COMPANY PROFILE

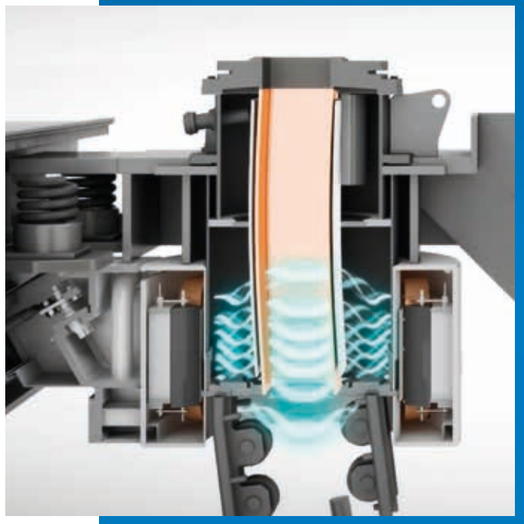
We are dynamic and innovative by vocation. We believe in research as the key to production efficiency. We develop products to the specific needs of each customer. Very few understand the continuous casting process as well as we do.

Ergolines.
Mastering details for shaping a world.

MASTERING DETAILS

FROM ELECTROMAGNETIC STIRRERS TO PROCESS CONTROL INSTRUMENTATION, ERGOLINES STRIVES TO GUARANTEE PERFECTION IN CONTINUOUS CASTING.

AN AMBITIOUS OBJECTIVE THAT IS ACHIEVED THROUGH RESEARCH, INNOVATION, AND THE CAPACITY TO DEVELOP SPECIFIC PRODUCTS FOR THE REQUIREMENTS OF EVERY CUSTOMER.



Everything starts here

OUR PRODUCT RANGE

EMS
Electromagnetic stirrer

EMS
Moving and opening

MFM
Portable EMS gauss-meter probes

MPF
Automatic mould powder feedersystem for billet, bloom and slab casters

PTC
Powder thickness measurement and control system for billet and bloom casters

OPD
Optical powder device

ILD
Electromagnetic mould level measurement and control system for billet and bloom casters

OPI
Mould oscillation monitoring system and oscillator checker

VSD
Vibrational slag carry-over detection systems

MTM / BPS
Mould thermal monitoring and breakout system

SUCCESS FIGURES

ERGOLINES IS ONE OF THE MAIN ACTORS ON THE INTERNATIONAL SCENARIO IN THE CONTINUOUS CASTING SECTOR.

SUPPLIES

40+
COUNTRIES
WORLDWIDE

APPLICATIONS

300+
STRANDS
FOR BILLETS

100+
STRANDS
FOR BLOOMS

200+
STRANDS
EQUIPPED WITH
ERGOLINES
SENSORS

“A leading player”

