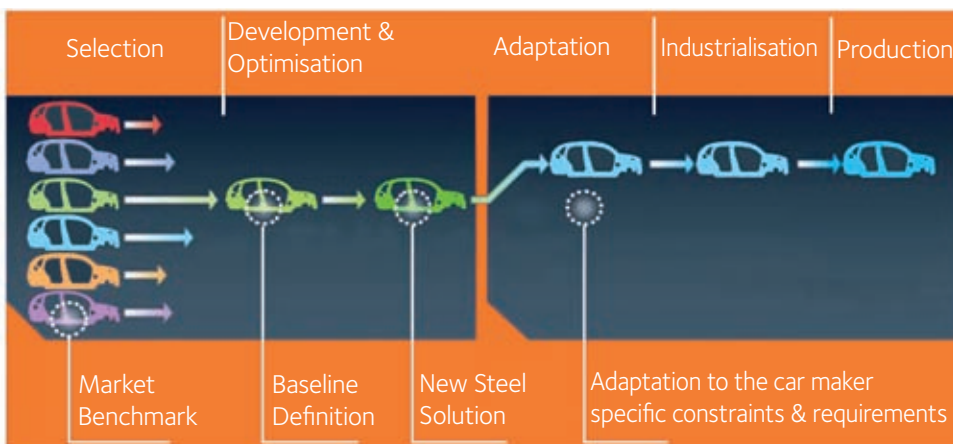
B-pillar



ArcelorMittal's automotive solutions

Steel Solutions projects
ArcelorMittal + Partners + Suppliers

Customer Support
Car maker + ArcelorMittal + ...



Introducing xcelcoat

The beauty of steel

In spring 2011, xcelcoat launched two new products: xcelcolour and xceldesign. Collaboration between R&D and the ArcelorMittal production lines involved is forging ahead and xcelcoat is expecting to launch yet another promising new product in the autumn: xcellook. All the products that xcelcoat intends to develop, manufacture and market, now and in the future, will be characterised by special aesthetic or functional surface properties.

Xcelcoat is the result of close collaboration between ArcelorMittal Gent and the OCAS R&D centre, which itself is a joint venture between ArcelorMittal and the Flemish Region. Consequently, it is logical that xcelcoat's new products should be distributed through the commercial network of ArcelorMittal Flat Carbon Europe (FCE). Geert Van Heirseele, the Sales Manager responsible for xcelcoat, is coordinating the commercial efforts.

Graphic design on steel

Both xceldesign and xcelcolour are based on EBT technology (see box). Geert Van Heirseele is enthusiastic about both products. 'Xcelcolour is electrogalvanised steel which is first put through a skin pass mill to produce a perfectly uniform surface texture. It is then finished with a transparent organic coating in a bronze or anthracite colour. The result is a very decorative steel sheet.'

According to Geert Van Heirseele, the secret of the new products lies above all in how the rolls are textured, since this surface profile is transferred to the steel as it travels through the skin pass mill. This process is similar to what happens in a printing press. EBT technology enables us to control the degree of roughness of the skin pass roll perfectly. It is even possible to imprint a pattern on the steel by adjusting the texturing parameters for the roll, and that certainly opens up new perspectives. EBT is a mature technology which has been applied creatively by the xcelcoat team to produce a brand new aesthetic product.

'Xceldesign is based on the use of EBT technology to apply a relief pattern to the skin pass roll,' explains Geert Van Heirseele. 'Some of the standard patterns we now apply to hot dip galvanised steel in the skin pass mill include a check or flowered design.

But if clients wish, we can also imprint their logo or any other motif. After this, the steel is finished with a durable organic coating which may be coloured or colourless.

An alternative to stainless steel

Xcelcoat's third innovative product is xcellook. It is an electrogalvanised carbon steel with a brushed finish which makes it look virtually identical to brushed stainless steel.

'It sounds simpler than it is,' explains Geert Van Heirseele. 'Electrogalvanised steel has a softer surface than stainless steel. If you apply the same brushing technique to both types, you get two very different results. We have developed a special brushing technique for electrogalvanised carbon steel which makes it look exactly like brushed stainless steel. After brushing, an environmentally friendly, durable,

transparent protective coating is applied, which also imitates the colour of stainless steel perfectly.'

