



ROTELEC PART OF
DANIELI
GROUP



PEOPLE
BEHIND
TECHNOLOGY



THE STIRRING AND INDUCTION HEATING COMPANY

ROTELEC THIS IS US

PIONEERS AND INNOVATORS.
EXPERIMENTERS AND EXPLORERS.
VISIONARY YET CONCRETE,
CURIOUS YET RATIONAL.



1977



Put simply, people.
Because behind the invention and
innovation of electromagnetic stirring
technology, there are brilliant minds.
Because behind our cutting-edge
systems, there are proficient experts.
Because every idea, insight, and project
has a face.

**BECAUSE THIS IS ROTELEC.
SINCE 1977.**

1977 IT ALL BEGINS HERE

1977

The year we are founded is 1977 and we call it a perfect year. But behind a perfect year are the ones that paved the way: years of planning, research and development. Behind a perfect year are people who build the future.

Our story begins earlier that same decade, when IRSID and CEM develop Electromagnetic Stirring (EMS) for long product continuous casters.

It's 1973. The revolution of electromagnetic technology has begun, with the world's first industrial application of strand electromagnetic stirring on a continuous caster: the rotative strand stirrer produced for SAFE in Hagondange, France. A second step soon follows the first. Visionary, promising, futuristic: the development of mould stirring for billet and bloom casting.

ROTELEC

It's 1977, our perfect year. Rotelec is born from the merger of Irsid, CEM, Arbed and Usinor. The goal? To promote the Magnetogyr©Process, our patented mould stirring technology for billets and blooms. We are united, strengthened by our differences, and ready to surprise the market. The name we choose is Rotelec, the synthesis of the French words "rotation électrique" (electrical rotation).

The name recalls the world's first industrial application of mould electromagnetic stirring, that same year, on Arbed's continuous caster for billets, blooms and rounds in Eschweiler, Germany.



1987

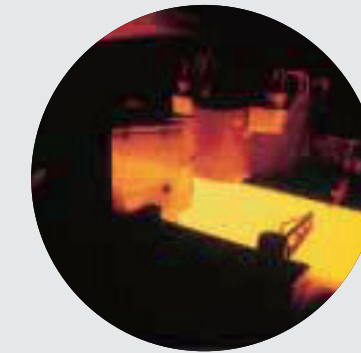
In **1987** we make a further stride into the technology's future: the induction heating of steel transfer bars at the entry of hot strip mill finishing stands.

Our growth is unstoppable, and in partnership with Irsid and Sollac-Fos (now part of the Arcelor Group), we develop and patent a C-type inductor with automatic gap adjustment – a true innovation that will go on to replace the traditional U-type inductor.



1991

In **1991** the Danieli Group, a global leader in turnkey steel plant construction, selects us as a strategic partner to enhance its continuous casting technology for special and high-quality steels.



2002

In **2002**, our pioneering research into the relationship between steel fluid dynamics and metallurgical quality leads to the development of the innovative MULTIMODE EMS technology: a cutting-edge solution that enables precise control of mould fluid dynamics through multiple modes of electromagnetic stirring. MULTIMODE EMS thus ensures optimized steel quality in slab casting. Over the years, collaboration with our strategic partners helps expand our global presence, strengthen our technological excellence, and foster continuous technical growth through the exchange of know-how.

2019

2019 marks another leap forward in electromagnetic technology: we deliver the world's first industrial application of MM-EMB on TSC at HBIS TISCO, China. New horizons unfold - innovation knows no boundaries.

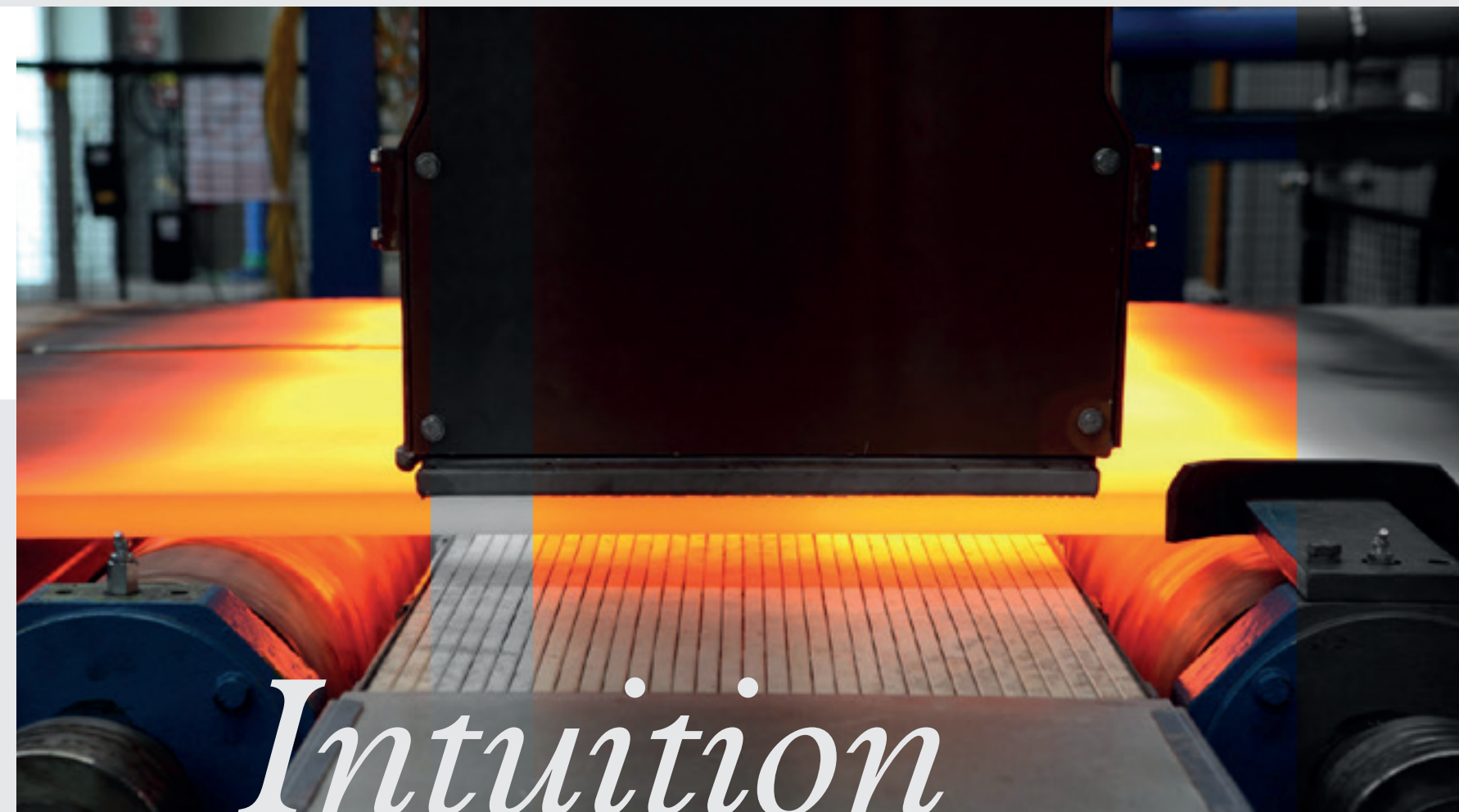
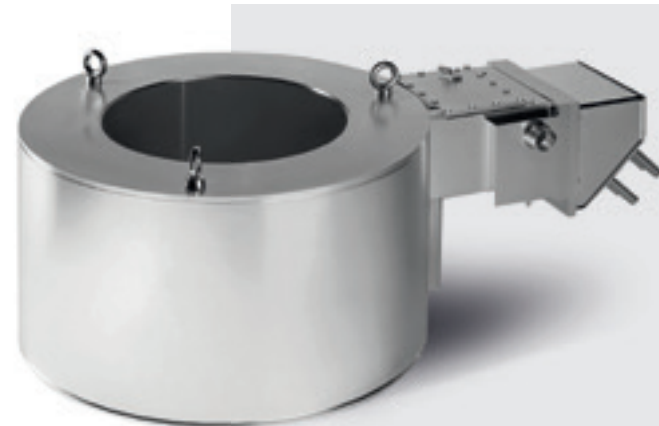


