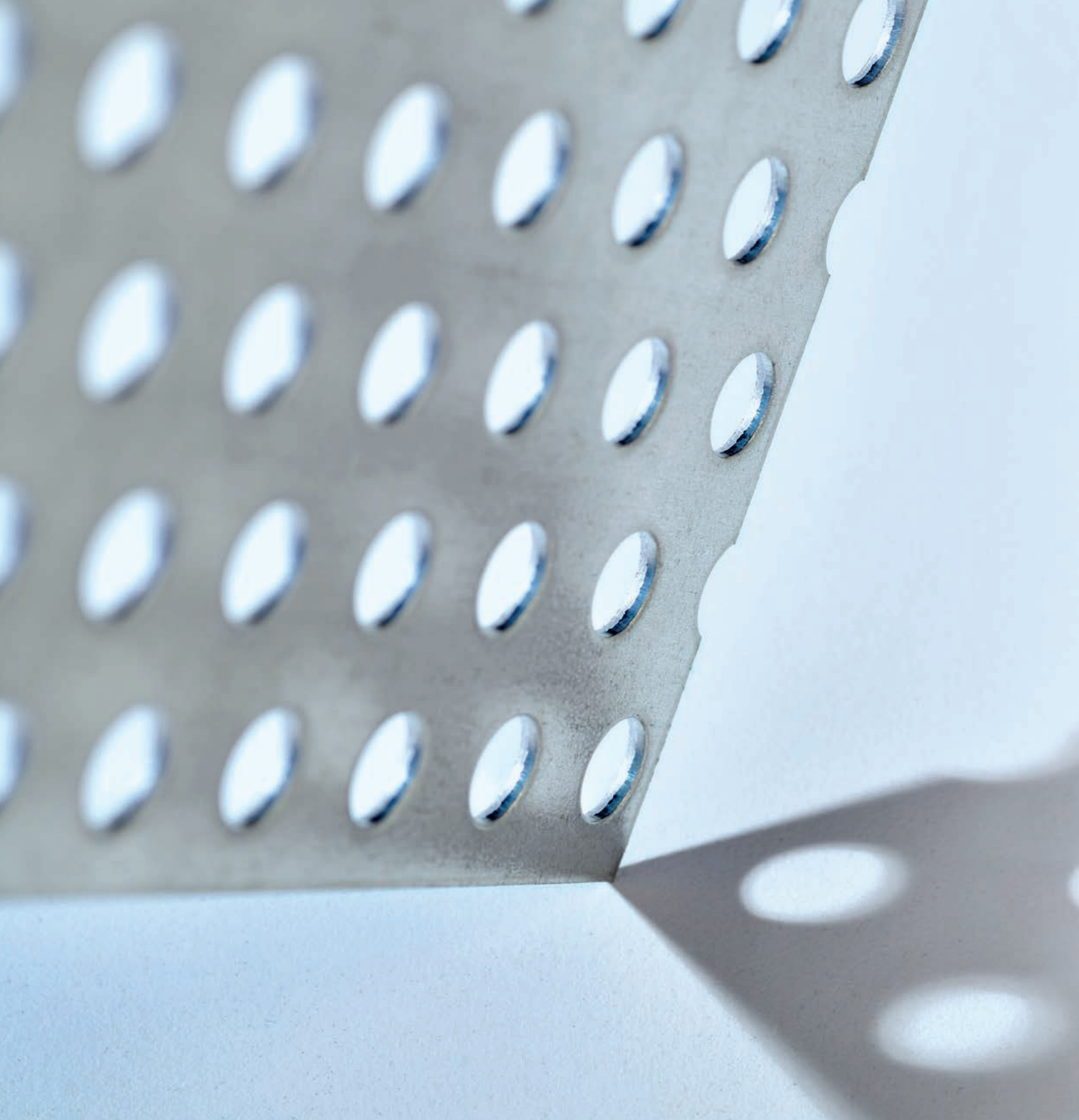




ArcelorMittal

Magnelis<sup>®</sup>  
Think strategy





Magnelis®  
Think strategy



# Magnelis®

## Think strategy

5

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### Magnelis®, the best metallic coating through a large panel of markets

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## Main advantages

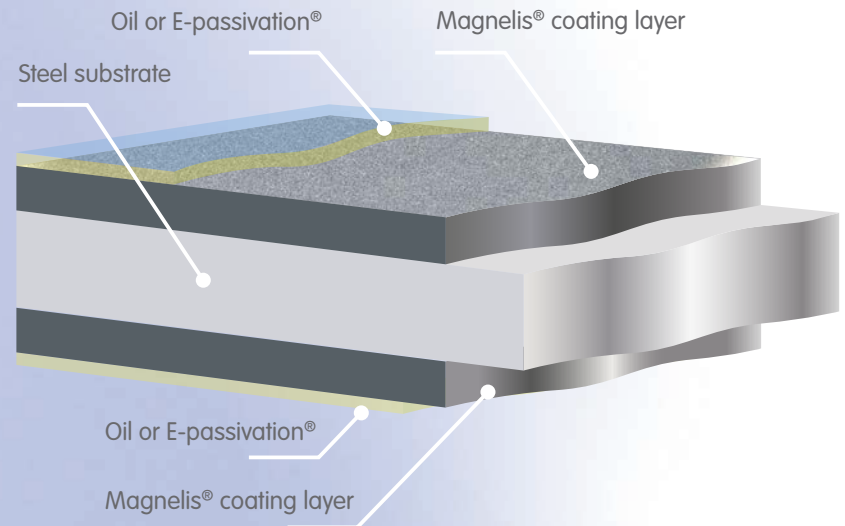
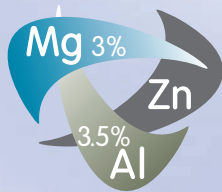
- Excellent corrosion resistance: three times better than galvanised steel (based on outdoor tests)
- Self-healing effect ensures excellent edge protection
- Best and most cost-effective alternative to post-galvanised steels
- Wide feasibility range
- Excellent processing properties
- Environmentally friendly

## What is Magnelis®?

Magnelis® is an exceptional metallic coating which provides a breakthrough in corrosion protection. Magnelis® is also the best choice for a wide variety of applications.

Thanks to its unique composition, Magnelis® provides an unprecedented level of surface and cut-edge protection, even in the most hostile environments.

Magnelis® is produced on a classic hot dip galvanising line, but the molten bath has a unique chemical composition including zinc, 3.5% aluminium, and 3% magnesium.



*Magnelis® has a naturally dark grey aspect.  
It is available with an environmentally friendly  
E-passivation® or it can be oiled on request.*

Magnelis®  
provides outstanding  
corrosion resistance,  
even in harsh  
environments



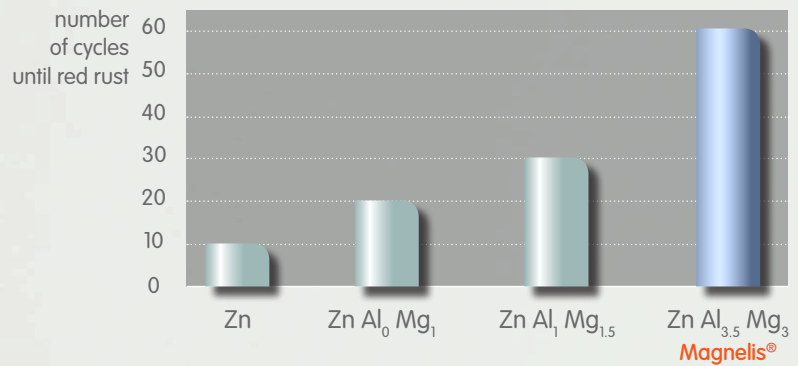


# Outstanding corrosion performance

Magnelis® resists corrosion for longer than standard galvanised products and it outperforms coatings containing less magnesium.

The specific composition of Magnelis® (3% Mg and 3.5% Al) is crucial as it leads to a stable and durable layer across the entire surface and edges of the steel. This provides more effective corrosion protection than coatings with a lower magnesium content.

## Corrosion resistance in cyclic test for different Zn, Al, Mg compositions



10 µm of coating submitted for an alternated cycling of 8 hours fog cycle (5% NaCl) / dry cycle / humidity cycle  
Source: ArcelorMittal R&D



Magnelis® offers  
deformed surfaces  
extra protection

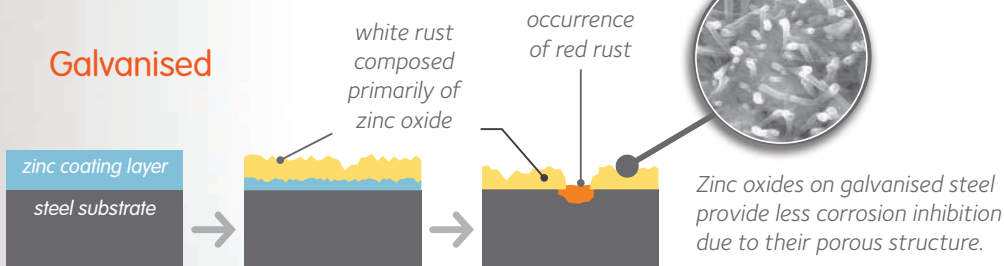
# Corrosion protection mechanism

The specific composition of Magnelis® (3% Mg and 3.5% Al) is crucial as it leads to the formation of a very dense, stable, and durable layer of protection. The compact layer of Magnelis® acts as a barrier to corrosion, preventing the underlying steel from coming into contact with the ambient environment. The result is highly effective corrosion protection, even in the harshest environments.