Today we are already supplying small amounts of xcellook to customers to introduce the product. Industrial-scale production will be in full swing by the end of 2011. 'Xcellook is the perfect material to replace stainless steel or other materials in applications like white goods, partition walls, ceiling panels and lifts.'

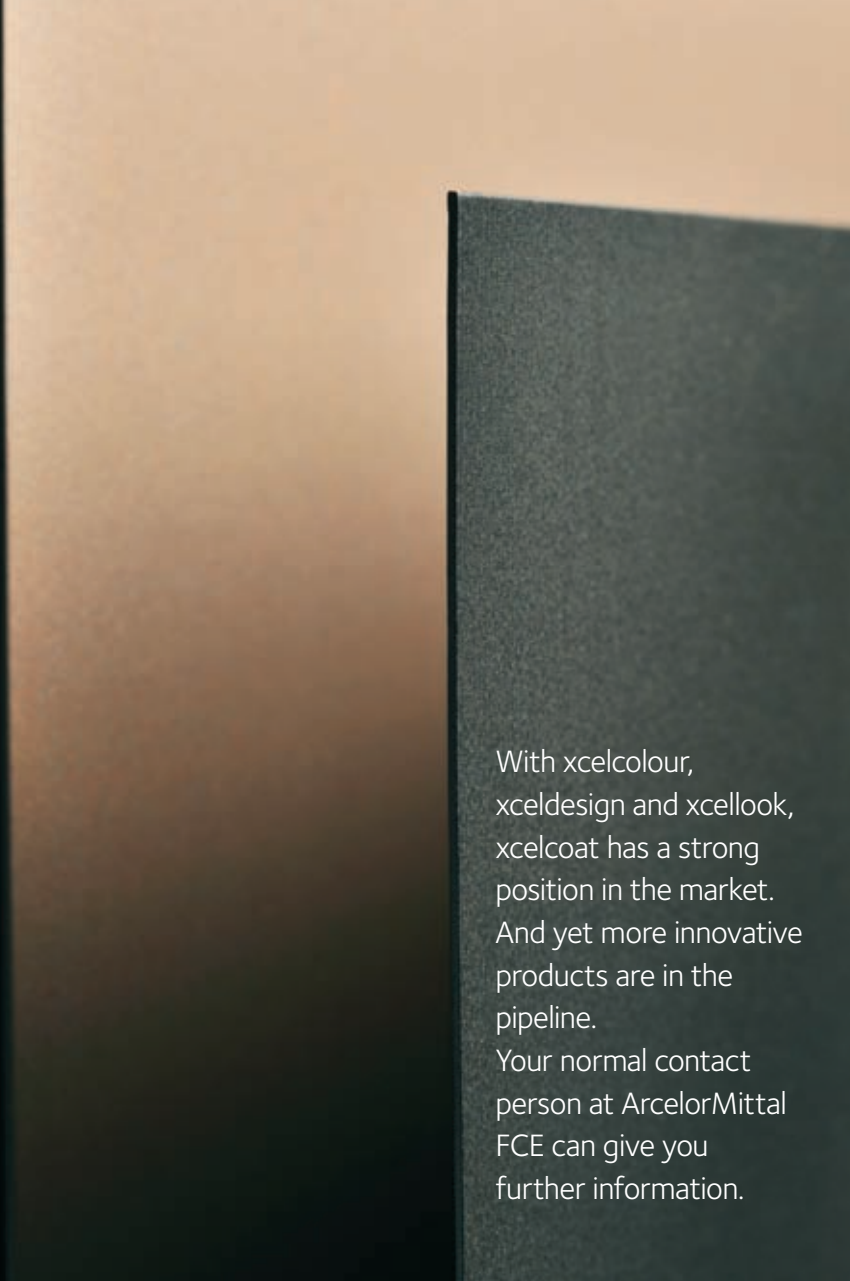
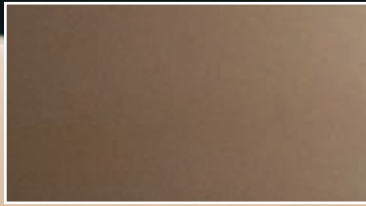
Wide interest

This brings us to potential fields of application for the three new products. 'It is clear that our products are destined for applications where the aesthetic aspect is important,' notes Geert Van Heirseele.