2025

2025. The story continues.

INTUITION IS OUR STRENGTH

MUCH MORE THAN A SIMPLE PLUS



Intuition



*We sensed the power of an idea.
We explored it, shaped it, and made it real.*

We understood the extraordinary potential of electromagnetic stirring and induction heating and used it to improve the quality and productivity of steelmaking processes.

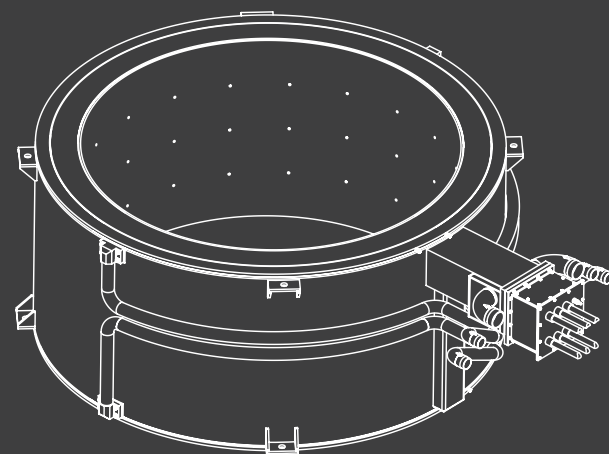
We recognized the need to develop innovative systems, tailor-made for specific process, by offering customized, flexible solutions.

WE SAW THE HIDDEN SIDE OF HIGH-TECH – AND BROUGHT IT TO LIGHT.

ROTELEC

NOT JUST WORDS

BEHIND THE NUMBERS,
THERE ARE PEOPLE



CONTINUOUS CASTERS EQUIPPED WITH EMS

399

TOTAL STRANDS

1,410

BILLET CASTERS

203

BLOOM CASTERS

76

ROUND CASTERS

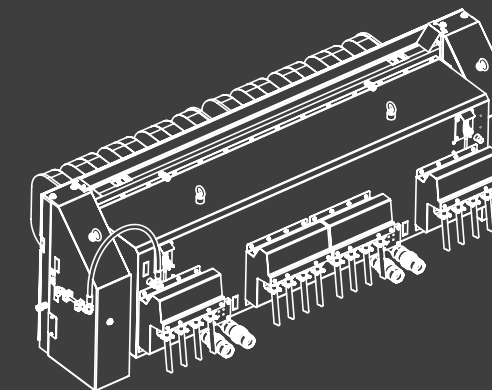
43

SLAB CASTERS

80

STIRRERS SUPPLIED

3,151



BILLET/BLOOM M-EMS

2,028

BILLET/BLOOM S-EMS

165

BILLET/BLOOM F-EMS

389

SLAB M-EMS

148

SLAB S-EMS

421

EDGE HEATER CARS
FOR HOT STRIP MILLS

30

TRANSVERSE FLUX
HEATERS

79

COUNTRIES
SERVED

50



A TIMELINE OF GROWTH

MILESTONES IN INNOVATION

The world's first industrial application of strand electromagnetic stirring on a continuous casting machine: the rotative strand stirrer for SAFE in Hagondange, France.

1973

Rotelec is born from the merger of Irsid, CEM, Arbed and Usinor.

1977

1977

The world's first industrial application of mould electromagnetic stirring, on Arbed's continuous caster for billets, blooms and rounds in Eschweiler, Germany.

1977

We patent the Magnetogyr® Process, our mould stirring technology for billets and blooms.

The world's first application of In-Roll EMS for Usinor, in Dunkerque, France.

1979

1981/83

The world's first industrial application of M+F EMS on KOBE's bloom caster and YODOGAWA's billet caster in Japan.

A new step forward: induction heating of steel transfer bars at the entry of hot strip mill finishing stands.

1987

A true innovation: we develop and patent a C-type inductor with automatic gap adjustment.

1987

1989

The world's first industrial application of C-type edge heaters on hot strip mills for SOLLAC in Fos sur Mer, France and NKK Keihin in Japan.

Danieli Group, a global leader in turnkey steel plant construction, selects us as a strategic partner.

1991

2002

Our pioneering research leads to the innovative MULTIMODE EMS technology.

The world's first industrial application of IH+EMS on the mould of a POSCO LICC continuous caster in South Korea.

2013

2019

The world's first industrial application of MM-EMB on TSC of HBIS TISCO in China.

The world's first industrial production of MM-EMB+S at NUCOR STEEL in West Virginia.