## Best protection for deformed areas

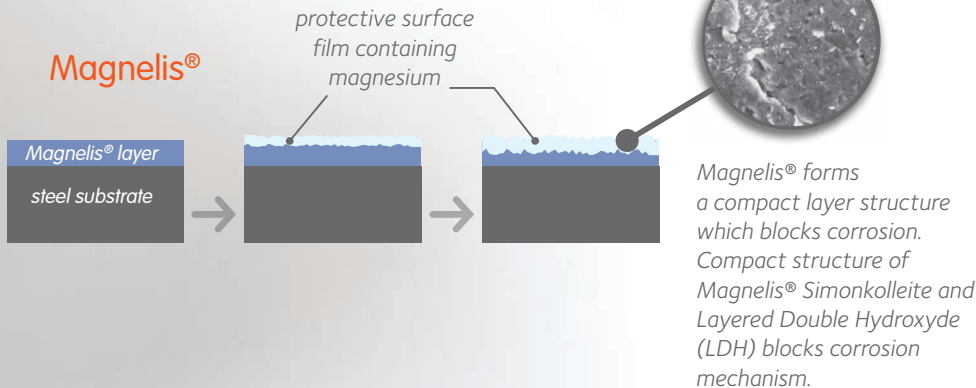
Magnelis® will even form a dense layer on highly deformed zones. This gives deformed steel shapes the same protection as flat surfaces. This is a key advantage of Magnelis® compared to other metallic coatings.

### Galvanised



Galvanised

### Magnelis®

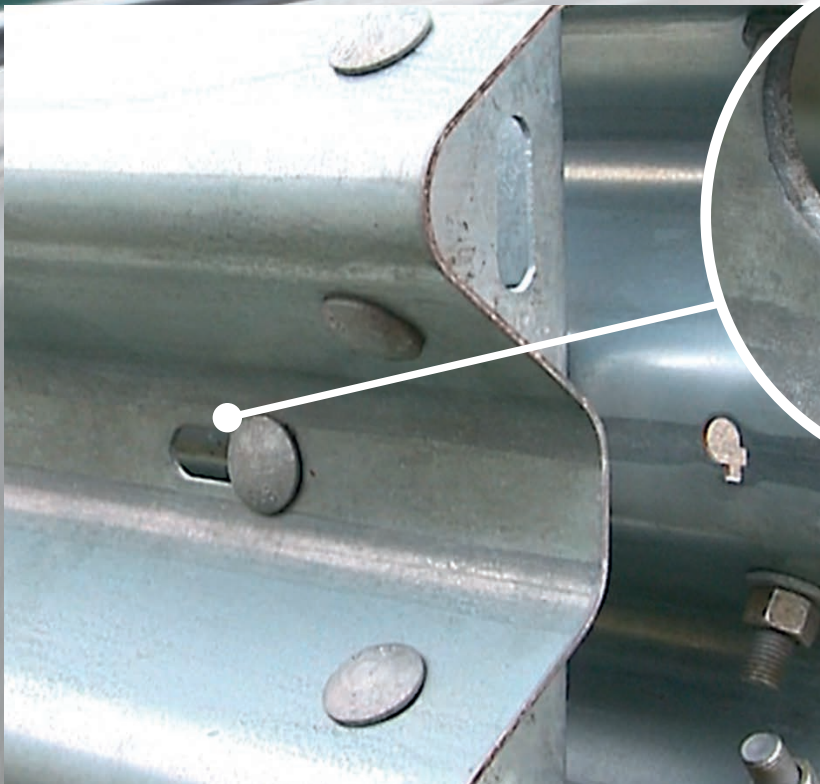


Magnelis®

No red rust observed after 1440 hours of salt spray testing on Magnelis® cup, where the galvanised cup is completely corroded.



The self-healing effect of Magnelis® ensures the protection of uncoated edges, scratches and perforations



*The perforated zone on a safety barrier is protected by the self-healing effect of Magnelis®.*

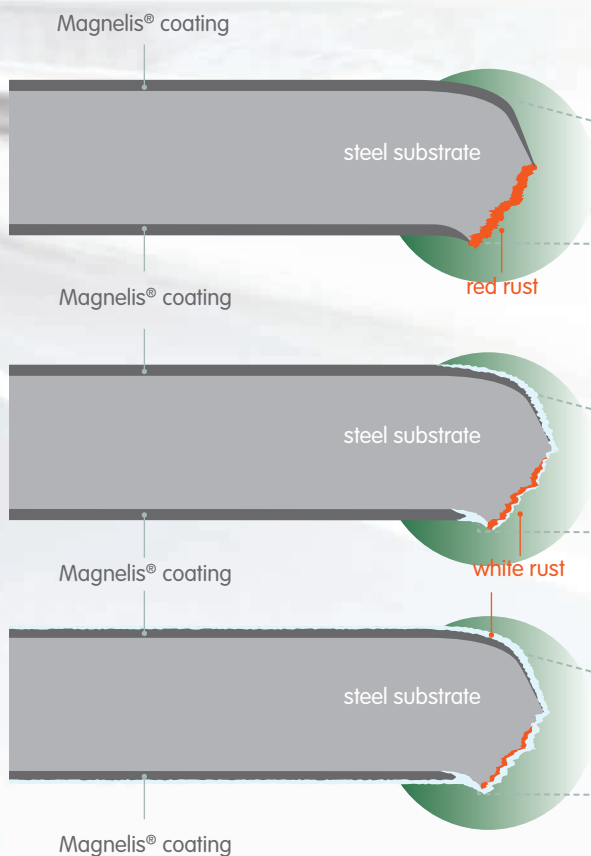
# Edge protection with self-healing effect

When exposed to the environment, Magnelis® forms a very dense zinc-based protective film, unlike galvanised where the film is very porous.

This unique dense film is also formed on edges, welds, perforations and scratches. In case some red rust was present on these uncoated zones, the red

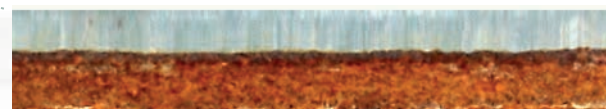
rust will be gradually covered by the Magnelis® film.

It is almost impossible for the environment to penetrate this film. The result is that Magnelis® provides perfect protection of the whole structure, even on the uncoated edges, scratches and perforations.



*Initial exposure period (up to several weeks\*)*

**The exposed cut end of the substrate is oxidised and forms red rust.**



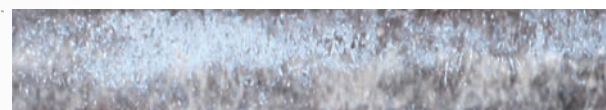
*Subjected to rain and condensation (beyond several weeks\*)*

**The zinc-based film containing magnesium on the coating layer migrates over the cut end.**




*Long exposure period (after more than a year\*)*

**Disappearing of red rust and increasing of white rust.**



*\* The speed of the self-healing may depend on the environment.*



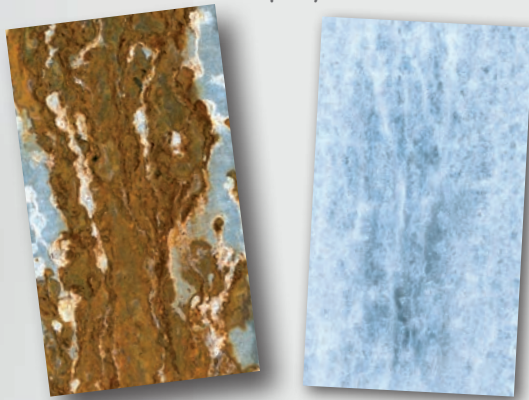
A woman with dark hair tied back, wearing a white lab coat and safety glasses, is seen from the side, working in a laboratory. She is positioned in front of a fume hood, which is emitting a thick layer of white vapor. The background consists of a brick wall with various pipes and conduits. The overall scene is brightly lit, typical of a laboratory environment.