The three new products have already been presented to manufacturers of white goods

Technical details of the three xcelcoat products

	xcellook	xceldesign	xcelcolour
Thickness	0.40 mm – 1.5 mm	0.40 mm – 1.5 mm	0.40 mm – 1.5 mm
Width	800 mm – 1500 mm	800 mm – 1500 mm	800 mm – 1500 mm
Substrate	ZE 75/75	Min. Z100	ZE 75/75
Finish	- Brushed: extra fine / fine / rough - Excellent imitation of brushed stainless steel (short lines)	Repeating motifs: check, flower or free choice of graphic element (logo)	Metallic
Colour	Colourless or ferritic	Oiled Organic coating: colourless or coloured	Bronze or anthracite
Protective film	Possible	Possible	Possible
Available	End 2011	Yes	Yes



With xcelcolour, xceldesign and xcellook, xcelcoat has a strong position in the market. And yet more innovative products are in the pipeline. Your normal contact person at ArcelorMittal FCE can give you further information.

(fridges, dishwashers, ovens etc), brown goods (TVs, DVD players etc), small household appliances, kitchens, lifts, stairs, partition walls and ceiling panels. All showed a keen interest in these products. 'You don't need much imagination to appreciate the possible impact of having one's company logo as a repeating decorative motif on office furniture, drinks dispensers, partition walls, reception desks or fridges,' claims Geert Van Heirseele. Xcelcolour is particularly popular among makers of brown goods, office and other furniture, partition walls and ceiling panels.

Xceldesign and xcelcolour offer substantial extra value in comparison with competing products. And of course that justifies a higher price too. 'It's a bit different with xcellook,' says Geert Van Heirseele. 'For all applications where stainless steel is used for aesthetic reasons, there is now an attractive, cheaper alternative. In this case, the potential savings are a decisive argument in favour of switching to the new material.'



'For all applications where stainless steel is used for aesthetic reasons, there is now an attractive, cheaper alternative.'

Geert Van Heirseele, Sales Manager responsible for xcelcoat

What is EBT?

EBT stands for Electron Beam Texturing. This is a high-precision technique for texturing rolling mill cylinders by means of electron beams, which melt small depressions or craters in the surface of the rolls, under vacuum. EBT technology was originally developed to improve the deep-drawing performance and paintability of flat steel. Xceldesign and xcelcolour are aesthetic applications of this technology.

Refining a winning formula

SteelUser to be significantly overhauled

In the previous edition of *Update*, Supply Chain manager Kris Notebaert unfolded concrete plans to raise ArcelorMittal Flat Carbon Europe's (FCE) level of customer service to new heights. He announced, amongst other things, that SteelUser, our e-business platform, would soon be overhauled to help achieve a faster and better response to customers' needs and queries. The team behind SteelUser has indeed been making steady progress and many regular users of the e-business platform have noted and commented on the improvements that have already been made. Many more upgrades are scheduled over the coming 18 months, so *Update* asked Marc Billant, Integrated Supply Chain and SteelUser business owner, for a preview of what lies ahead.

SteelUser has been around for over ten years now. As in so many other areas of our life, Internet technology has proven to be an efficient tool for exchanging information in the steel industry. No wonder that the number of customers using this e-business platform has steadily gone up. We have built up a strong, integrated set of web applications linked to the ArcelorMittal production mills by adapting and refining these applications in the light of experience. These include applications such as Order follow-up, Commercial documents,

Auctions, Web order entry and Claims handling.

SteelUser earns good customer satisfaction scores

Today, SteelUser plays an increasingly important role in the way ArcelorMittal FCE supports its Customer Relations processes and the 2010 customer satisfaction survey has revealed that clients approve of this trend. Detailed analysis of their response has shown, for instance, that regular users

of the Order follow-up tool in SteelUser tend to be more satisfied with ArcelorMittal FCE's Order follow-up performance overall.