2024



WORLDWIDE INNOVATIONS



S-EMS

FRANCE

FIRST S-EMS OF IRSID/CEM

World's first industrial utilization of S-EMS on SAFE's 4-strand 240 mm² vertical bloom caster, France



M-EMS

GERMANY

M-EMS IMPROVES
SURFACE/SUBSURFACE QUALITY

World's first industrial utilization of M-EMS on ARBED Eschweiler billet-bloom-round caster, Germany.



IN-ROLL-EMS

FRANCE

FROM COLUMNAR TO EQUIAXED
CASTING

World's first industrial utilization of In-Roll EMS for plate grades on USINOR Dunkerque slab caster, France.



M+F+EMS

JAPAN

M+F EMS REDUCES CENTRE
SEGREGATION IN HC GRADES

World's first industrial utilization of M+F EMS on KOBE STEEL bloom caster and YODOGAWA billet caster, Japan.

WORLDWIDE INNOVATIONS

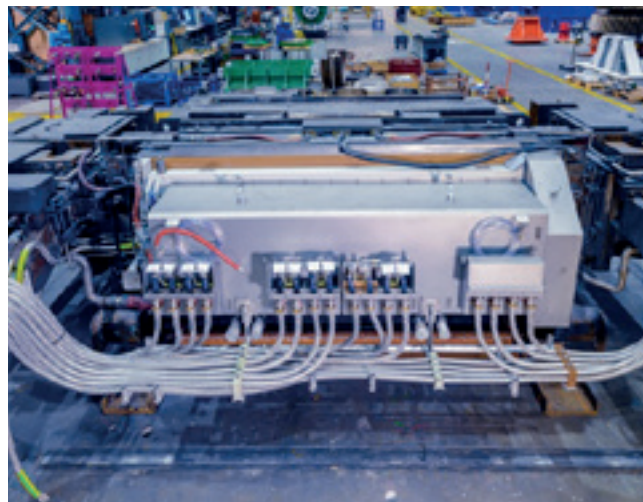


INDUCTION EDGE HEATER

JAPAN

World's first industrial utilization of C-type edge heater on the hot strip mills of SOLLAC, Fos sur Mer, France and NKK Keihin, Japan.

C-type edge heater inductors are the most efficient, but were not used initially because the pole gap was thought not to be adjustable to bar shape. Therefore, two separate U-type inductors were used for gap adjustment, despite being less efficient.



MULTI-MODE[®] EMSTIRring

SOUTH KOREA

M-EMS IMPROVES SURFACE/SUBSURFACE QUALITY

World's first industrial utilization of MM-EMS (combining braking and accelerating mode with rotating mode) on POSCO's Pohang and Gwangyang slab casters.



VERTICAL SEMI CC INDUCTION HEATER+EMS

SOUTH KOREA

World's first industrial utilization of IH+EMS on POSCO LICC big ingot caster, South Korea.



MULTI-MODE[®] EMBRAKING

CHINA

M+F EMS REDUCES CENTER SEGREGATION IN HC GRADES

World's first industrial utilization of MM-EMB on TSC of HBIS TISCO, China.

THERE'S NO EVOLUTION WITHOUT KNOWLEDGE

EXPERTISE IS ALL



Evolution



*We have more than 50 years' worth
of know-how and time-proof experience.*

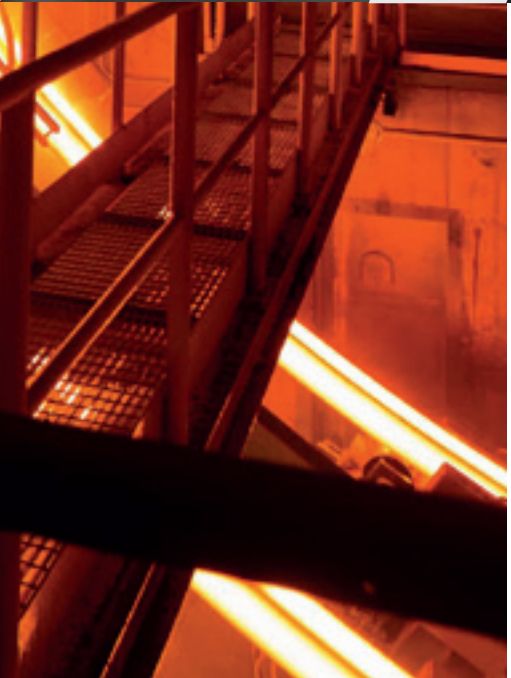
This is the only way we can design and create high-quality, long-lasting products.

Our philosophy is custom-made. We invest in the best possible result, relying on a production process that meets the unique needs of every client. At Rotelec, we offer complete, personalized service up to the commissioning phase. We also take care of customer training: much more than the transfer of information, this is a strategic investment to build a network of long-term relations.

OUR KNOW-HOW IS BUILT ON PEOPLE WORKING FOR PEOPLE.

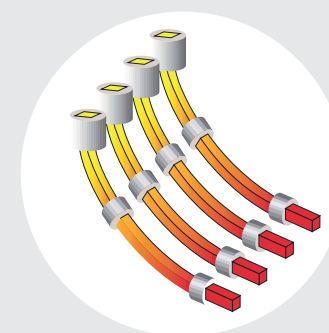


ROTELEC



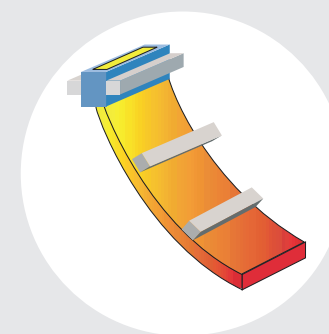
THE EXPONENTIAL TECHNOLOGY

3 PRODUCT LINES
MULTIPLE TECHNOLOGICAL SOLUTIONS



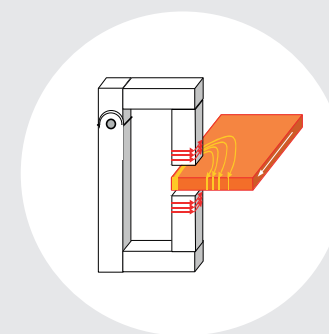
Electromagnetic rotative stirring for billet and bloom casting

Electromagnetic Stirring (EMS) technology is a game-changer in billet and bloom continuous casting, as often proved over the decades. Our rotating stirrers generate powerful electromagnetic forces within the liquid steel, creating dynamic rotation and recirculation. This innovative process significantly enhances heat transfer for uniform solidification and homogenizes the liquid steel temperature, significantly improving continuous casting quality and productivity.