DISTINGUISHING FEATURES

+ 01

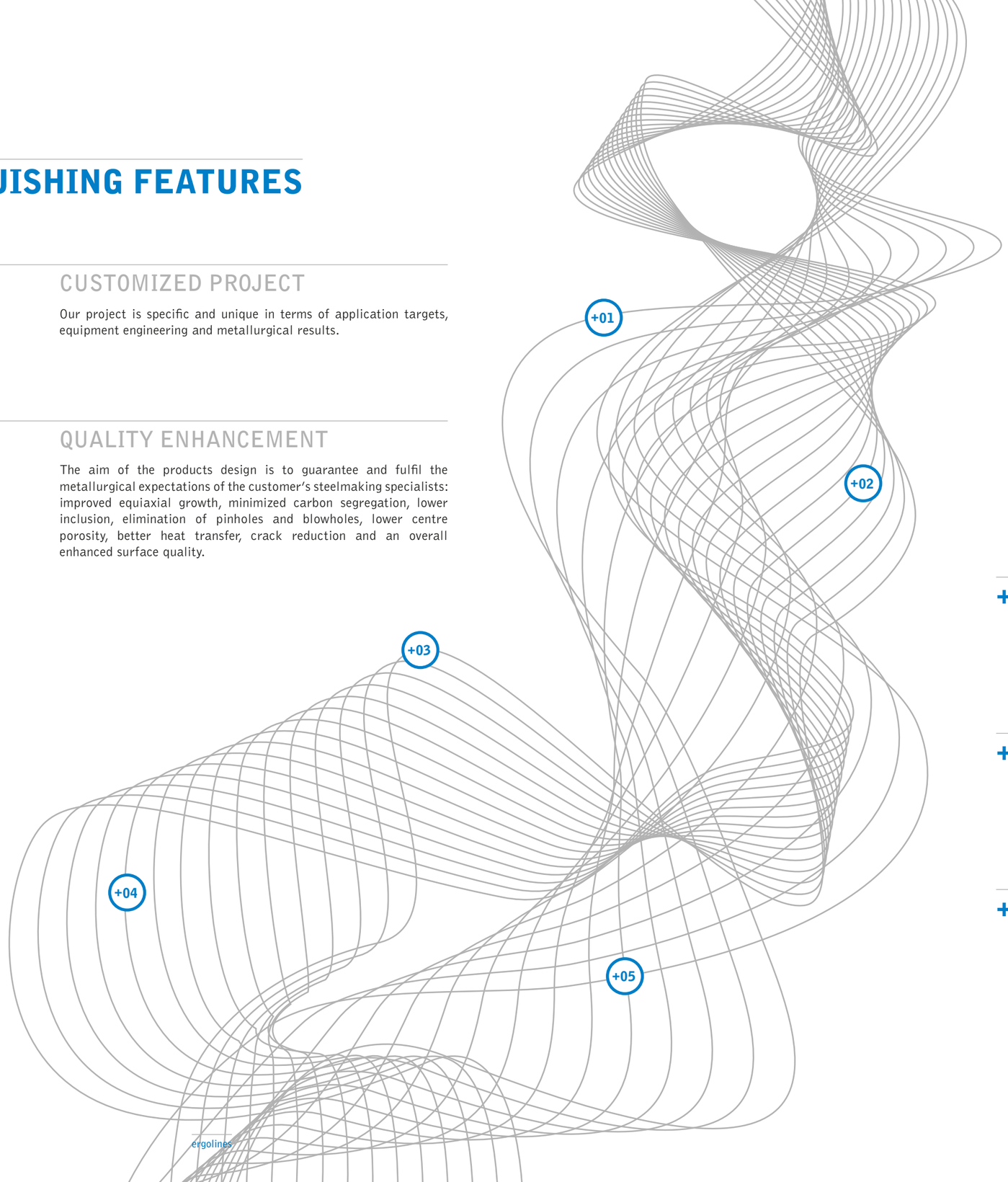
CUSTOMIZED PROJECT

Our project is specific and unique in terms of application targets, equipment engineering and metallurgical results.

+ 02

QUALITY ENHANCEMENT

The aim of the products design is to guarantee and fulfil the metallurgical expectations of the customer's steelmaking specialists: improved equiaxial growth, minimized carbon segregation, lower inclusion, elimination of pinholes and blowholes, lower centre porosity, better heat transfer, crack reduction and an overall enhanced surface quality.



+ 03

REDUCED ENERGY CONSUMPTION

High-efficiency solutions imply remarkably reduced energy consumption, thus ensuring customer's ROI.

+ 04

OPTIMISED SPACES

The design target is the minimisation of the impact on the available spaces through maximizing the electromagnetic stirring performances.

+ 05

ERGONOMICS

Thanks to carefully-designed products, Ergolines provides ergonomic and easy to use tools both for production and for maintenance.

We observe your products from a privileged perspective, enabling us to offer you only the best.

Ergolines.
Inside continuous casting.