'As our customers' supply chain became increasingly direct, we began to receive more and more suggestions for improvements and additions that would enhance the efficiency of our e-business platform,' Marc Billant says. 'This enabled us to target what really matters, by focusing on data accuracy and introducing improvements in Order follow-up features and new tools like e-Link or Claims handling.'

However, adapting our systems in response to customers' needs and wishes may sometimes not be enough. ArcelorMittal FCE aims to offer its customers the very best in terms of operational performance, functional comprehensiveness and user friendliness. 'That is why we have set up a two-year programme to review and assess all SteelUser functions and identify a clear strategy for improving the overall performance of our e-business platform,' Marc Billant continues. 'SteelUser must remain a cutting-edge e-business platform that meets market challenges, today and tomorrow. We must take full advantage of SteelUser's wide customer usage and satisfaction to work out how we can optimise processes that rely on web services. This does not only involve functional SteelUser specialists and IT experts. It also means that our collaboration processes between customers, sales agencies and Customer Services will also be optimised to guarantee maximum efficiency and effectiveness, given the opportunity offered by a shared information system and language.'





'Facilitating basic tracking and highlighting exceptional changes will enable both customers and Customer Services to focus on high value-added activities and improve our common supply chain performance.'

Marc Billant, Integrated Supply Chain and SteelUser business owner

Improve, expand and enhance

Marc Billant briefly reviews a list of priorities that have already been set. The Web order entry configuration possibilities and order modification functions are to be improved, the Order follow-up features will be facilitated and call-off enabled, and Order follow-up screens for automotive clients should be made easier to understand. 'Most importantly, we need to finalize with the remaining mills the constant synchronization of SteelUser order data with the actual production and shipment situations. All these improve-

ments will be put in place in the course of 2011 and 2012.'

Simultaneously, the e-business platform will be equipped with several new functions, such as 'eAlerts', which will be launched before the summer of 2011. A first basic version of this application has been available on SteelUser for some time: small alert messages appear whenever newly registered commercial documents become available. With the upcoming eAlerts, customers will be able to configure the notifications they require by selecting from a list of events. The email

alert will be sent daily or weekly, as requested. It will contain a summary of the latest events and a link to access the details on SteelUser.

To round it all off, the lay out and user interface of SteelUser will be revised and restyled for maximum ease of use and to be totally in line with the ArcelorMittal house style.

A new style of collaboration

'At ArcelorMittal FCE, we have no doubt that this complete overhaul of SteelUser will foster a new style of collaboration,' Marc Billant concludes. 'All the improvements and enhancements that are scheduled for the coming months are bound to bring customers closer to their contacts in the mills. Facilitating basic tracking and highlighting exceptional changes will enable both customers and Customer Services to focus on high value-added activities and improve our common supply chain performance.'

All improvements and upgrades will be carried out with minimal disturbance to existing services. Communication kits will be prepared for each new step and these will be made available on SteelUser and the FCE website (www.arcelormittal.com/fce). Questions and remarks relating to the overhaul of SteelUser can be sent to helpdesk.eservices@arcelormittal.com.



Meeting the customer

How the CEOs of the steel mills establish stronger customer relationships

In the previous edition of *Update* we reported on the new policy ArcelorMittal Flat Carbon Europe (FCE) has introduced to encourage CEOs of the steel mills to personally strengthen the bonds with their key customers. Two CEOs of Business Division South West commented very positively on their experiences after visiting customers at their production sites. We now turn our attention to the CEOs of the Business Division East.

Sanjay Samaddar, CEO of Business Division East and CEO of ArcelorMittal Poland, is quite pleased with the new policy. 'It has cleared up the mild confusion that arose shortly after the creation of ArcelorMittal. At a certain point in time people were led to believe that only sales and marketing people were allowed to have direct contact with the customers. To my mind that was never the case. I have always had meetings with my key customers at trade fairs as well as at their offices and mills. These meetings are mostly seen as a sign of respect and commitment.'

Augustine Kochuparampil, CEO at ArcelorMittal Ostrava (Czech Republic), just can't imagine refusing to meet a customer asking to see him about some technical or logistical issue. 'We should never take our customers for granted,' he says. 'Actually, we must know them inside out. So I visit them regularly to talk about their concerns and devise solutions to their business challenges.'