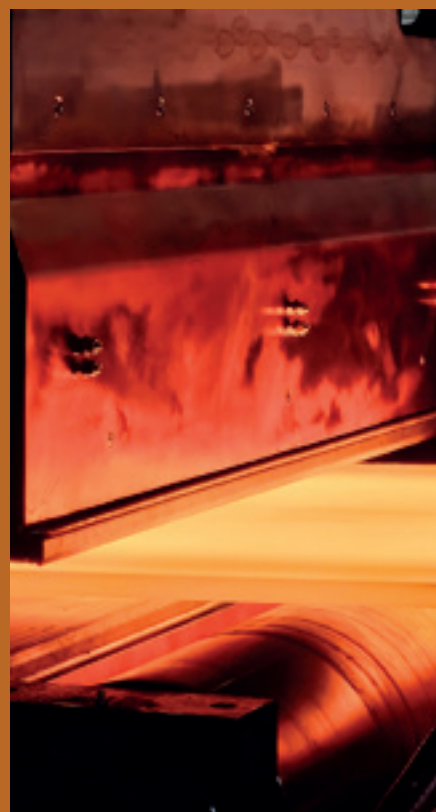
Electromagnetic stirring and braking for slab casting machine

Designed for slab casters, linear electromagnetic stirring technology and DC brake magnet technology offer powerful solutions. These innovative devices precisely control molten steel flow, delivering significant benefits. Whether optimizing internal solidification with “butterfly” patterns in the strand or finely tuning meniscus flow in the mould, linear electromagnetic stirring technology provides the exact force needed. It can slow or accelerate the steel stream from the nozzle and even rotate the liquid up to the meniscus. This means unparalleled control, leading to superior slab quality and casting efficiency.



Induction heating for hot strip mills

By applying electromagnetic principles, induction technology generates targeted eddy currents within steel bars. This ensures unparalleled thermal uniformity across the strip and meticulously compensates for heat losses at bar edges. The result? A superior product, with improved thickness, reduced defects, and less coil trimming, alongside significantly enhanced rolling efficiency. What's more, with zero combustion emissions, induction processes are more sustainable as they maximize the yield and provide a rapid return on investment.



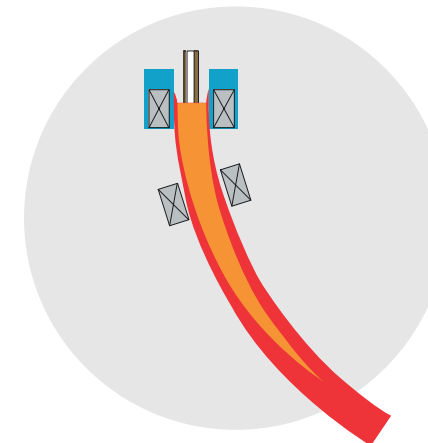
Stirrers for billet and bloom continuous casters, electromagnetic stirrers for slab continuous casters, induction heaters for hot strip mills. These are our three basic lines.

But we never stop at the basics – we've elevated high-tech to create brand new technological solutions. Versatile, customized, unique. Designed, edited and developed ad hoc for every application. Made to measure, for the steel industry.

ROTELEC

Electromagnetic rotative stirring for billet and bloom casting

THE UNCOMPARABLE ADVANTAGE OF EMS INTEGRATION



S-EMS

Strand electromagnetic stirring or combination with mold stirring technology.

POSITIONING

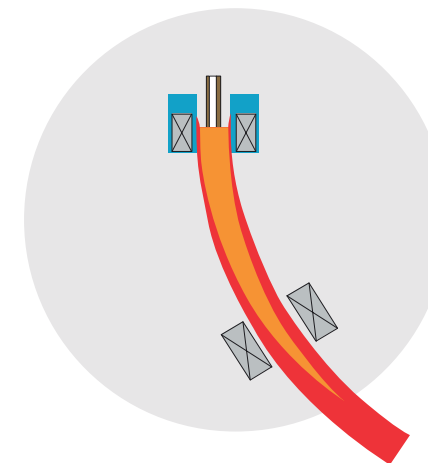
Sub-mold position or much lower in the strand but above the mushy zone.

FEATURES

Rotating stirrer (three-phase), low frequency and low power.

METALLURGICAL BENEFITS

- Further superheat reduction by mixing high-temperature liquid zones (upper zone) and low-temperature liquid zones (lower zone).
- Increase of the nucleation rate thanks to the dual effect of columnar dendrites remelting and superheat reduction.
- Redistribution of the solutes expelled from the solidification front.
- Reduction of shell thickness differences with a delaying effect on the formation of solidification bridges near the point of closure of the liquid cone (less segregation and porosity).



F-EMS Solution

Final Electromagnetic stirring technologies are always used in combination with Mold EMS.

POSITIONING

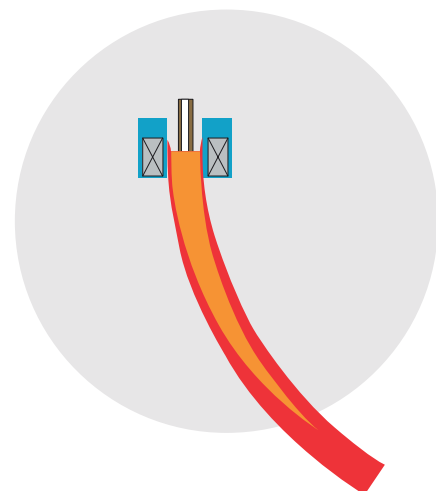
Positioned in the mushy zone at the end of solidification.

FEATURES

Rotating stirrer (three-phase), low frequency and high power.

METALLURGICAL BENEFITS

- Redistribution of the solutes expelled from the solidification front and dilution by the less segregated liquid steel from the upper zones. Result is a more homogeneous content of carbon and alloy elements in the product cross section.
- Reduction of mushy zone temperature gradients. Result is a breakage or a significant delay in the formation of solidification bridges resulting in less trapping of segregated liquid.
- Feeding of new liquid to compensate for the volumetric shrinkage due to solidification – less porosity.



M-EMS

Mold electromagnetic stirring technology.

POSITIONING

At mold position.

