



SINCE 1949

CASTELLINI[®]
OFFICINE MECCANICHE

ROLLING MILL EQUIPMENT
SPARE PARTS & SERVICE
for metal industry



Castellini Officine Meccaniche S.p.A. is a family-owned company looking back on more than 60 years of history. Based in Northern Italy, Castellini is specialized in the supply of High Tech Rolling Mill Equipment and Spare Parts for the Metals Industry (Steel & Aluminum).

Thanks to a consistent corporate policy and to its outstanding quality, Castellini is nowadays recognized at an international level as being first class partner of the major contractors as well as worldwide Metals Producers.

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COMPANY

- State of the art workshop
- Competence
- Quality first



ENGINEERING

- Technology / Design
- Mechanical engineering
- Auxiliary systems design
- Project management
- Operational support



PORTFOLIO ACTIVITIES

- Rolling mill equipment
- Spare and wear parts
- On site Service & Assistance
- Revamping Project



INTRODUCTION

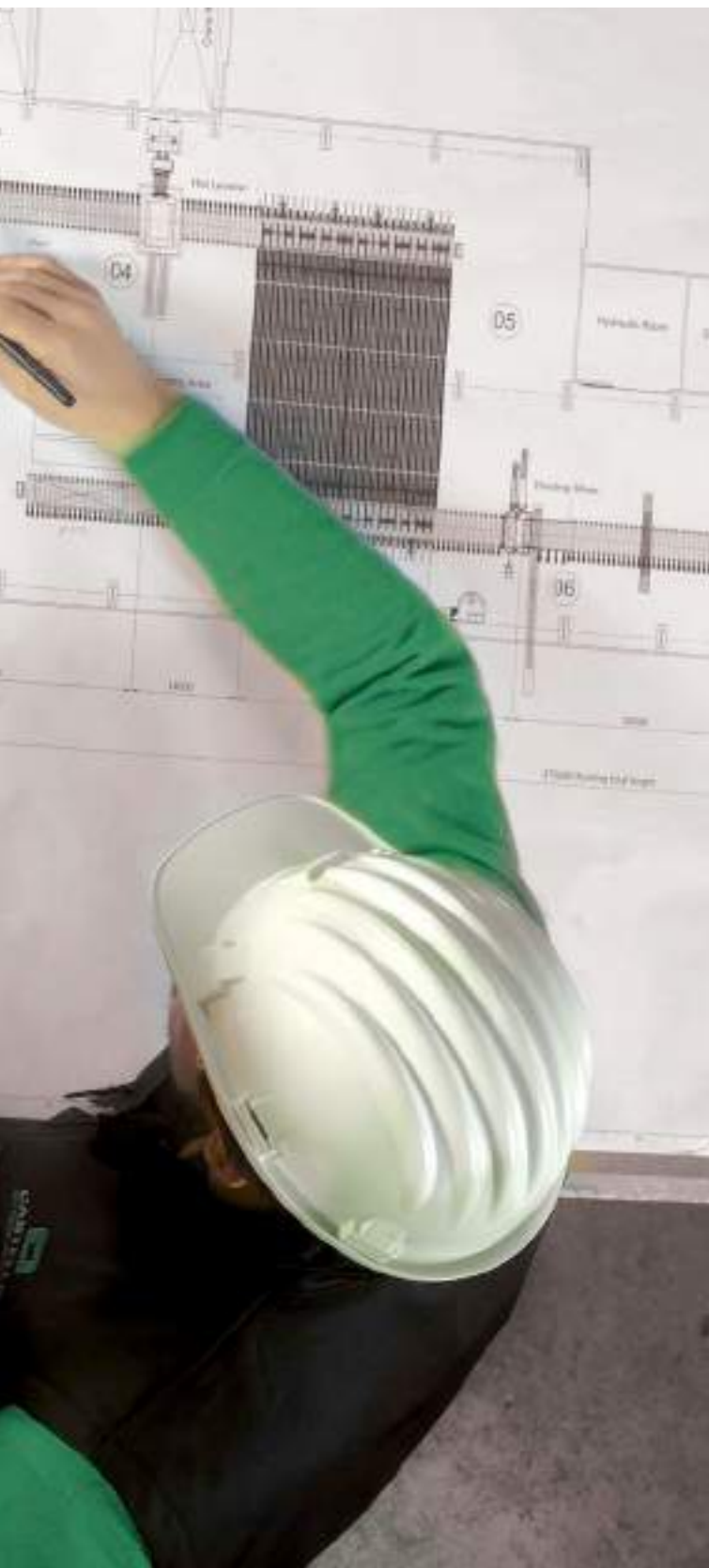
Our products are entirely manufactured, assembled and tested in our state of the art workshop in Cazzago S. Martino in Northern Italy area, and delivered worldwide. During planning, design, construction, assembly and putting into operation of our plants, our knowhow guarantees high equipment availability and operation safety.