The superior corrosion resistance of Magnelis® has been demonstrated in accelerated laboratory testing and proven through outdoor tests

*Magnelis® samples are tested in the laboratory.*

# Corrosion resistance, accelerated corrosion tests

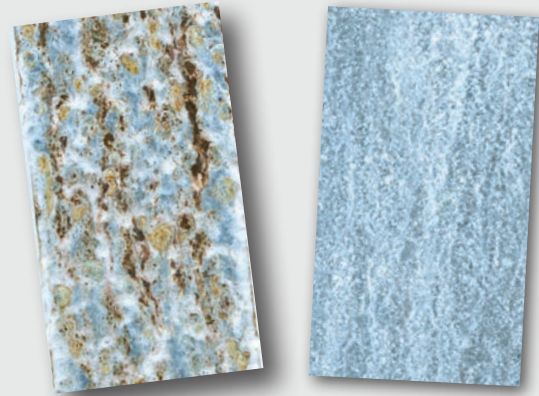
Magnelis® versus pre-galvanised  
(salt spray test)



Hot dip galvanized 20 µm  
after 6 weeks

Magnelis® 20 µm  
after 34 weeks

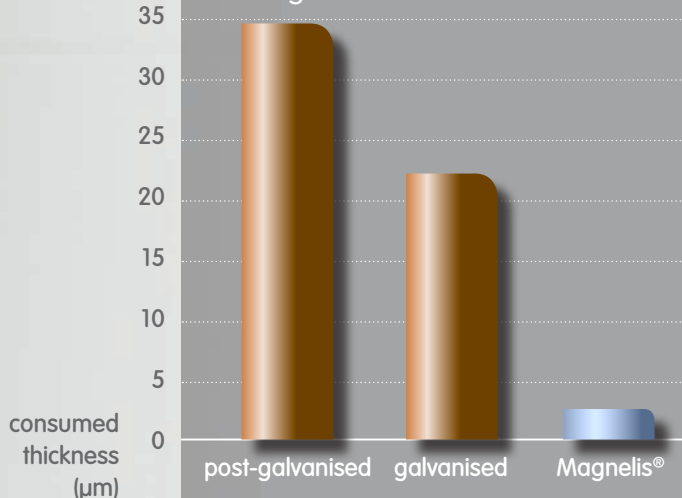
Magnelis® versus post-galvanised  
(salt spray test)



Post-galvanised 85 µm  
after 12 weeks

Magnelis® 20 µm  
after 12 weeks

Coating loss after 6 weeks



Salt spray and cyclic corrosion test results highlighted the superior performance of Magnelis® compared to other metallic coatings.

No red rust was observed on steel with a 20 µm coating of Magnelis® after 34 weeks of salt spray testing. Magnelis® offers a real advantage over post-galvanised steel.

*These are results from a 3CT (VDA 621-415) cyclic corrosion test. Source: ArcelorMittal R&D*



Magnelis® outperforms  
galvanised steel in all  
types of environments

*Magnelis® samples  
at the French Corrosion  
Institute in Brest.*

## Corrosion resistance, proven outdoors

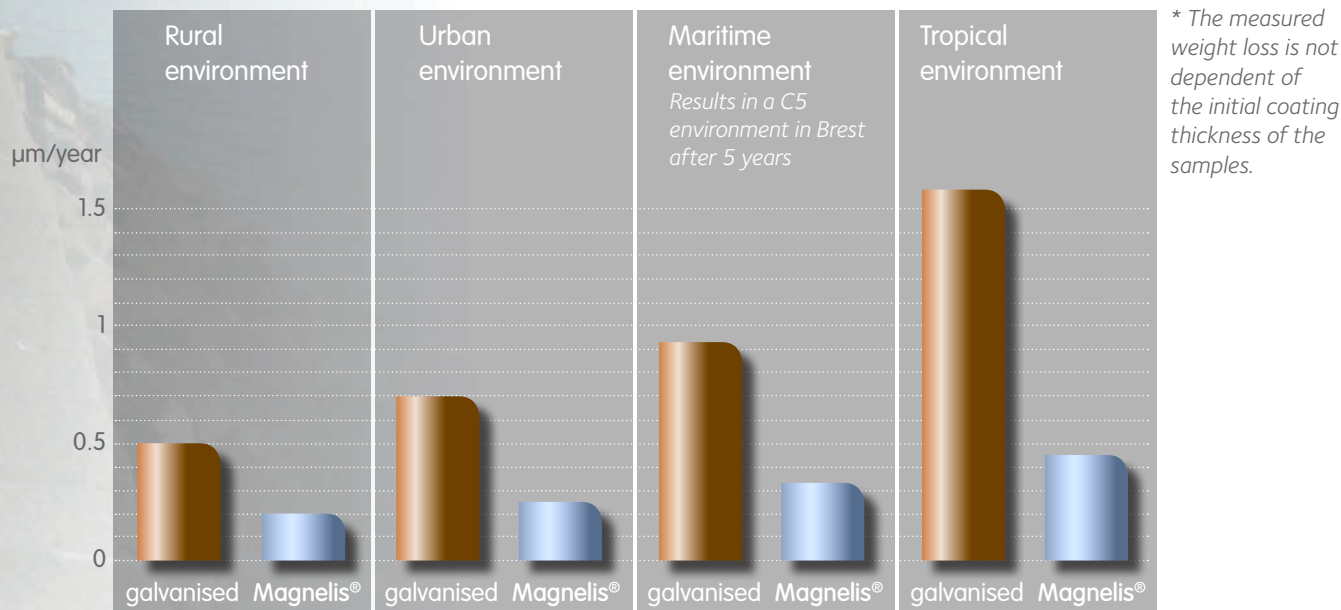
More than thousand Magnelis® samples have been exposed to a variety of different environments around the world in outdoor tests. The samples included shapes such as flat sheets, tubes, and profiles, and a range of different dimensions.

Every test has confirmed the optimal protection provided by Magnelis® against long-term corrosion.

Magnelis® shows three times better protection than galvanised steel in all types of environments, and even more in very aggressive environments.

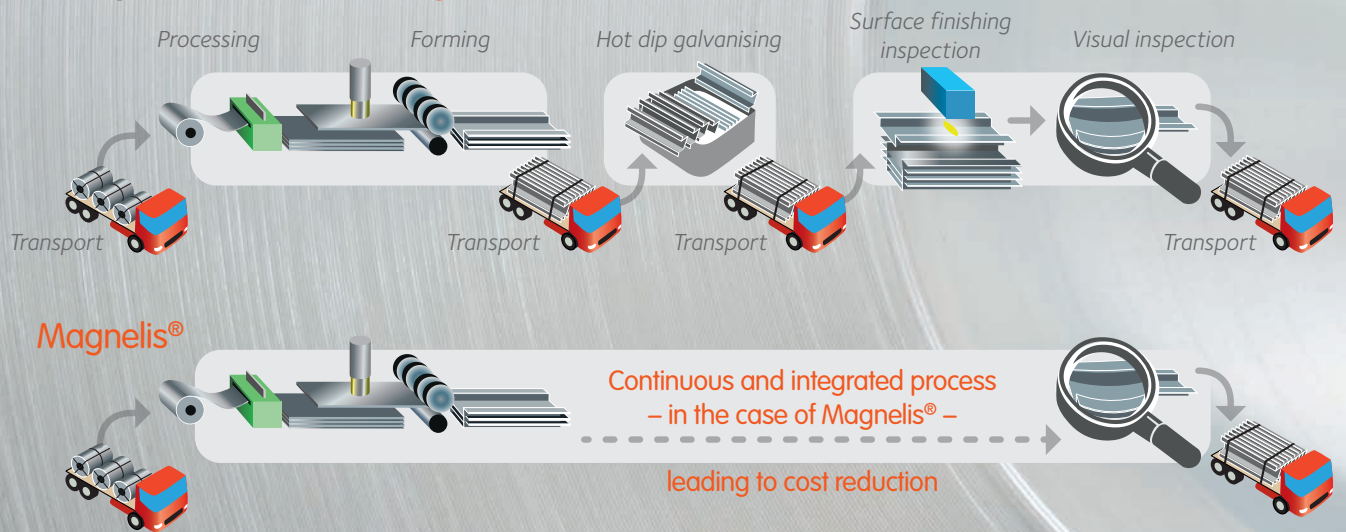
### Mean yearly consumed thickness\* in different environments in microns/year (after 2 years)

Source: ArcelorMittal R&D





## Post-galvanised versus Magnelis®





# Cost advantages over competing solutions

## Advantages over post-galvanised steels

- Freedom to optimise designs thanks to the ability of Magnelis® to protect deformed shapes
- Lower weight of Magnelis® coating (depending on environment) to obtain the same level of corrosion resistance
- Protects flat and deformed surfaces as well as cut edges
- Shortens the logistics chain thanks to simpler fabrication processes.

## Cost effective compared to stainless steel and aluminium

- Magnelis® provides the high level corrosion resistance of stainless and aluminium at a significantly lower cost.

## Reduces maintenance costs compared to post-painting:

- The use of Magnelis® can avoid the need for post-painting. This leads to cost savings and productivity improvement
- The extended durability of Magnelis® results in reduced maintenance.

**Magnelis®**  
Think strategy



# Technical specifications

Magnelis® is applied to the steel on a continuous hot dip galvanising line.

The steel strip is dipped into a molten bath of Magnelis® which includes zinc, 3.5% aluminium, and 3% magnesium.

By closely controlling the process conditions, ArcelorMittal is able to ensure the optimal properties of the final product.

Magnelis® can be applied to a very wide range of steel grades. These include steels for cold forming and deep drawing applications, as well as structural and high strength, low alloy steels.

Steel thickness can range from 0.45 to 6 mm, while the coating can be from 5 to 35 µm/per side (ZM430).