FEATURES

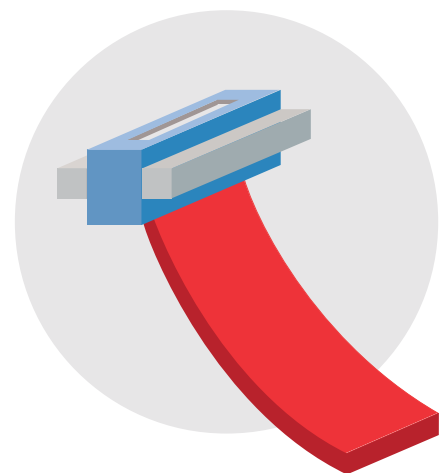
Rotating stirrer (three-phase), low frequency and high power, coils internal or external to the mold.

METALLURGICAL BENEFITS

- Active cleaning of the meniscus and solidification front washing, for reduction of surface inclusions, blowholes and pores.
- Further superheat reduction and increased formation of solidified equiaxed crystals.
- Reduction of solidified shell breakouts and increased casting speed (productivity).

Electromagnetic stirring and braking for slab casting machine

SHOOTING FOR THE STARS WITH EMS TECHNOLOGY



MULTI-MODE® EMS MULTI-MODE® EMB MULTI-MODE® EMB+S

Mold electromagnetic stirring and braking technology for conventional and thin slabs.

POSITIONING

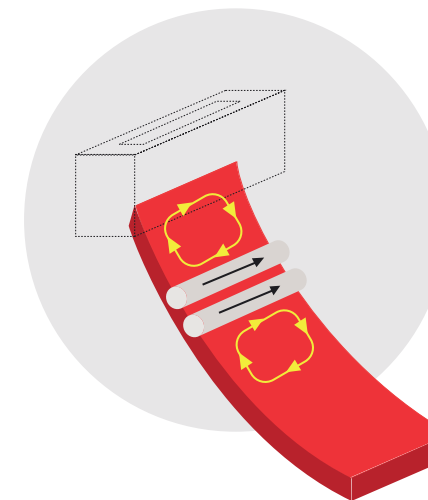
Electromagnetic stirrers or brakes are mounted behind the backup plates of each mold and depending on the system either directly fixed to the mold or on a retractable manipulator.

FEATURES

Linear (traveling magnetic field) stirrers, 2-phase AC current, electrically controlled direction, intensity and frequency. The DC magnetic brake generates a DC magnetic field correctly positioned in space and adjusted in intensity. All systems utilize proprietary software for real-time flow pattern prediction and automatic parameter adjustment.

METALLURGICAL BENEFITS

- **Quantitative flow control:** actively corrects steel flow patterns (single-roll, unstable, weak/strong double-roll) to optimize slab quality and productivity.
- **Defect reduction:** eliminates defects from excessive flow (e.g., slivers, lubrication loss, breakout alarms) and corrects issues from weak/unstable flow (e.g., alumina inclusions, cold meniscus, longitudinal cracks).
- **Meniscus & shell uniformity:** controls flows at the meniscus to wash the solidification front, equalize temperature, and achieve uniform shell thickness, reducing inclusions.
- **Operational flexibility:** allows variation in casting speed without compromising slab quality.
- **Productivity gains:** reduces downgrade and scrap rates, minimizes scarfing/grinding, and lowers breakout alarms, leading to increased yield and a rapid return on investment (approx. one year).



S-EMS IN ROLL

(Integrated) Strand electromagnetic stirring technology.

POSITIONING

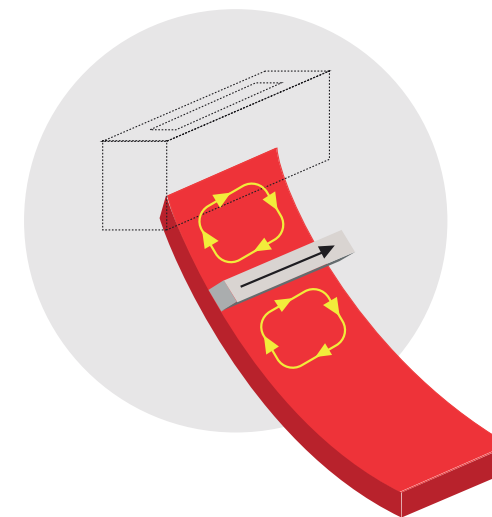
Integrated directly into existing roll segments within the strand, in either face-to-face or side-by-side configurations.

FEATURES

Produces a horizontal AC magnetic field using linear motor technology. Designed for minimal footprint and optimized power consumption (≈120 kVA per pair), cooled by water.

METALLURGICAL BENEFITS

- **Enhanced internal structure:** promotes equiaxed grain formation, significantly reducing center porosity and segregation.
- **Defect elimination:** stops ridging/roping in ferritic stainless and silicon steels, and reduces crack susceptibility in carbon grades.
- **Tailored flow control:** generates a “butterfly” stirring pattern (single-stage) or a “triple zero” stirring pattern (double-stage) to actively mix hot liquid steel with colder liquid steel.
- **Process flexibility:** offers single-stage for low superheat casting and double-stage for higher superheat for superior thermal homogenization.
- **Easy integration & roi:** minimal impact on caster mechanics, lower maintenance, and rapid payback (under one year) through quality gains.



S-EMS BOX TYPE

(External) Strand electromagnetic stirring technology

POSITIONING

Linear inductor mounted in a “box” configuration behind the rollers of a slab caster segment.

FEATURES

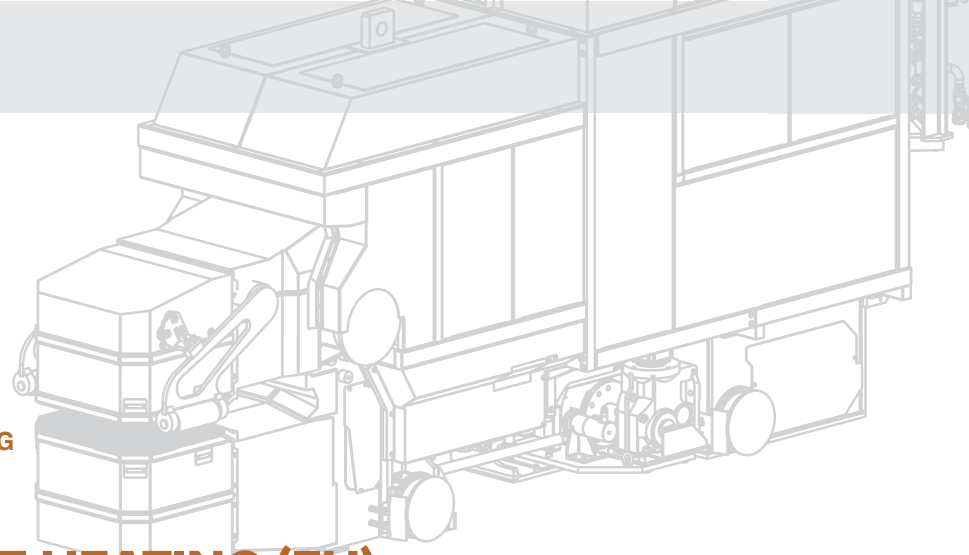
Generates a strong horizontal, through-thickness AC magnetic field. Requires segment modification and a manipulator for removal. High electrical power demand. Coils and a dedicated heat shield are cooled by demineralized water.