OUR PRODUCTS

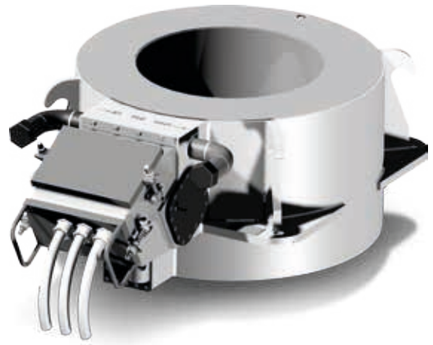
PRODUCTION EXCELLENCE STARTS FROM CONTROL OVER THE DETAILS. EVERY PRODUCT WE OFFER IS BORN OUT OF THIS.

We are able to provide you with top class equipment capable of controlling every aspect of the continuous casting process, derived from our own commitment to checking every detail during production: from design to the choice of raw materials, from the selection of suppliers to updating production technology, right to workforce training. The result is a range of reliable, durable, top-quality products acknowledged as international benchmarks.

"Control over details"

EMS
ELECTROMAGNETIC STIRRER

M-EMS (Mould Electromagnetic Stirrers)
S-EMS (Strand Electromagnetic Stirrers)
F-EMS (Final Electromagnetic Stirrers)



The electromagnetic stirrers are used in the continuous casting process to improve the product quality and to increase the steel production. According to the position along the casting strand and metallurgical effects, stirrers can be classified mould, strand and final stirrers. The benefits obtained using one or more EMS in combination include surface and sub-surface quality, internal and central soundness as segregation, porosity and central cracks.

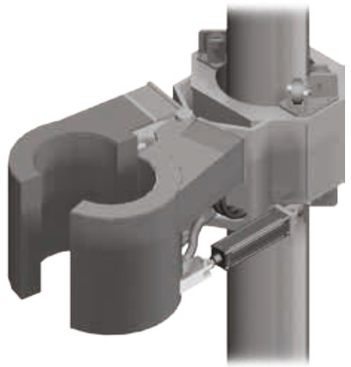
NEEDS

- Cast product metallurgical enhancement
- Production increase
- New steel grade production
- Production rejection reduction

ADVANTAGES

- Surface and sub-surface quality enhancement
- Solidification structure improvement
- Central soundness enhancement
- Stirrer custom design on new and existing CCM
- Energy saving design

EMS
MOVING AND OPENING



The diversification of production and the constant addition of new casting sections and steel grades have become a need within the dynamic steel market. The need to manage very different casting sizes and steel grades has led to a more complex design of casting machines, equipment for process control and devices aimed at the quality of the cast product. In order to meet the quality requirements of plants offering a wide range of formats and steel grades, Ergolines developed a particular stirrer series that can be moved along the casting line so as to be always positioned in the position granting the best metallurgical results. The stirrer is also composed of two halves which can be opened by a peculiar pneumatic system to ease the extraction of both the cast product and dummy bar.

NEEDS

- FEMS optimal position for a wide range of casting sizes
- FEMS optimal position for a wide range of casting speed
- FEMS optimal position for a wide production mix
- Easy cast product extraction during emergency
- Easy dummy bar extraction possibility (e.g. in vertical CCM)

ADVANTAGES

- Best achievable metallurgical results
- F-EMS always in optimal position even changing casting parameters or steel grades
- Easy management of emergency

MFM
PORTABLE EMS GAUSS-METER PROBE

Ergolines offers a new-generation portable gauss-meter instrument for measurement and complete analysis of the rotating magnetic field produced by EMS stirrers.

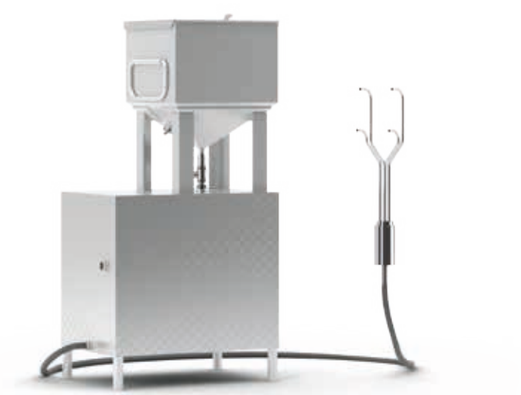
NEEDS

- Periodical EMS check
- EMS power supply system check
- Stirrer position check
- Comparison between stirrer of different strands
- Comparison between stirrer of different supplier