Coating Designation		ZM70	ZM90	ZM120	ZM175	ZM200	ZM250	ZM310	ZM430
Coating Mass (total both sides)	g/m <sup>2</sup>	70	90	120	175	200	250	310	430
	oz/ft <sup>2</sup>	0.23	0.30	0.40	0.60	0.65	0.80	1.00	1.40
Coating Thickness	(µm/per side)	5	7	10	14	16	20	25	35

## Aspect

MA and MB aspect

## Surface Treatment

C (E-Passivation® CrVI-free), O (oiled)

## Thickness

0.45 to 6.00 mm (0.018 to 0.236 inches)

## Width

Up to 1680 mm (66 inches)

## Steel grades

DX51 to DX57 + ZM

S220 GD to S550 GD + ZM

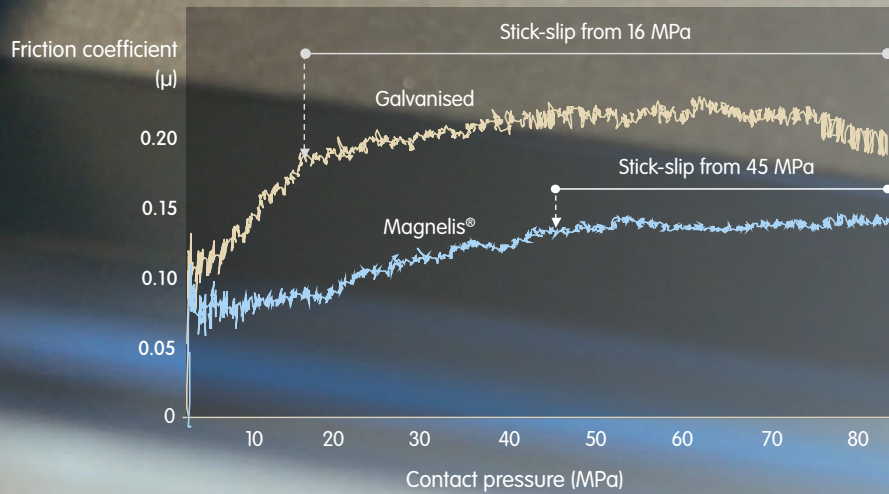
HX260 LAD up to HX700 LAD + ZM

H240 + ZM



## Friction test

Magnelis® offers improved friction behaviour.



Lubrication Oil Fuchs 41075 in excess  
Source: ArcelorMittal R&D

## Easy to process

Thanks to its highly resistant, adherent metallic layer, Magnelis® can be processed using a variety of methods. These include bending, drawing, and profiling. Magnelis® maintains a high level of corrosion protection, even in the deformed zones.

Outdoor exposure tests have confirmed the exceptional corrosion resistance of Magnelis® on deformed parts compared to galvanised steel. The Magnelis® barrier protects the entire surface including cut edges and perforations.

### Powder behaviour comparison

Magnelis® reduces the powdering behaviour.



Lubrication Oil Fuchs 41075 in excess  
Source: ArcelorMittal R&D

### Formability

Magnelis® proves better results on workability of the product and protection of the processing tools.

Friction tests show that Magnelis® performs better than hot dip galvanised steel.

Steels coated with Magnelis® are easy to process and do not harm processing tools. Magnelis® also enables manufacturers to deform the steel without the need for a lubricant, something that is not possible with galvanised steels.

### Weldability

Magnelis® offers improved weldability due to its thinner coating. The process to weld Magnelis® is the same as that used for zinc-coated parts. The same welding consumables, procedures, and guidelines can be used. Arc, spot, and high frequency induction (HFI) welding techniques are all compatible with Magnelis®.

In cases where welded areas need to be re-protected, Magnelis® demonstrates even better corrosion resistance than a post-galvanised coating.

### Paintability

Magnelis® can be post-painted and offers superior corrosion resistance compared to other metallic coated steels.





Magnelis® is  
the only metallic  
coating product  
certified for use in  
a C5 environment

# Standards and certification

Magnelis® has been included in the European standard for hot dip galvanised steel (EN 10346) since July 2015 and Magnelis® is expected to be included in the near future in the ASTM.

The excellent corrosion resistance of Magnelis® has seen it certified for use by external bodies including: CSTB (France), DIBt (Germany), SP (Sweden).

Magnelis® is the only metallic coating product certified for use in a C5 environment by the SP certification body in Sweden. It has also been included in the highest corrosion resistance class (K111) by DIBt in Germany.

Magnelis® is suitable for food contact applications in accordance with European regulation EC 1935/2004.

Magnelis® complies with the European directives covering:

- Restriction of Hazardous Substances (RoHS)
- Registration, evaluation, authorisation and restriction of chemicals (REACH)
- Waste Electrical and Electronic Equipment (WEEE)

**CSTB**  
ANALYSE ET RELEVEMENTS  
ENVELOPPE ET REVÊTEMENTS  
Constructions Légères et Couvertures

## Evaluation Technique Préliminaire de Matériau

Revêtement métallique sur tôle d'acier

**Dérivation et Couverture métallique**

Le rapport n° 9 de valeur d'avis technique n° 14 est en vigueur du 21 avril 2012. Il est d'application immédiate à l'usage des Groupes Spécialisés dans le cadre de l'application des demandes d'avis techniques sur des ouvrages de couverture, terrasses et façades dont les têtes sont constituées avec ce revêtement.

Il a été établi en collaboration avec des experts de la corrosion et des spécialistes des façades et couvertures métalliques.

**Magnelis®**

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23 Avenue de Bois Saint-Jean  
85-4000 LISIEUX  
Belgique

**Distributeur :** ArcelorMittal  
23 Avenue de Bois Saint-Jean  
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85-4000 LISIEUX  
Belgique

Commission chargée de formuler des Avis techniques  
**Groupes Spécialisés n° 2**  
Constructions, Façades et Cloisons Légères  
Séance du 22 novembre 2011  
Vu pour enregistrement le **18 JUIL 2012**

Cette Evaluation Technique comporte 9 pages. Sa reproduction n'est autorisée que sous la forme de fac-similé ou d'original et accord préalable au CSTB.

Service de la coordination des Avis Techniques  
CSTB, 89 Avenue Jean Barde, Champs de Mars  
88, 1 23 84 88 82 82 - Fax : 33 1 69 95 79 37 - Internet : www.cstb.fr  
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**Deutsches Institut für Bautechnik**  
DIBt

Zulassungsentwurf für Bauelemente und Bauteile  
Bauteiltechnische Prüfung  
Ein vom Bund und den Ländern  
gemeinsam getragene Anstalt des öffentlichen Rechts  
Mitglied der CSTB, der VCI und der VCI/SP

**Algemeine bauaufsichtliche Zulassung**

**Zulassungsummer:** Z-30.11-51

**Antragsteller:** ArcelorMittal  
19 Avenue de la Liberté  
2020 LUXEMBOURG  
LUXEMBOURG

**Zulassungsgegenstand:**  
Mit dem Beschichtungssysteme Magnelis korrosiongeschützte Stahlbänder (Coils) für die Herstellung dünnwandiger kaltgeformter Bauteile

**Datum:** 23.07.2013  
**Geschäftszeichen:** 136-130-11-1210

**Gültigkeitsdauer:**  
vom **23. Juli 2013**  
bis **23. Juli 2018**



**Swedish Technical Approval**  
SC0559-13

and decision on production control, in accordance with chapter 8, 22 and 23 §§ Planning- and Building Act (2010:900), PBL.

**Magnelis ZM310, Corrosion protection coating**

**Holder**  
ArcelorMittal Global Research & Development, C / Chavari 6, 48910 Sestao, Bizkaia, Spain  
VAT number: ES B20431300  
Internet: [www.arcelormittal.com](http://www.arcelormittal.com)

**Information supplied by**  
ArcelorMittal Global Research & Development, Rue de la Digue, 22, BE-4400 Fénilleux, Belgium  
Tel: +32 4 236 21 99, E-mail: [corine.dau@arcelormittal.com](mailto:corine.dau@arcelormittal.com)

**Product**  
Corrosion protection coating, Magnelis ZM310, is a special coating composed by an alloy of zinc, aluminium and magnesium. Coating thickness 25 µm per side.

**Intended use**  
Intended as corrosion protection of steel sheet for indoor- and outdoor applications. The corrosion protection is suitable for corrosivity class C3, according to ISO 12944-2 described class, based on a deemed expected lifetime of 15 years.