METALLURGICAL BENEFITS

- **Enhanced internal structure:** creates a powerful “butterfly” liquid flow, significantly increasing the equiaxed zone.
- **Temperature homogenization:** actively mixes hot and cold liquid steel regions for a more uniform internal structure during solidification.
- **Defect elimination:** stops ridging/roping in ferritic and silicon grades.
- **Low maintenance:** the heat shield is the only consumable part.
- **Rapid roi:** quality improvements lead to payback in under one year.

Induction heating for hot strip mills

BOOSTING EFFICIENCY BY THE PERFECT HEATING



EDGE HEATING (EH) Technology

Self-Adjusting Positioning for accurate thermal control at the edges.

PURPOSE

EH compensates for natural temperature drop at the edges of hot transfer bars before the finishing mill, which typically causes uneven mechanical properties.

TECHNOLOGY

EH induces eddy currents using a transverse AC magnetic flux, instantaneously and efficiently heating bar edges.

EQUIPMENT OVERVIEW

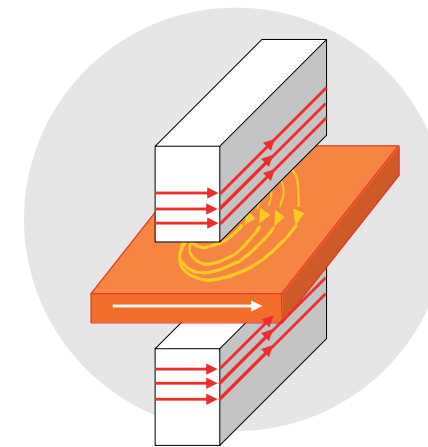
- Pioneer of C-type Edge Heaters with adjustable gaps, replacing older U-type designs.
- Each system features two independently controlled heating cars.
- Automatic and individual positioning of upper and lower inductor arms ensures minimal air gap for maximum heating power and reduced energy consumption. This allows heating with just one inductor per car (exclusive to Rotelec).

PROCESS & PERFORMANCES

- EH raises edge temperature above the AR3 transformation temperature to eliminate or shrink coarse grain bands.
- Localized Heating: Eddy currents concentrate at the edge with an exponentially decreasing thermal profile inward.
- Controlled Heating Profile: tunable heating gradient by adjusting inductor-to-bar alignment, matching the bar's cooling profile.
- Real-Time Control: coil current dynamically adapts to bar thickness, speed, and target temperature increase (ΔT).

KEY BENEFITS

- Consistent Strip Quality: Improved elongation and uniform properties across the full bar width.
- Edge Defect Mitigation: Prevents coarse grain bands and minimizes rolled-in scale.
- Operational Efficiency: Better thickness control at thin gauges, less wear on working rolls, and more flexible scheduling.
- Reduced Trimming: Material savings of up to 2%.
- Rapid ROI: Material savings and reduced energy usage lead to payback in under one year.



TRANSVERSE FLUX HEATING (TFH) Technology

Achieving Thermal Uniformity and Hot Rolling Efficiency.

PURPOSE

TFH compensates for the natural temperature drop in a hot transfer bar before it enters the finishing mill, which typically causes uneven mechanical properties across the strip.

TECHNOLOGY

An advanced induction heating system using two face-to-face inductors. It generates eddy currents via a transverse AC magnetic flux directly through the bar, ensuring instant and efficient heating.

EQUIPMENT OVERVIEW

- The equipment features two inductor cars, each with an inductor, moving on rails.
- A hydraulic handling mechanism provides horizontal movement from parked to operating positions and vertical movement to maintain a minimal 20 mm gap above any bar thickness.
- Powered by medium-frequency converters and controlled by PLC/PC units for precise, automated management.
- Integrated cooling circuits ensure optimal temperature levels.