Reinforcing a well-established practice

When it comes to strengthening the bonds between the mills and their key customers, ArcelorMittal FCE Business Division East has quite a history. 'Both in Poland and the Czech Republic the CEOs of our mills never fail to attend two major customer events,' Tomasz Plaskura, CMO of ArcelorMittal FCE Business Division East, confirms. 'In the Czech Republic we have the International Trade Fair of Brno beginning of October and the Customer Day in Prague in December. In Poland, there is the International Trade Fair of Poznan in June and the Customer Day in Krakow in December. On top of that the CEOs of our mills regularly meet individual customers to discuss strategic issues.'

For Business Division East the new policy is not so much a new departure as a reinforcement of a well-established practice. 'We welcome it as an empowerment of the local organisation,' Tomasz Plaskura summarises.

'I never miss an opportunity not to sell steel.'

Thorsten Brand, CEO of ArcelorMittal Eisenhüttenstadt





Some pictures of customer meetings at events or during a visit of one of our mills

Mutual trust

'I never miss an opportunity not to sell steel,' Thorsten Brand states provocatively. As the CEO of ArcelorMittal Eisenhüttenstadt (Germany) he has some very clear-cut ideas about visiting his customers. 'My job isn't *selling* steel. What I do is independent of commercial negotiations. That is what makes me freer to really meet my clients and establish mutual trust. I think it is vital for people in production to know the customer; otherwise we cannot adapt our internal processes to meet all their requirements.'

Sanjay Samaddar provides a striking example of such an adaptation. 'A while ago, Tomasz Plaskura asked me to join him on a visit to a customer who wanted us to hold stocks for him,' he says. 'As a rule we don't do that, but this customer carefully explained to me how erratic deliveries were putting his business at risk. I heard him out

for a while and realised it was not a tall order to meet his wishes. I could even see how that would increase our business, so I committed myself at once and it has yielded benefits for both of us.'

'What matters most for customers is that in a crisis, they can turn to the CEO of the mill,' Thorsten Brand continues. 'As a rule, they don't come to me with their problems very often, but when they do, I must not betray their confidence. As the mill's CEO I offer them additional security and an extra pair of ears.'

Sanjay Samaddar chimes in: 'Absolutely! I recall the case of a customer whose policy it was never to buy more than 50% of his raw materials from one single supplier. I went to see him and promised him free access to the CEO of the mill. That got him out of his mindset and his orders have been pouring in.'

One goal, but separate roles

'As a result of the new policy, the commercial organisation has moved closer to the mills again,' Tomasz Plaskura concludes. 'Now, more than ever, we are showing one face to the customer. But the customers also understand and respect the separate roles of the sales and marketing people on the one hand and the mills on the other.'

Thorsten Brand nods. 'When I go to meet a customer, I'm usually accompanied by one or more sales persons. That is how we show alignment and proximity. I can also bring engineers with me to discuss production processes, quality issues and logistical challenges. And most importantly: I can commit myself, regardless of all commercial engagements and ongoing negotiations. That is how I create customer value which sales and marketing people couldn't possibly provide without the active participation of the mills.'

'My meetings with key customers have mostly been seen as a sign of respect and commitment.'

Sanjay Samaddar, CEO of Business Division East and CEO of ArcelorMittal Poland

'We should never take our customers for granted. Actually, we must know them inside out.'

Augustine Kochuparampil, CEO of ArcelorMittal Ostrava



Hot stamping pioneer

Gestamp Automoción is an international group dedicated to the design, development and manufacture of metal components and structural systems for the automotive industry. The company is one of ArcelorMittal's key partners in the development of hot-stamped components for the automotive sector.

Hot stamping is a process that is used by car makers and manufacturers to create high-strength parts in vehicles. As a result of the micro-structural changes that occur in the steel during hot stamping, tensile strength can be improved up to four times that of the steel before processing (see *How hot stamping makes steel stronger*).

If steels can be made stronger through hot stamping, they can also be made thinner. This enables car makers to reduce the weight of the vehicle, thereby lowering fuel consumption and CO₂-equivalent emissions, but without compromising the strength of the car. Today, hot stamped components make up a significant part of the body-in-white (BIW) and chassis of cars.