**Trade name**  
Magnelis ZM310

**Approval**  
The product satisfy the requirements set forth in chapter 8, 4 § 1 PBL, in respect to and under conditions stated in this certificate, and are therefore approved in accordance with the provisions of the following sections of Swedish mandatory provisions on application of the European construction standards (Eurocodes), (EKS) issued by the National Board of Housing, Building and Planning:  
EKS  
Durability  
Durability  
Section A, 7 §  
Section E, EN 1993-1-1, clause 2.1.3

**Associated documents**  
-

**Control**  
Production control is to be performed in accordance with instructions described in control



In production and during its service life, Magnelis® has a significant lower environmental impact compared to its competitors



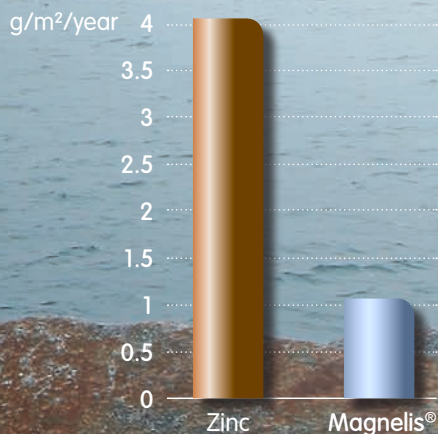
# The environmentally responsible coating

The application of a Magnelis® coating ensures the preservation of natural resources as it uses significantly less zinc than pure zinc coatings. Magnelis® also reduces zinc runoff\* to soils.

Magnelis® is 100% recyclable and does not contain any harmful elements. It is REACH compliant and an environmental product declaration (EPD) is available.

## Zinc runoff rate\*

Magnelis® considerably reduces zinc runoff into soil.

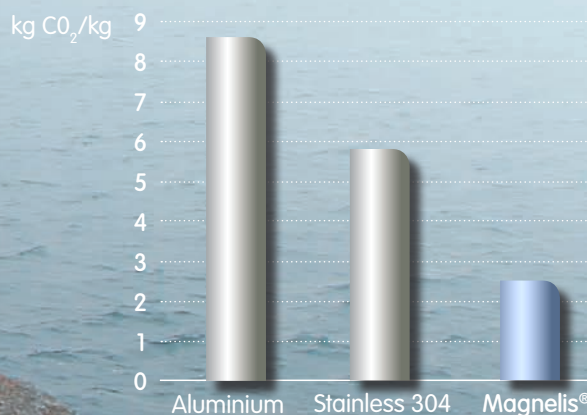


\* the rate of dissolution of a material from its surface into the soil  
Source: French Corrosion Institute

The production of Magnelis® also has a lower environmental impact compared to other highly durable materials such as stainless steel or aluminium.

## Production impact on CO<sub>2</sub> emissions

CO<sub>2</sub> emissions for the production of Magnelis® are much lower than for aluminium, a difference that is not compensated by aluminium during the use phase, even when aluminium parts are lighter than steel parts.



Sources: ArcelorMittal R&D, European Aluminium Association, World Steel Association, Eurofer



A close-up photograph of a metal drill bit drilling into a metal plate. The drill bit is positioned vertically, and a small amount of metal shavings is visible at the point of contact. The background is a light-colored metal surface. An orange text box is overlaid on the left side of the image.

Our support can help  
you to optimise the  
use of Magnelis®



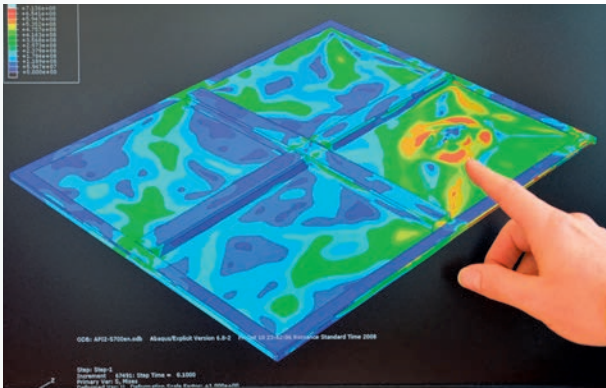
# Co-engineering Magnelis® solutions

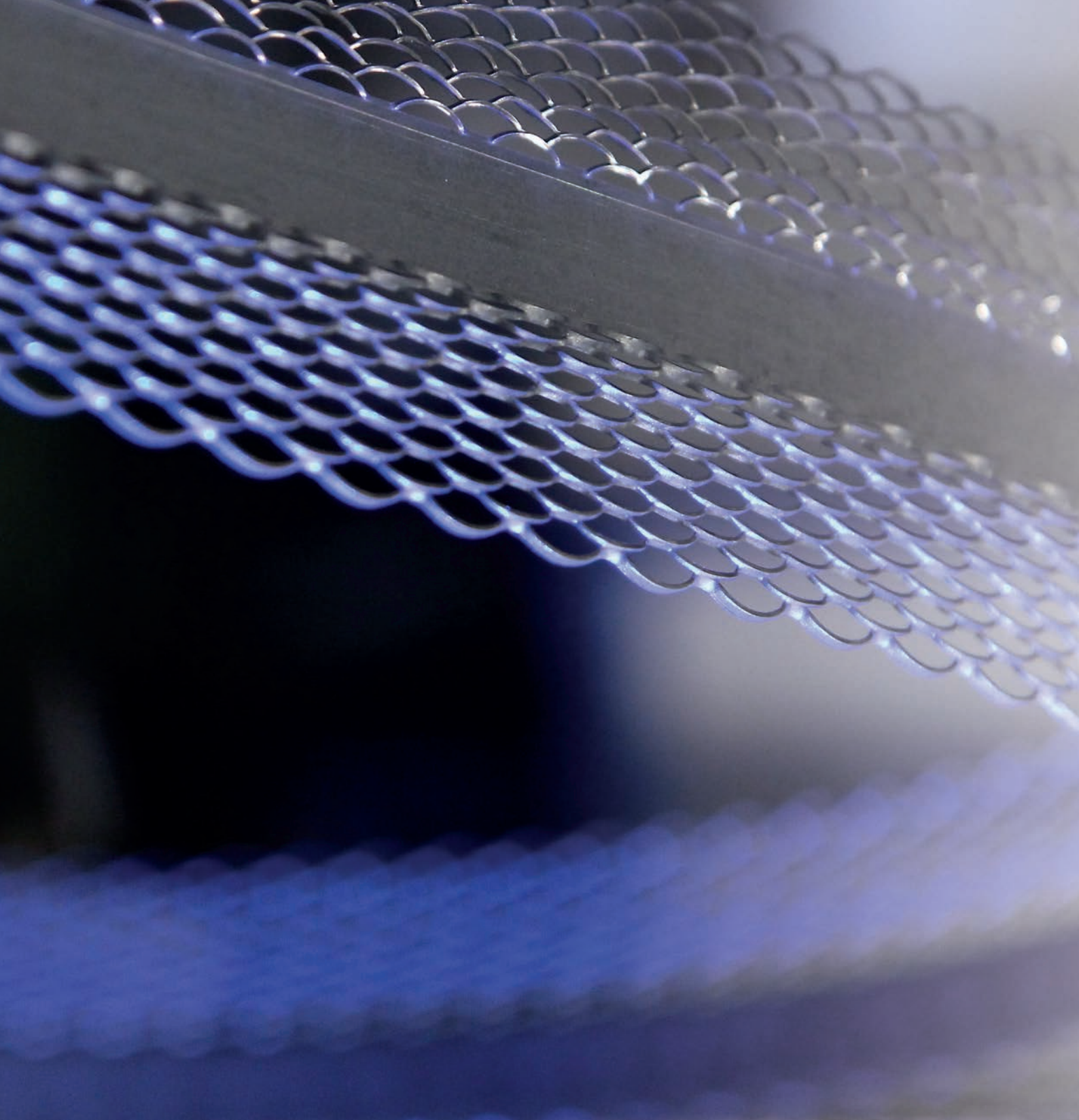
ArcelorMittal is offering an innovative co-engineering approach to its customers in order to optimise the use of Magnelis® and to achieve the best possible results and cost reduction.

Our co-engineering team includes researchers and technicians with a strong background in mechanical design.

ArcelorMittal's assistance to customers can be applied at all stages of product development, from initial design through to serial production. We can help you to take every advantage of the benefits Magnelis® can offer:

- The most suitable steel grade and coating for your application
- Cost optimisation through thickness reduction and process improvements (using finite element simulations)
- Improving the quality and durability of your product
- Definition of minimal mechanical properties and thicknesses for successful production
- Deformation analysis of stamped parts to validate the theoretical analysis
- Technical support during production.