PROCESS & PERFORMANCES

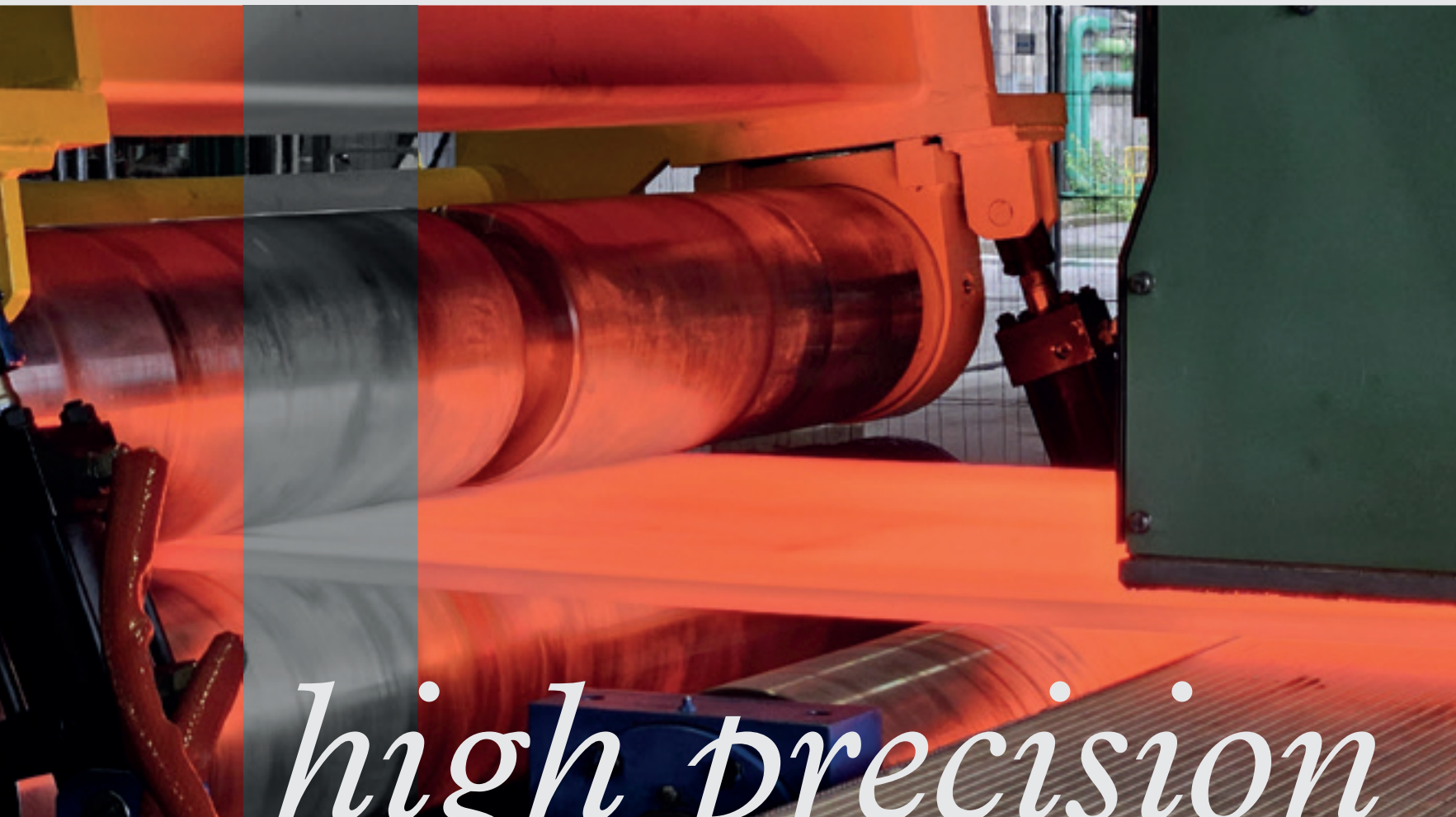
- Direct Internal Heating: Eddy currents concentrate heat precisely within the bar's cross-section.
- Instantaneous Response: Coil current dynamically adapts to bar thickness, speed, and heating targets (ΔT), providing immediate and precise temperature control.
- Uniformity Control: Independent regulation of each inductor's power ensures head-to-tail temperature equalization, crucial for consistent rolling behavior.

KEY BENEFITS

- Enhanced Product Quality: Eliminates flame-based heating defects (e.g., black spots), significantly reduces scale formation, and ensures improved elongation and uniform mechanical properties across the entire bar width and length.
- Operational Efficiency: Facilitates better thickness control at thin gauges, reduces wear on working rolls, and allows for more flexible scheduling.
- Environmental Friendliness: Operates with no combustion emissions, smoke, or waste heat.
- Rapid ROI: Boosts yield and quality, typically leading to a return on investment in less than one year.

HIGH-QUALITY ONLY

THE PERFECT FIT



high precision



*Customized, high precision,
complementary.*

Our electromagnetic technology is a perfect fit for the highest quality and productivity standards.

We design and manufacture a wide range of electromagnetic stirrers for continuous casting machines, for both commercial and special steels. Behind us stands extensive, time-proof experience in the design and construction of induction edge heaters for hot strip mills.

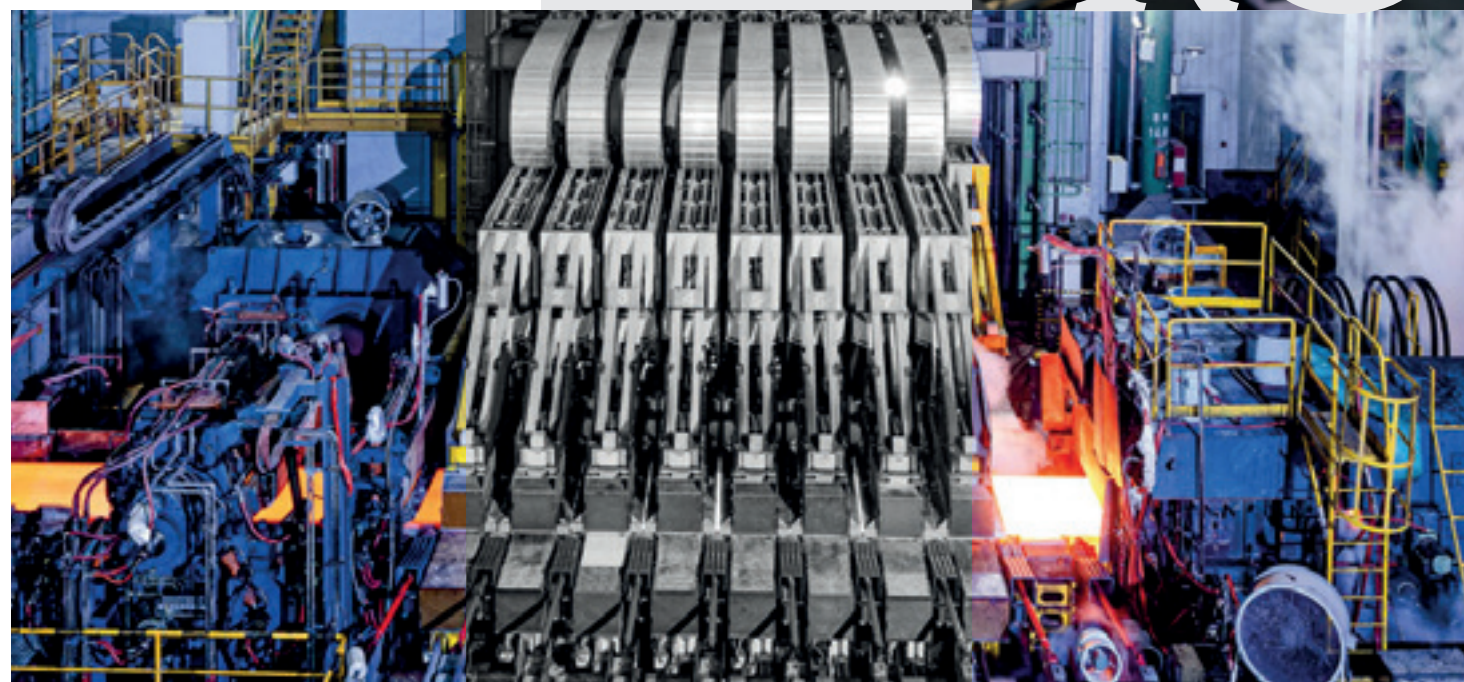
**IF YOU'RE SEEKING HIGH-QUALITY SOLUTIONS,
WE ARE THE PARTNER YOU NEED.**

TO REWRITE HISTORY, ONE NEEDS TO HAVE WRITTEN IT FIRST

ENGINEERING AND R&D



R&D



*Our engineering department
is Rotelec's heart and soul.*

Here, the client's specific steelmaking needs are analysed and developed into projects.