Grown with the firm, a highly skilled team of professionals, many of them with more than 30 years of experience, grant a high quality of machining execution that means long operability for your plant.

Castellini is a DNV (Det Norske Veritas) certified company. All the equipment produced by Castellini in its workshop, once completed, is balanced in accordance to the UNI EN ISO Standard Norms.







ENGINEERING

Our world is done by the daily problem of the production people, for which every minute has a cost, the need having at first reliable equipment, the key importance of the manufacturing details that make the difference, the mandatory combination between technological requirements, mechanical design, automation controls and productivity demand.

Our work is enriched by finding lay out for a given product mix, to define most suitable machine for every specific plant or need among our portfolio, to help customer in solving a time loss issue by modifying existing machines.

Approach of Castellini is to apply its experience, knowledge and willing of improvements to solve customer problem and meeting its needs. Our aim is to supply you solutions that meet your technical requirements as well as your budget. We offer mechanical equipment complete with latest process automation controls, electrical part and auxiliary systems.



Technology and layout

Choice of the proper lay out and equipment as well as productivity calculation are the base for definition of an effective solution. At first it's experience from which comes the basis idea, then the testing by mathematical models: simulation programs for rolling schedule and for testing equipment performance are the tools by which the lay out solution is validated.



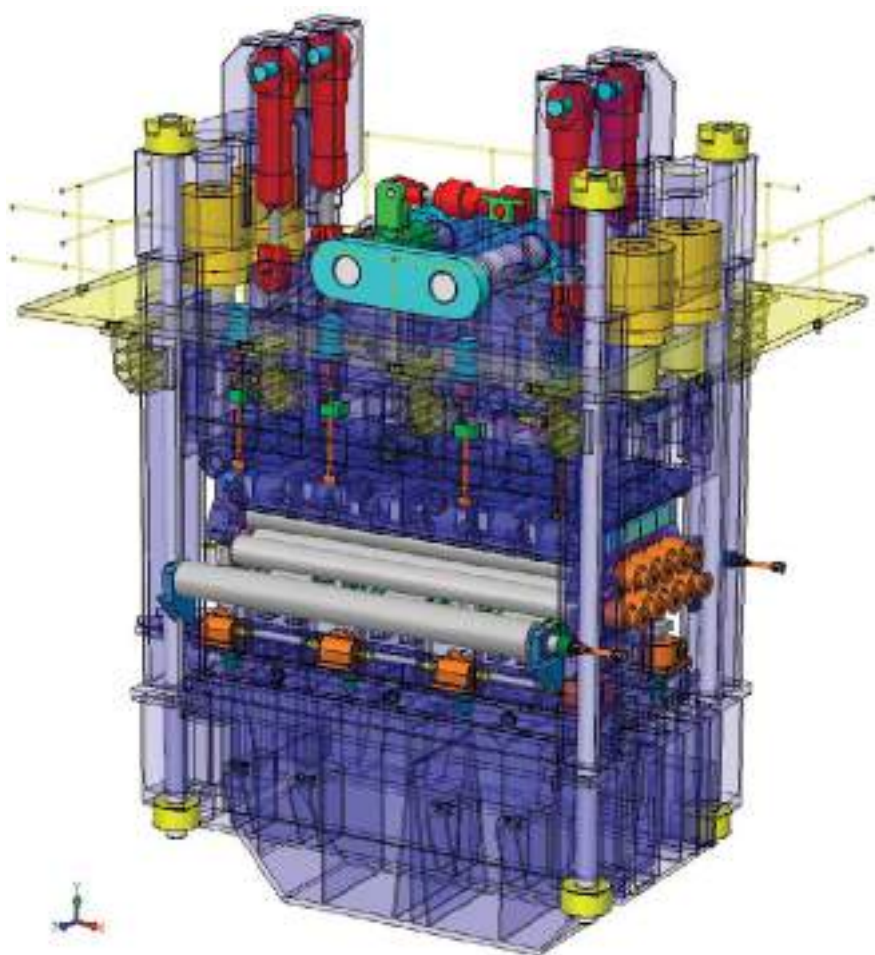
Design Auxiliaries

Hydraulic, lubrication and descaling systems are defined accordingly to the performances and cycles required by the process. Competence in steel production technologies and heavy working conditions are a core competence for a proper design of those equipments. Focus is on reliability and care of details, due to awareness of how much cost every risk of failure to our Customers. Fully reliability, easy maintenance and full coverage of required performances are the perspectives in mind of our designers.