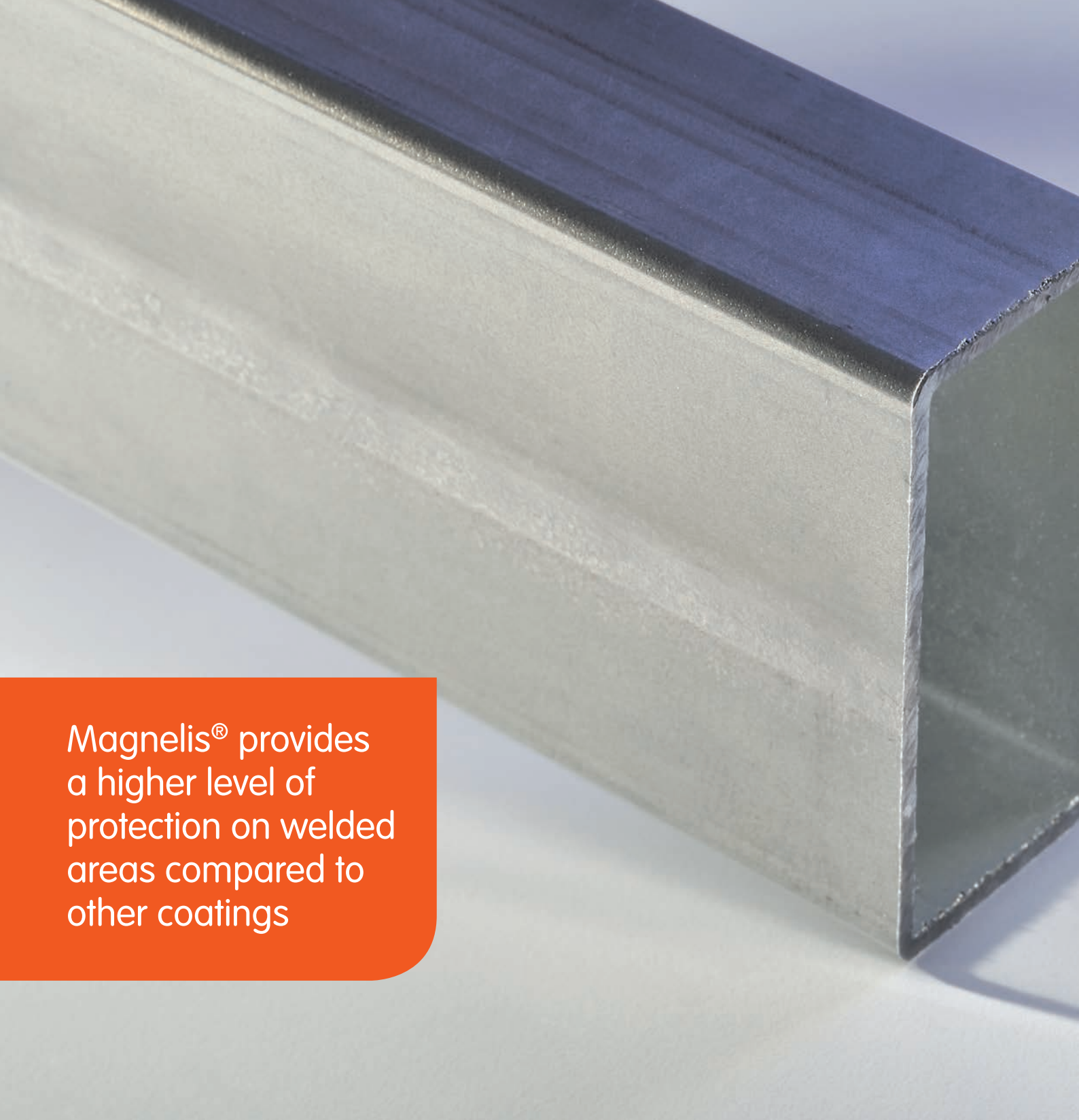




# Magnelis<sup>®</sup>, the best metallic coating through a large panel of markets

- 33 ■ Magnelis<sup>®</sup> outperforms pre-coated welded tubes
- 35 ■ The durable coating for solar structures
- 41 ■ Optimal protection for agricultural applications
- 45 ■ Construction – Durability guaranteed
- 49 ■ Infrastructure – Durable safety barriers, lighting poles, acoustic walls...
- 51 ■ Industry – Appliances and electrical equipment



A close-up photograph of a metal profile, likely a C-channel, showing a weld joint. The top flange is coated with a dark blue material, while the main body is a light grey metal. The weld joint is visible on the right side, showing a textured, metallic surface. The background is a plain, light-colored surface.

Magnelis® provides  
a higher level of  
protection on welded  
areas compared to  
other coatings



# Magnelis® outperforms pre-coated welded tubes

Magnelis® has very clear advantages when it comes to tubes. On a standard galvanised tube, the welded area is the weak point for corrosion. Magnelis® increases the protection and lifetime of the welded zone to unprecedented levels.

## Processing

Magnelis® offers similar weldability to standard hot dip galvanised steel. The same welding consumables, procedures, and guidelines can be used for structural tubes and pipes. Arc welding, spot welding, and high frequency induction (HFI) welding are all compatible with Magnelis®.

## Self-healing effect

Magnelis® self-heals on cut edges and thin welded zones. The zone is progressively covered with protective Magnelis® compounds which act as a barrier to corrosion. The result is outstanding corrosion resistance, even on welded zones.

The life of a welded tube can be extended significantly beyond that of a post-galvanised tube if the welded area is re-protected with Magnelis®.

Magnelis® versus pre-galvanised



Magnelis® ZM120 welded, not re-protected

Galvanised Z275 welded, not re-protected

Magnelis® versus post-galvanised



Magnelis® ZM310 welded and re-protected

Post-galvanised welded







# The durable coating for solar structures

35

solar

Magnelis® supports moves to generate clean and renewable energy by offering advanced corrosion protection for solar installations. Magnelis® is the preferred coating solution for both concentrating solar power (CSP) plants and ground-mounted structural solutions for photovoltaic (PV) solar farms. It offers increased durability, the best possible protection against corrosion and abrasion.

Magnelis® extends the life of solar structures so operators can maximise the return on their investment. Its key advantages in these applications are:

- Guaranteed durability up to 25 years
- Improved resistance against abrasion
- Effective against corrosion even placed in soil
- Large feasibility range both in thickness and steel grade
- Cost effective
- Rapid installation
- Reduces environmental impact.

The minimum recommended coating for the upper parts of solar structures is Magnelis® ZM310 at 25 µm per side. For areas in soil or subject to higher abrasion, we recommend Magnelis® ZM430 at 35 µm per side.

Magnelis® can be supplied in a wide range of steel grades and thicknesses up to 6 mm. This flexibility allows operators to optimise the design and total cost of their solar structures.



A 25-year guarantee\* is available for Magnelis® ZM310 used in the support structures of solar applications. It is the first metallic coating to be guaranteed in marine conditions (C5-M, ISO 12944-2).

\* Guarantee for Magnelis® ZM310 is subject to project-specific conditions. Contact us for more information.

Magnelis® is  
the preferred material  
for the structural  
components  
of solar fields





# Optimum abrasion resistance for steel solar structures in deserts

Magnelis® has much higher hardness compared to standard zinc coatings. This has a direct and positive impact on the abrasive wear resistance of the coating.

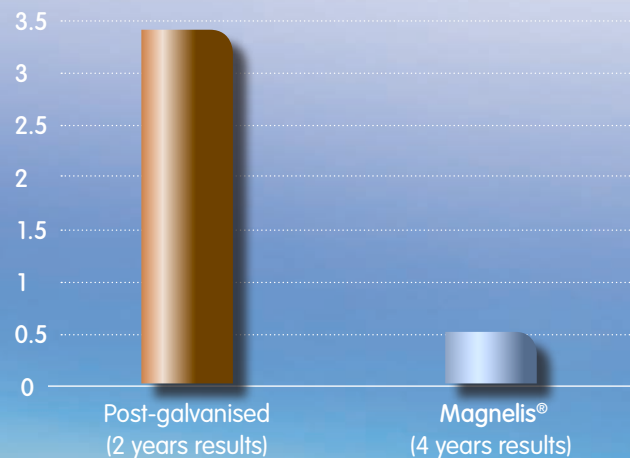
The hardness of Magnelis® is much higher than that of hot dip galvanised coatings, increasing its resistance to abrasion

Galvanised		64
Magnelis®		141

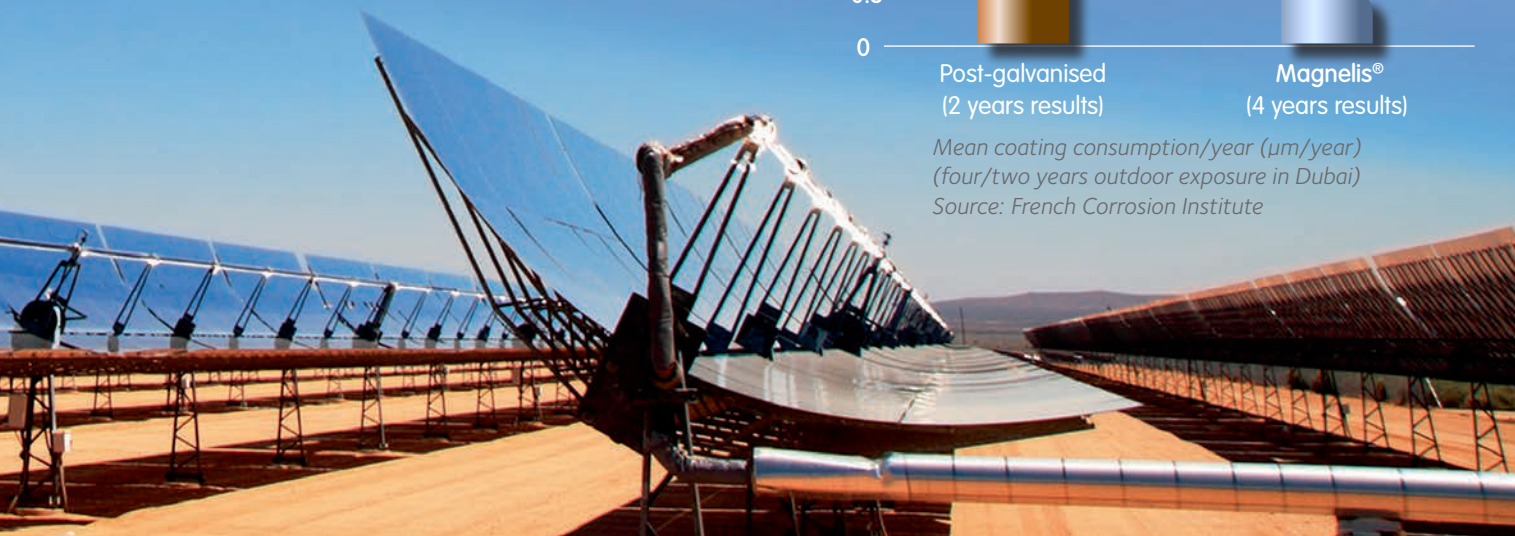
*Hardness Vickers (HV)*

The excellent abrasion resistance of Magnelis® has been proven through outdoor exposure tests in desert environments.