Mechanical and electrical engineers, metallurgical process engineers and induction specialists form the core of this department, which bridges customer needs and the delivery of the finished product.

Scientific expertise and experimental techniques drive the rhythm of our R&D – consistently able to meet market demands through seamless interaction with the customer. We carry out mathematical modelling of liquid steel, with or without electromagnetic forces; experiments on low-melting-point alloys; and studies on the flow of liquid steel inside the industrial moulds of casting machines.

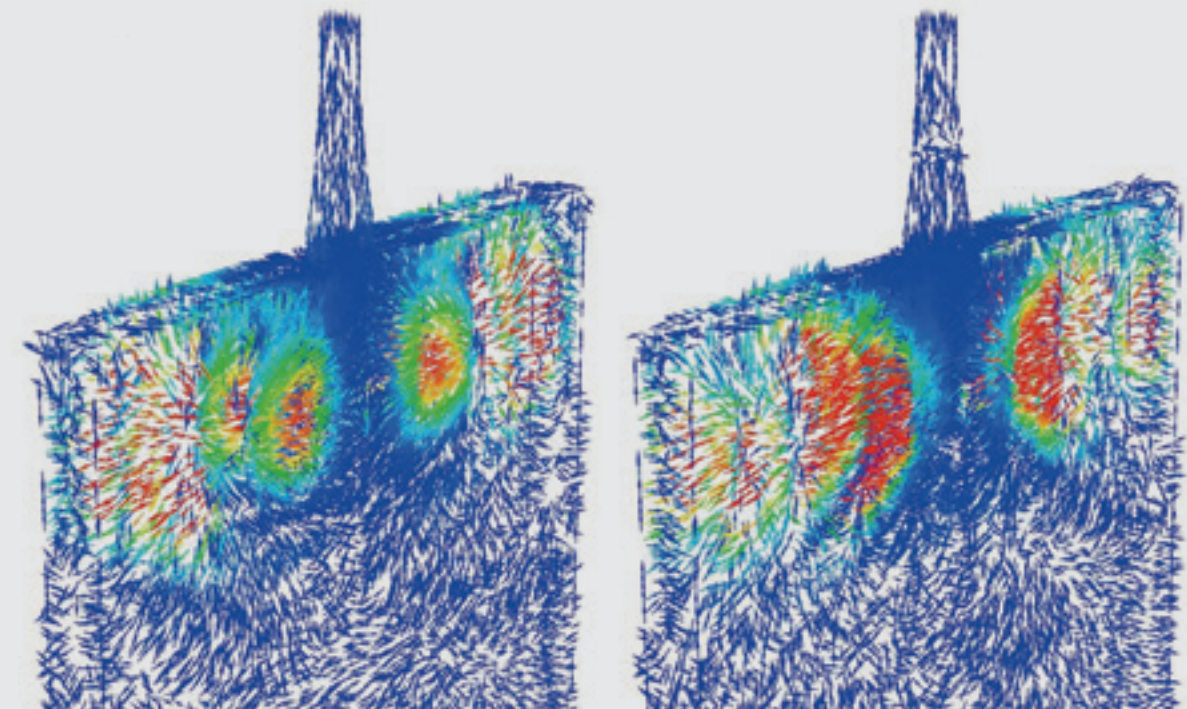
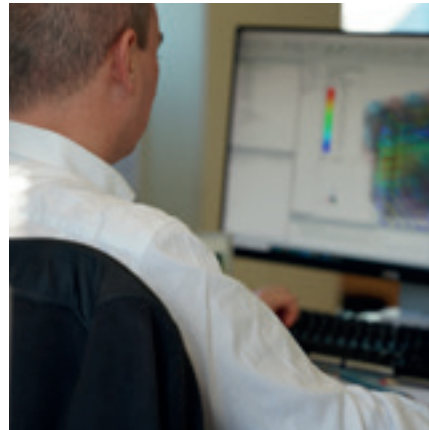
WHEN HISTORY REPEATS ITSELF, ROTELEC TURNS A NEW PAGE.

ROTELEC

THE POWER OF COMPUTATION

NO APPROXIMATION ALLOWED:
WE ARE THE AVANT-GARDE OF PRECISION

Precision



EMLA forces

EMLS forces



*Computational power is our pride,
our hallmark, our signature.*

No approximation allowed: we are the only company in the world that delivers precise measurements of steel flow velocity in the mould, for total confidence in every simulation.

In addition, our cutting-edge MHD innovation fuses electromagnetism with fluid dynamics, giving us precise insight into the effects of stirring on liquid steel in the mould and down the production line.

We also leverage this expertise across all our induction heating systems, maximizing inductor efficiency for each customer's specific application.

ROTELEC IS THE AVANT-GARDE OF PRECISION.



MADE IN FRANCE

100% IN HOUSE



ROTELEC

Quality and expertise in-house ensure excellence and complete control. At our state-of-the-art facilities in Saint Quentin-Fallavier, our team of experts oversees every step of the production process – from concept to creation, from assembly to final testing.

It's all made in France: by handling every phase right here, we ensure the utmost quality and service that goes above and beyond. We design, build and inspect, first-hand.

At Rotelec, people make all the difference.

GREEN BY NATURE

PEOPLE FIRST



We are Green by nature

We build 100% electric systems for a sustainable, productive future.

Our heating and stirring solutions reduce CO₂ emissions, improve steel quality and optimize energy consumption. The result? Longer lifespans, greater strength, better efficiency – and, naturally, a smaller environmental footprint.

AT ROTELEC, TECHNOLOGY HAS PEOPLE IN MIND.





ROTELEC SA
85 Boucle de la Ramée
38070 Saint Quentin Fallavier
FRANCE
Ph. +33 (0)474959670
info@danieli-rotelec.fr
www.rotelec.fr



DANIELI

The reliable innovative
partner to be front runners
in the metals industry