Early beginnings

One of the first patents for hot stamping technology was issued to Swedish company Hardtech in 1974. Originally developed for agricultural applications, Hardtech soon realised the potential of hot stamping for automotive parts.

By 1986, Hardtech's plant in Lulea (Sweden) was producing hot stamped parts. In parallel, Gestamp had also started to develop hot stamping at its plant in Haynrode (Germany) using an innovative rotation furnace. In 2005, Hardtech was incorporated into the Gestamp group and the rapid development and deployment of the technology began. By the end of 2011, Gestamp will have 34 hot stamping lines in operation all around the world.

Rapid evolution

Hot stamping has changed significantly since Gestamp Hardtech was formed from the merger in 2005. New high-performance production lines and press-hardened dies (PHD) have been developed, reducing

the time needed to create a part to as little as ten seconds.

Gestamp's internal research and development department and its PHD toolshop are continuing to develop new hot stamping processes and equipments. One example is the patented Partial Hardening technology. Partial Hardening enables soft zones to be created inside a press hardened part. It can be used to control deformation in a crash or to improve the weldability of press-hardened parts.

Global growth

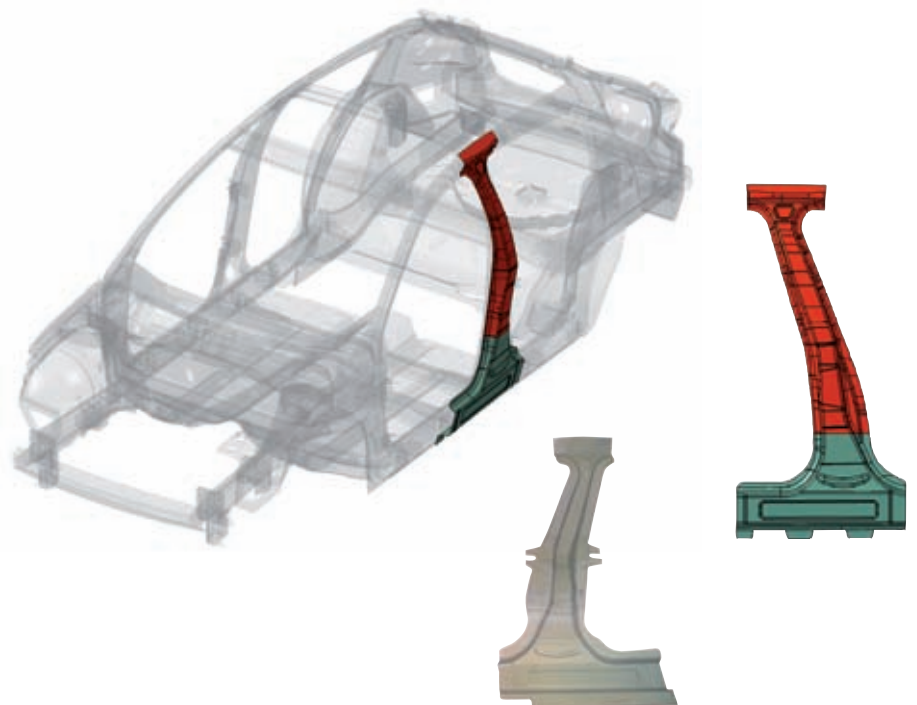
Gestamp sees a huge potential for hot stamping. In 2009, around 150 million hot stamped parts were produced all around the world. Gestamp accounts for almost 20% of production today. By 2014 the company forecasts around 450 million hot

stamped components will be produced each year.

Use of hot stamping is widespread in Europe and is growing very quickly in the United States. The technology is also being adopted in Asia – particularly in China and Korea. There is less use of hot stamping in South America, though this will change as countries in the region improve their crash-safety regulations.