ADVANTAGES

- Magnetic induction, frequency and field geometry measurement
- Periodic maintenance
- Ergonomic and easy to use

MPF
AUTOMATIC MOULD POWDER FEEDERSYSTEM FOR BILLET, BLOOM AND SLAB CASTERS



Maintain the powder thickness constant in the mould is a very important task to avoid level fluctuation and to improve steel quality keeping constant the heat transfer, the lubricating powder film and also increasing the surface quality. Automatic Mould Powder Feeding system - MPF is a device designed for CCM with protected pouring in which it is necessary to automate the powder feeding on the liquid pool into the mould. The automatic Mould Powder Feeding system - MPF is designed to work for any casting section and casting format (billets, blooms and slab).

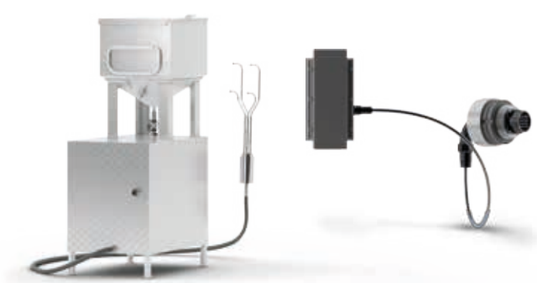
NEEDS

- Surface product quality enhancement
- Powder entrapment risk reduction
- The personnel on the casting floor reduction
- The powder feeding system automation
- Uniform powder distribution in the mould

ADVANTAGES

- Constant powder thickness in the mould
- Constant liquid level in the mould avoiding level fluctuations
- Uniform lubrication and heat transfer and enhanced surface quality
- No dependency from operator experience
- Reduce the risks for operators and to increase their safety
- Process repeatability
- Improve the productivity and the quality of the steel reducing the breakout risk

PTC
POWDER THICKNESS MEASUREMENT AND CONTROL SYSTEM FOR BILLET AND BLOOM CASTERS



Powder feeding is therefore a priority to ensure the stability of the powder level and the quality of steel. The primary task to implement this automatism is the measuring of powder thickness on the liquid bath in real time. In combination with one radioactive level sensor or optical system, acting as main level control device, the PTC system can guarantee the powder thickness control on billet and bloom casters.

NEEDS

- Surface product quality enhancement
- Powder entrapment risk reduction
- Powder feeding system automation

ADVANTAGES

- Keep powder level constant in the mould
- Inclusions reduction
- Uniform heat exchange in the mould
- Process repeatability
- It avoid the presence of an operator to control the powder level in the mould

OPD
OPTICAL POWDER DEVICE

Stable mold powder feeding is a crucial requirement in high quality submerged casting. Beyond being poorly reproducible, manual feeding is also potentially hazardous for the operator. To overcome both problems Ergolines developed OPD, a new optical system enabling real-time control over powder thickness and steel level. While a multi-spectral camera monitors powder consumption by dedicated image processing, a laser scanner serves as primary level control device. OPD can be used as a feedback tool to drive Ergolines' powder feeding machine, enabling reliable and fully automated powder addition and control.

NEEDS

- Increase operational safety
- Reproducible mold powder feeding
- Even powder feeding over steel surface
- Stable steel meniscus

ADVANTAGES

- Fully automated powder feeding: no need for manual intervention
- Fully repeatable, closed-loop powder feeding
- Homogeneous powder coverage of the liquid bath
- Improved meniscus stability
- Reliable steel level control

ILD
ELECTROMAGNETIC MOULD LEVEL MEASUREMENT AND CONTROL SYSTEM FOR BILLET AND BLOOM CASTERS

The use of electromagnetic sensors for mould level measurement in continuous casting of steel is a worldwide common practice. The ILD sensor is an inductive transducer typically used for mould level control in billet and blooms casters.