Magnelis® performs much better than galvanised steels in sandy environments



*Mean coating consumption/year (µm/year)  
(four/two years outdoor exposure in Dubai)  
Source: French Corrosion Institute*







The very dense film  
of Magnelis® assures  
the best possible corrosion  
protection in soil

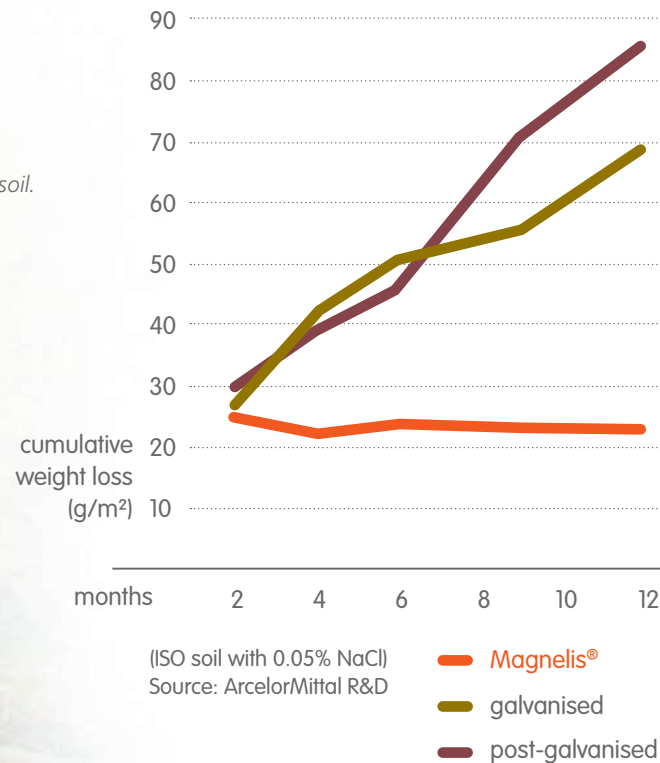


# Magnelis<sup>®</sup>, superior behaviour in soils

When it comes into contact with soils, Magnelis<sup>®</sup> also produces its protective film to cover the steel surface. This very dense film reduces the contact between the steel and the soil, dramatically slowing the progression of corrosion.

*Magnelis<sup>®</sup> ZM430 is the preferred corrosion protection for steel structures which are placed in soil.*

Comparison of corrosion rates for galvanised, post-galvanised, and Magnelis<sup>®</sup> coated steels during one year in soil.









# Optimal protection for **agricultural** applications

Magnelis® is used in a variety of agricultural applications due to its excellent corrosion resistance in highly alkaline atmospheres (pH between 10 and 13) and those rich in ammonia.

## Vineyards

Magnelis® ensures ultimate corrosion protection for vineyard poles. Poles coated with Magnelis® have a life span in line with that of the vines they support.

Poles account for more than 60% of the cost of vineyard fences. Magnelis® poles are at least 20% more cost-effective than wood and galvanised poles and can perform over the total lifetime of the vines.

Outdoor tests have proven that Magnelis® has superior corrosion resistance in soils compared to zinc-heavy coatings. Magnelis® is more stable than conventional coatings when it is placed in contact with soil.

Magnelis® is eco-friendly and reduces zinc runoff to soil considerably compared to post-galvanised products.

## Greenhouses

Greenhouse structures must sustain extremely warm and humid atmospheres. Magnelis® offers excellent corrosion resistance in this application due to its very dense protective layer.

In addition to its excellent formability, Magnelis® also provides a high level of corrosion resistance on deformed parts.





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# Optimal protection for agricultural applications

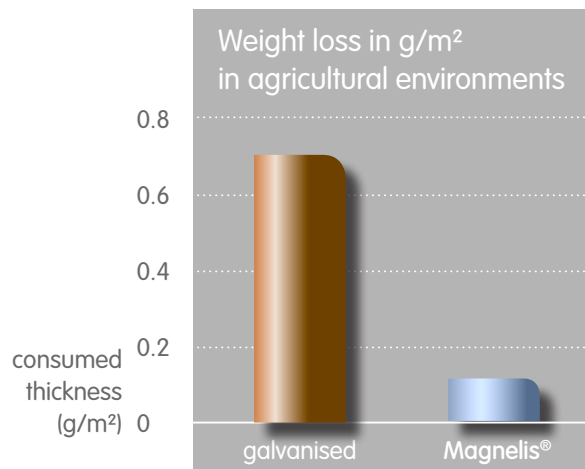
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## Animal housing

Farm buildings housing cattle, pigs, and poultry face severe challenges from atmospheric corrosion. Magnelis® coated profiles and tubes are the ideal answer to guarantee the durability of these structures. Multiple tests (including accelerated tests and long exposure on real farms) have demonstrated the outstanding corrosion performance of Magnelis® in animal housing. Magnelis® reduces the risk of corrosion and disease as bacteria have no corrosive areas in which to hide.

Thanks to its high surface hardness Magnelis® is also better at resisting animal scratches. Magnelis® also eliminates the need for post-painting, and can replace stainless steel or aluminium.

Magnelis® is available in all dimensions required for animal housing, and offers a very cost-effective solution.



Measurement of mass loss:  
pH: 11.7 – Solution with 5% NH<sub>3</sub> –  
T: 20°C – Test duration 24 h

Source: ArcelorMittal R&D

## Silos

Magnelis® offers excellent outdoor corrosion protection for silos, wherever they are located. The hard surface of Magnelis® also reduces the abrasive effect of grain on the coating.

Magnelis® is suitable for food contact applications such as the interiors of fermentation silos and meets the requirements of European regulation EC 1935/2004.

Magnelis® is available in thicknesses ranging from 0.45 to 6 mm, and in various steel grades, coating weights, and levels of protection.



Magnelis® guarantees  
a cost effective and  
long life solution

# Construction

## Durability guaranteed

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The remarkable corrosion resistance of Magnelis® allows it to be used for a wide range of structural applications. These include the sub-structures of ventilated facades, composite floors, purlins for roofs, side rails for walls, rainwater systems, and light steel framing. But it can also be used for roof and wall profiles in some corrosive environments such as coastal areas, agricultural structures, and water transport systems.

### Longer lifetime

Magnelis® increases the lifetime of structures by a factor of three compared to hot dip galvanised solutions. In more severe environments, the benefits of Magnelis® can be even greater.

### Self-healing effect

When cut, perforated, or scratched, Magnelis® slows down corrosion by forming a very dense zinc-based protective film. This ensures perfect protection of the whole structure.

### Excellent workability

Profiling processes are facilitated by the excellent forming behaviour of Magnelis® as it has a lower friction coefficient than galvanised steel. The Magnelis® coating also adheres firmly to the steel to prevent powdering during processing.

### Reduced coating thickness

The superior corrosion protection of Magnelis® offers our customers two possibilities. They can increase the level of corrosion protection with the same metallic coating thickness; or they can achieve the same protection while significantly reducing coating thickness.

### Low total cost of ownership

Magnelis® offers significant cost reductions as it reduces the need for ongoing maintenance and avoids the need for additional painting. This makes Magnelis® the most cost-effective solution compared to galvanised and post-galvanised corrosion protection.

### Contact with concrete

As concrete hardens, a very alkaline environment is created. This can be extremely aggressive against coated steel. Magnelis® resists corrosion in these applications much better, and is the preferred metallic coating for applications which come into contact with concrete.

### Wide feasibility range

Magnelis® is available in a wide range of high strength steels, allowing design optimisation.





# Construction

## Diverse range of applications

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construction

### Building structures

Magnelis® is the perfect corrosion protection solution for roof structures and purlins, wall side rails, facade sub-structures, and light steel-framed structures. It can be utilised in outdoor, exposed, semi-exposed, or unexposed environments to ensure a longer lifetime than hot dip galvanised steel and other traditional coatings. The performance of Magnelis® has been proven in outdoor tests.