Even lighter future

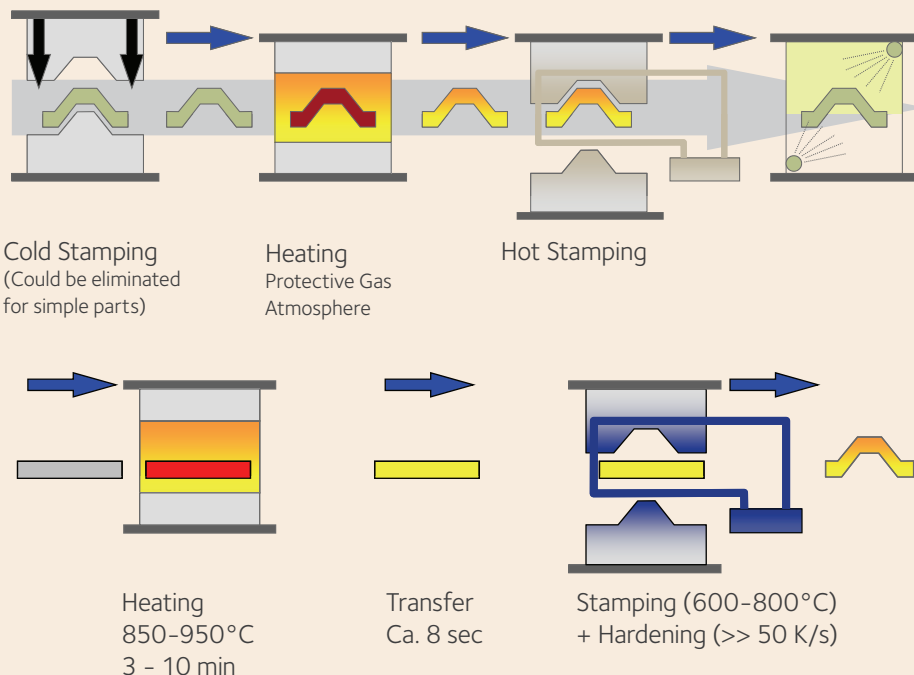
When hot stamping was first introduced to the automotive industry it was mainly outsourced to companies such as Gestamp. However, some car makers have developed their own in-house capabilities. Some of them exhibit significant capacities in hot stamping lines.



Gestamp is one of ArcelorMittal's most important partners in the development of hot stamped components for cars.

To achieve further reductions in the weight of components, many car makers are using these lines to test new hot-stamping designs during the concept phase of new vehicle design.

ArcelorMittal and Gestamp continue to work closely to develop new steels and processes to create lighter and stronger vehicles. The recent cooperation between the two companies on the S-in motion concept vehicle is testimony to this work.



How hot stamping makes steel stronger

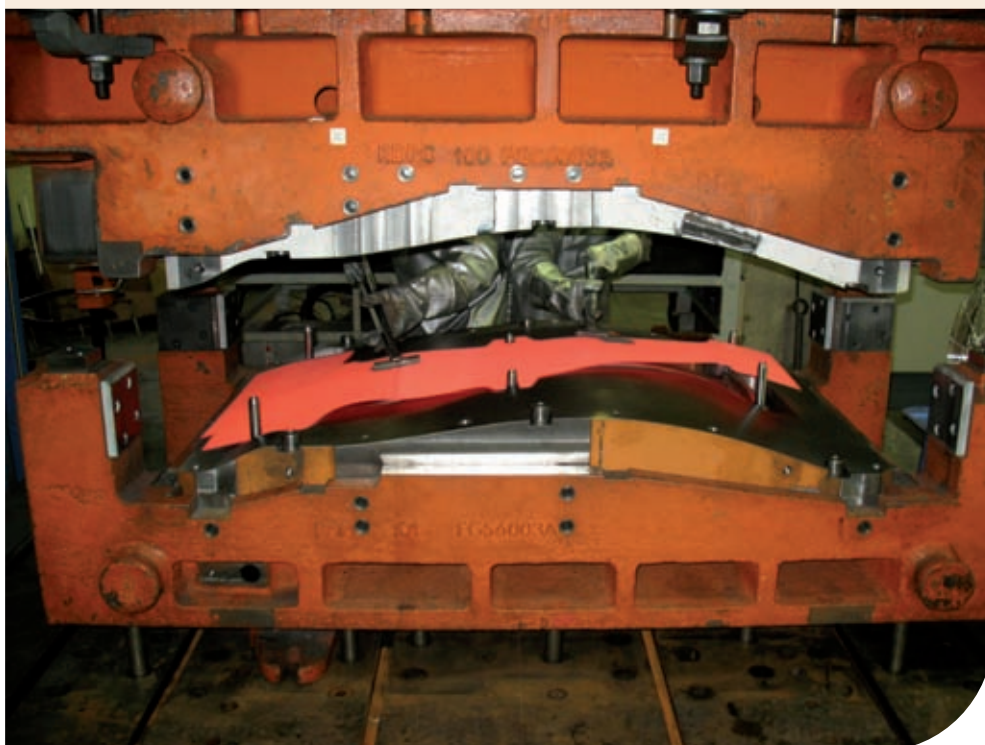
Hot-stamping starts with a steel blank that has limited mechanical properties and a tensile strength between 400 and 600 MPa. The blank is heated in a furnace at 850 to 950°C for several minutes. This procedure creates a homogeneous austenitic microstructure in the steel.