NEEDS

- Stable and reliable mould level control

ADVANTAGES

- No radioactive sources needed (no trouble about installation, storage and disposal)
- Accuracy and reliability constant over the time
- Periodically replacement not needed

OPI
MOULD OSCILLATION MONITORING SYSTEM AND OSCILLATOR CHECKER

In every continuous casting process, the mould assembly is constantly kept in oscillation by means of an oscillation table; this helps the steel flow thus avoiding sticking to the internal copper walls. Accurate 3D measurement of the spatial trajectory of the mould is of great help to early predict situations in which the oscillation table system needs maintenance. It also helps to trouble-shoot anomalous behaviours of the CCM and to analyse them.

NEEDS

- Oscillator behaviour check
- Oscillator maintenance
- Sticking probability reduction
- Set parameters check
- Comply with the oscillator specifics check

ADVANTAGES

- Complete oscillator behaviour description
- Negative strip time evaluation
- Preventive maintenance
- Continuous oscillator monitoring with the sensor permanent installation

VSD
VIBRATIONAL SLAG CARRY-OVER DETECTION SYSTEMS

Unpredictable slag carry-over from ladle to tundish represents a serious problem, which can lead to either steel impurity or poor ladle yield. Ergolines VSD gives the right balance. The system early detects slag carry-over from ladle to tundish, thus allowing the operator, or an automatic control system, to shut-off the ladle, preserving steel purity in the tundish.

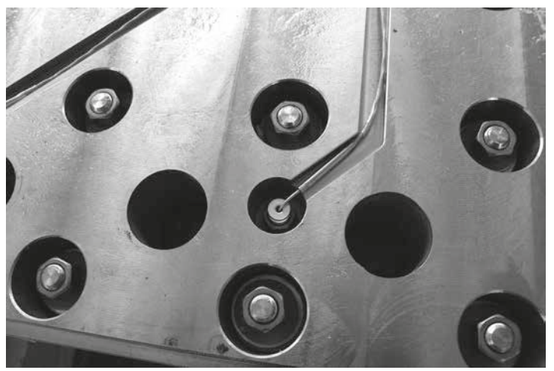
NEEDS

- Increase ladle yield and reduce steel waste
- Reduce slag entrapment in the cast product

ADVANTAGES

- Steel quality improvement
- Optimized slag/steel ratio at the end of the casting sequence
- Optimized ladle yield
- Reduced wear of refractory and slide gate refractory plate

MTM / BPS
MOULD THERMAL MONITORING AND BREAKOUT SYSTEM



The mould is the most important section of a caster, where liquid steel forms a solid shell. An incorrect growth of the shell can cause a sticker, which leads to a breakout of the strand. This results in downtime of the caster and extensive repair work. The MTM/BPS system performs real-time monitoring and analysis of the temperature maps of mould walls by means of a matrix of high-precision k-type thermocouples.

NEEDS

- Reduce sticking number and breakout risk
- Optimize casting process

ADVANTAGES

- Three rows of thermocouples
- Adaptive sticking recognition algorithm
- Real time mould thermal monitoring
- Post-processing analysis

ENGINEERING AND METHODS

WORK PROCESS AND KNOW HOW

Every single stirrer design derives from the quality and production exigencies of steel producers. On the back of each project, there is a very deep and detailed metallurgical and defectiveness analysis regarding the final product employment. Such analysis leads to the selection of the best stirring technology.

To determine the best stirring system it is necessary to study the liquid steel motions imposed by the stirrer. Ergolines has developed a powerful designing tool that allows foreseeing and therefore optimizing the stirring process within various situations. The tool, internally developed by Ergolines researchers, divides the designing in two phases, an electromagnetic and a fluid dynamic calculation coupled by an algorithm allowing it's use within the dynamic design ambient.