### Rainwater and roofing systems

Magnelis® can be utilised for roofs and corrugated profiles in aggressive environments such as marine or agricultural areas. It is the first metallic coating steel to be classified for use in a C5 environment and comes with a guarantee up to 20-years. In non-marine environments, the guarantee can be up to 25-years. When used in rainwater systems, a 10-year guarantee is available.

### Flooring

Composite floor systems made with steel and concrete are flexible and adaptable to any kind of structure or renovation. They allow large spans and reduce floor thickness while maximising interior space.

Metallic coated steel with Magnelis® is the ideal solution for durable, long lasting composite floors. It offers excellent corrosion performance when in contact with concrete or in high alkaline atmospheres.



*Magnelis® is the only metallic coating with a 20-year guarantee for roofing and in marine environments (C5-M more than 300 m from the sea). A guarantee of up to 25 years can be provided for inland roofing applications.*







# Infrastructure

## Durable safety barriers, lighting poles, acoustic walls...

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Magnelis® is widely used to protect safety barriers, lighting poles, road signs, acoustic walls, bridge parapets, and many other infrastructure applications.

### Outstanding corrosion protection

The excellent corrosion behaviour of Magnelis® has been extensively proven in outdoor tests. Magnelis® outperforms galvanised steel by a factor of three, and higher in more severe environments.

### Self-healing effect

Magnelis® offers protection for cut edges and perforations thanks to its inbuilt self-healing properties.

### Reduced corrosion in soil

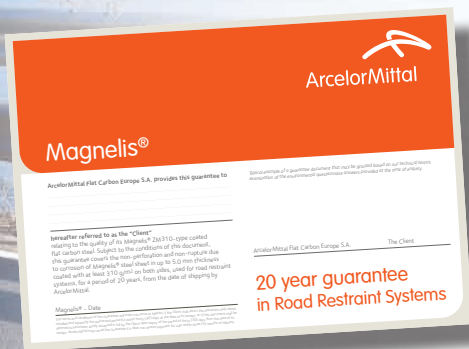
Outdoor tests have proven that Magnelis® has superior corrosion resistance in soils compared to zinc-heavy coatings. Magnelis® is more stable than conventional coatings when it is buried in the soil and results in less zinc runoff. Magnelis® ZM430 offers the best possible corrosion protection in soil.

### Wide feasibility range

Magnelis® can be provided in a range of thicknesses and grades suitable for road safety and other infrastructure applications.

### Cost competitive compared to post-galvanisation

Using Magnelis® for infrastructure applications offers clear cost advantages. Total cost of ownership is optimised as production, logistic, installation, and maintenance costs are reduced significantly.



*ArcelorMittal offers a guarantee of up to 20-years on Magnelis® in road safety applications.*

*Magnelis® is now included in the EN 10346 standard for continuously hot dip coated steel flat products, and the EN 1317 standard for road safety systems. Magnelis® solutions have also been certified by bodies which oversee the Construction Product Regulation. Certifications have been granted in Austria, Belgium, the Czech Republic, Norway, and Spain. Certification is ongoing in other countries.*



## Appliances and electrical equipment

Manufacturers of appliances and electrical equipment are requesting significantly improved corrosion protection, while maintaining processing and cost effectiveness. Magnelis® is the answer to these demands. Magnelis® is already widely used for the casings, structures, and hinges of appliance units, cable trays, and cooling towers.

### Outstanding corrosion protection

The excellent corrosion behaviour of Magnelis® has been proven through extensive outdoor tests. Magnelis® outperforms galvanised steel by a factor three.

### Self-healing effect

Magnelis® also protects edges and perforations thanks to its inbuilt self-healing properties.

### Significantly improved protection against white rust

Conventionally galvanised steel shows substantial signs of white rust after a salt spray test. Magnelis® offers a huge improvement in white rust resistance. Salt spray tests have shown it lasts much longer.

### Reduced coating thickness

The superior corrosion protection of Magnelis® offers our customers two possibilities. They can increase corrosion protection by applying the same coating thickness, or target the same level of protection with a significantly thinner metallic coating layer.

### Scratch resistance

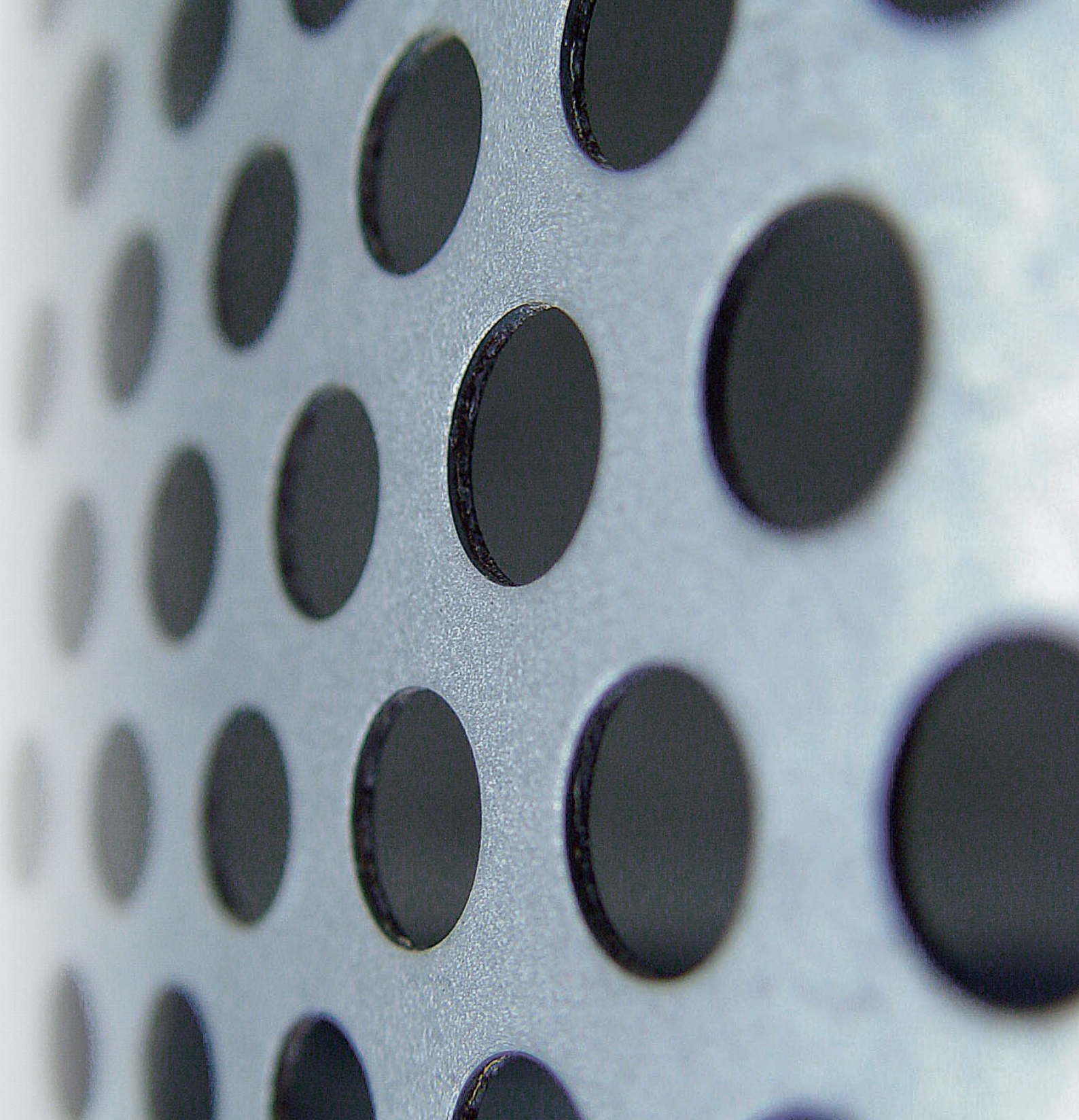
Thanks to its very high hardness, Magnelis® offers excellent wear and abrasion resistance.

### Improved productivity and paintability

The lower friction coefficient and improved adhesion of Magnelis® increases its processing properties. The easiness to post paint Magnelis® can bring a further improvement of corrosion resistance versus galvanised steel.

*Magnelis® ensures corrosion resistance while maintaining the electrical conductivity of cable trays.*





# Benefits of **Magnelis®** in a nutshell

Features		Magnelis® versus hot dip galvanised (Zn)
Anti-corrosion properties	Outdoor corrosion	+++
	Agricultural buildings (animal housing, barns, greenhouses, silos...)	+++
	Marine environments (construction, swimming pools...)	+++
	Industrial environments (acid- or alkaline-rich environments)	+
	High humidity	+++
	Contact with concrete	+++
	Abrasion	+++
	Soil corrosion	+++
	Edge protection thanks to self-healing effect	+++
	Perforations or scratches on exposed applications	+++
	Corrosion of formed parts (bent or stamped)	+++
	Temporary protection (transport, storage)	+++
Processing properties	Bending and profiling	+
	Forming and shaping	+
	Welding (equivalent coating thickness)	=
	Painting	++

## Credits

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