The blank is rapidly transferred to the hot stamping press by a robot to avoid heat loss. At high temperatures the material exhibits excellent formability and complex shapes can be created with a single stroke.

Quenching takes place during or just after forming. The component is cooled at a controlled rate of between 50 and 100°C per second. The cooling transforms the austenitic microstructure into a very hard crystalline structure with a tensile strength of up to 1,500 MPa. Springback is minimised as the part remains in the die during cooling.

The total cycle time (transfer + forming + cooling) takes approximately 15 to 25 seconds. The formed component is removed from the die at about 150°C.

ArcelorMittal hot stamping trials



About Gestamp

Gestamp is a leading supplier of metal components and structural systems for all of the world's leading automotive manufacturers. The company began operations in 1997. Today, Gestamp Automoción has a presence in 18 countries worldwide. The company has 70 production centres, 13 research and development centres and more than 18,000 employees. Turnover in 2010 exceeded €3 billion.



Make a date with ArcelorMittal FCE

In this magazine, Sanjay Samaddar, CEO of ArcelorMittal Poland and CEO of Business Division East, speaks of his frequent contacts with clients. In his view, you can often learn more from a chat, a handshake or a glance than from research reports and polls. Of course, you have regular contacts with your commercial, technical and logistical partners at ArcelorMittal FCE. Trade fairs and conferences offer an extra opportunity to exchange ideas or find inspiration.

Whatever the region or sector in which you operate: industry, automotive, steel packaging, electrical steel, tubes and pipes etc., there is bound to be an event you are keen to attend. And an event where we will be glad to make time for a good, open discussion with you.

Trade fairs and conferences in 2011:

- Budma (construction) – 11-14 January 2011, Poznan (Poland)
- Ecobuild (construction) – 1-3 March 2011, London (UK)
- Russian Automotive Forum – 15-17 March 2011, Moscow (Russia); guest speaker: Jean-Martin Van der Hoeven, CMO Automotive Europe
- Steel Tube & Pipe Conference – 21-23 March 2011, Houston, Texas (USA)
- Made in Steel – 23-25 March 2011, Brescia (Italy)
- Hannover Messe – 4-8 April 2011, Hannover (Germany)
- Icota (Intervention & Coil Tubing Association) – 5-6 April 2011, Montgomery, Texas (USA)
- Metpack (metal packaging) – 11-14 May 2011, Essen (Germany)
- European Steel Day 2011 – 19 May 2011, Brussels (Belgium)
- Construmat (construction) – 16-21 May 2011, Barcelona (Spain)
- CWIEME (International Coil Winding, Insulation and Electrical Manufacturing Exhibition and Conference) – 24-26 May 2011, Berlin (Germany)
- Turkey Auto Summit – 26-27 May 2011, Istanbul (Turkey) – guest speaker: Jean-Martin Van der Hoeven, CMO Automotive Europe (in conjunction with Borçelik)
- Steel in Cars and Trucks – 5-9 June 2011, Salzburg (Austria)
- Blechexpo – 6-9 June 2011, Stuttgart (Germany)
- MSV International Engineering Fair – 3-7 October 2011, Brno (Czech Republic)
- EuroCarBody – 18-20 October 2011, Bad Nauheim (Germany)
- Batimat (construction) – 7-12 November 2011, Paris (France)

Further information and a short report and pictures can be found on our website: www.arcelormittal.com/fce