Electromagnetic task

In the electromagnetic calculations EMS geometrical dimensions, mould and cast product shielding effect are considered. It provides:

- EMS Current Range
- EMS Frequency Range
- Best wave shape for the application
- Equivalent EMS electrical circuit
- Power supply design parameters
- Electromagnetic forces

Fluid dynamic task

In the fluid dynamic calculation, the shroud geometry and the casting speed influence are analyzed. It allows to:

- To analyze flow pattern inside the mould
- To determine the best EMS working current
- To determine the best EMS working frequency
- To analyze the meniscus velocities in order to avoid powder entrapments
- To analyze flow pattern induced by S-EMS/ F-EMS to avoid white bands
- To determine the best stirrer position (both in mould and in final position)

From the above, it may be easily understood that all Ergolines EMS designs are turn-key solutions where metallurgical results are at their best, efficiency is very high, reducing energy consumption (kW / ton of produced steel), and therefore the customer returns on investment.

In addition, Ergolines guarantees experimental validation of the design methods by intensive sessions of factory testing, which include accurate and detailed measurements of the electromagnetic induction on each manufactured stirrer.

ANALYSIS

01

The main target is to minimize the impact on the available spaces, through maximizing the electromagnetic stirring performance so as to guarantee and fulfil the metallurgical expectations of the customer's steelmaking specialists: improved equiaxial growth, minimized carbon segregation, lower inclusion, elimination of pinholes and blowholes, lower centre porosity, better heat transfer, crack reduction and an overall enhanced surface quality.

DESIGN

02

The mechanical design is supported by the most modern CAD/CAE technologies for the development of the stirrer bodies and the verification of the installations and the interfaces with the continuous casting machine.

Using tri dimensional models allows Ergolines a quick and secure information exchange with the customer and grants a complete vision of the stirrer installation.

Such instruments allow an accurate structural calculation for the verification of the stresses acting on the stirrer due to the pressures of the cooling circuits and thermo-dilatations due to the radiation of the cast product.

MANUFACTURING

03

The activity of Ergolines is not limited to engineering: all material procurement and production steps are directly and carefully followed in the Ergolines production facility. All aspects of production must be accurately managed: screening and choice of materials, selection and qualification of suppliers, constant updating of manufacturing technologies and processes, including chemical and thermal treatments, as well as a particular care for the specialization and training of machine operators.

High, reliable and long-lasting insulation properties are given by a special insulation technique and by a special proprietary resin treatment based on VPI (Vacuum Pressure-Impregnation) technology, which ensures a long coils lifetime.

All manufactured products are visually and instrumentally checked and tested during all manufacturing phases.

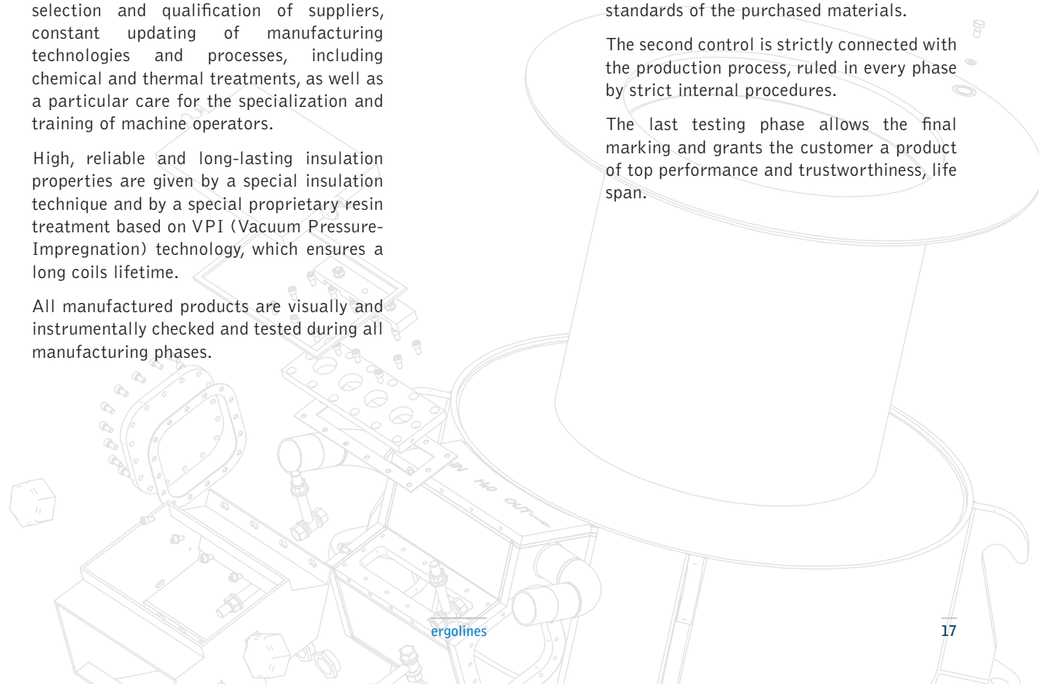
QUALITY

04

The first quality control applied to Ergolines products, is a very attentive selection of the suppliers and the purchase of certified products. Such activity, together with a further control with dedicated instruments, are granting the top trustworthiness standards of the purchased materials.

The second control is strictly connected with the production process, ruled in every phase by strict internal procedures.

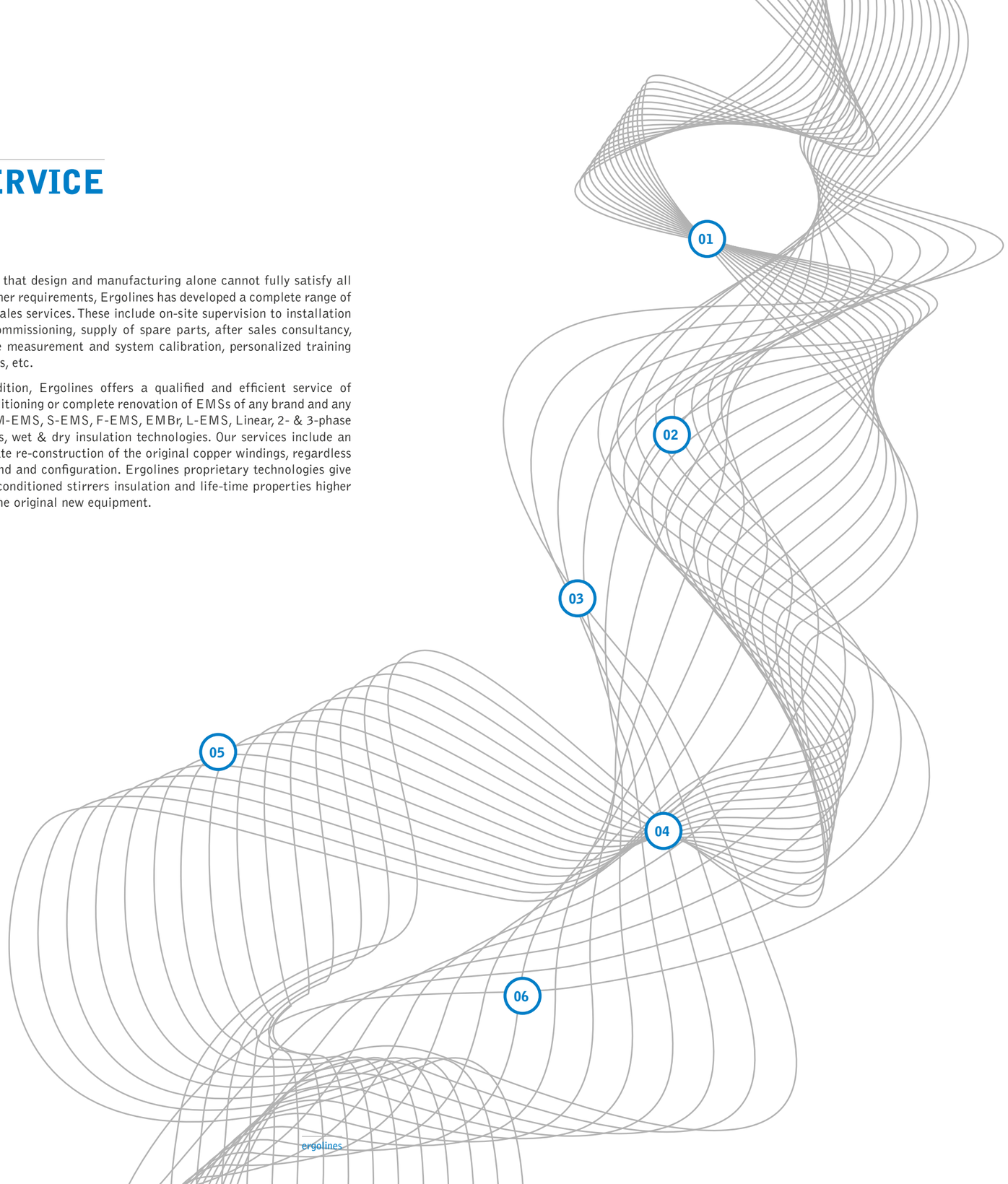
The last testing phase allows the final marking and grants the customer a product of top performance and trustworthiness, life span.



SERVICE

Aware that design and manufacturing alone cannot fully satisfy all customer requirements, Ergolines has developed a complete range of after-sales services. These include on-site supervision to installation and commissioning, supply of spare parts, after sales consultancy, on site measurement and system calibration, personalized training courses, etc.

In addition, Ergolines offers a qualified and efficient service of reconditioning or complete renovation of EMSs of any brand and any type: M-EMS, S-EMS, F-EMS, EMBr, L-EMS, Linear, 2- & 3-phase designs, wet & dry insulation technologies. Our services include an accurate re-construction of the original copper windings, regardless of brand and configuration. Ergolines proprietary technologies give the reconditioned stirrers insulation and life-time properties higher than the original new equipment.



01

STIRRERS REPAIRS

- Proprietary VPI re-impregnation treatment
- Reconstruction of windings
- Complete EMS revamping
- Final electric and hydraulic testing

02

START-UP AND COMMISSIONING

- Full equipment and installation check
- Equipment start-up
- Working parameters fine-tuning
- Resident operator training

03

AFTER SALE

- Supply of all spare parts
- Remote assistance
- On-site assistance
- Optimisation of Ergolines systems according to new customer's needs

04

ON-SITE MEASUREMENTS

- Magnetic field evaluation for EMS of any brand and type
- Complete oscillation monitoring and analysis service

05

RESEARCH AND DEVELOPMENT

- Customised studies and developments
- Magneto-fluid dynamic
- Performance Optimisation
- Ergonomics and energy-saving analysis

06

NUMERICAL SIMULATION

- 3D electromagnetic analysis
- 3D fluid-dynamic analysis
- 3D magneto-hydrodynamic analysis
- 3D multiphysics analysis
- Solidification analysis

REFERENCES

ERGOLINES HAS ESTABLISHED A NUMBER OF IMPORTANT RELATIONS WITH LEADING COMPANIES IN THE FIELD.

“Relations with leading companies”

MOST RELEVANT ONES

Acciaierie Valbruna

Acciaierie Venete spa

Arcelor Mittal

BGH Edelstahl

Celsa Group

Cogne Acciai speciali spa

Dalmine Tenaris Group

Deutsche Edelstahlwerke

Feralpi Group

Ferriere Nord Gruppo Pittini

Georgsmarienhütte

Gerdau Sa

Hyunday Steel Company

Inteco TBR Casting Technologies Gmbh

Lucchini

Ovako AB

Primetals

Riva Group

Sarralle

Tata Steel

Ugitech

AND OTHERS ›››

LOCATION

Ergolines is located at Area Science Park, Trieste, Italy.

ASP is a centre of excellence, gathering many international leading engineering and manufacturing companies in the steelmaking equipment sector, most of which cooperate with Ergolines on a regular basis.

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