Automation

Electrical part , Lev I and Lev 2 automation are last elements to offer a complete solution to our customers. Between mechanical and hydraulic equipments there must be a fully integration for reaching performances and needs of customers. The key factor is the consolidated partnership and strict collaboration with specialized electrical suppliers and automation company Castellini has settled during last years.

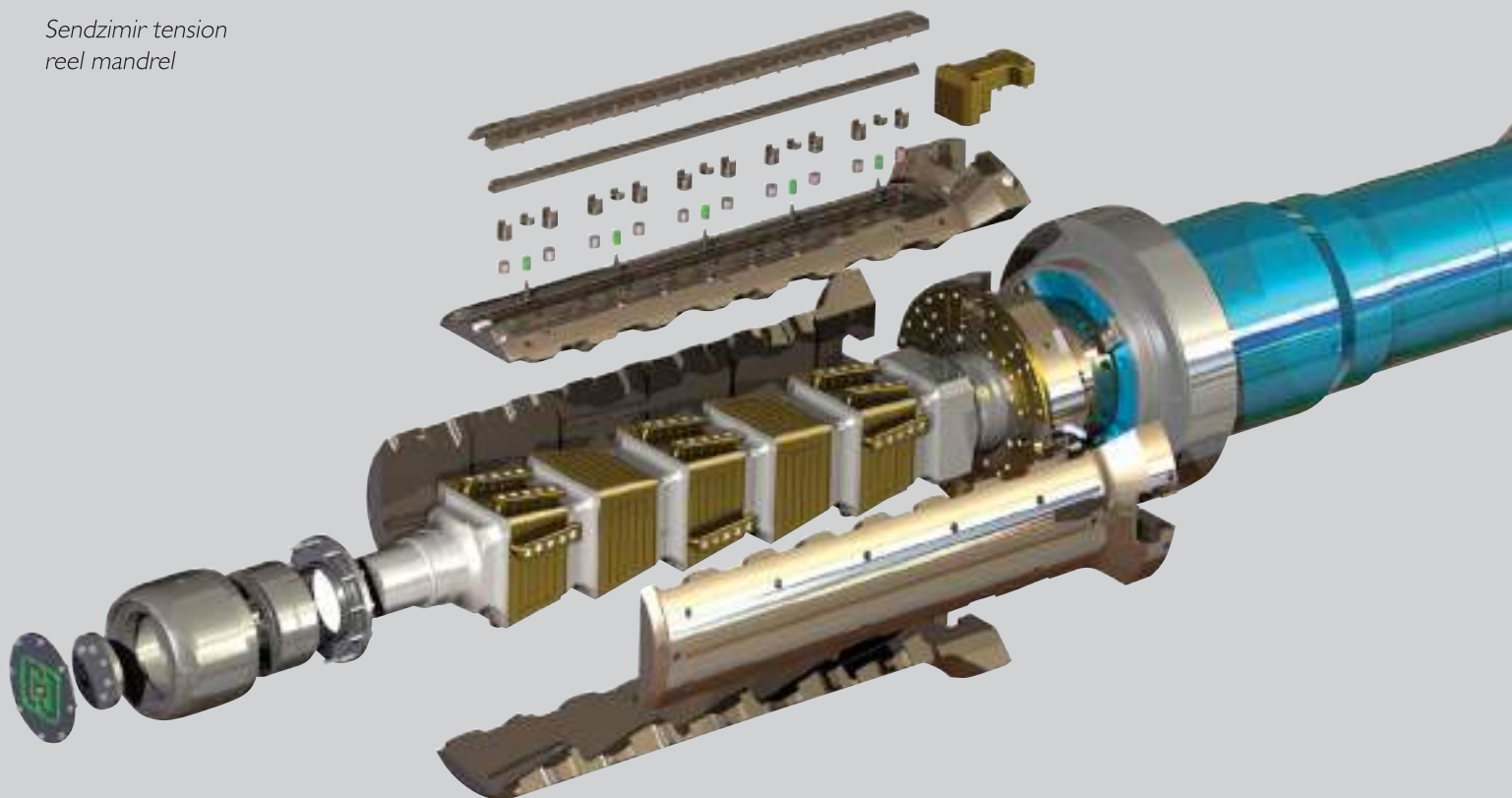


*Hot plate leveller
3D modelling*

Design Mechanical

Experience, knowledge and calculation capacity are skills Castellini developed on his mechanical design team. The purpose is to provide our customers effective, pragmatic and innovative solution for their plant and equipment. Solid modelling and finite element analysis are extensively used to optimize the equipment engineering. High quality components, correct dimensioning, selection of materials and treatments have been improved over the years and now are the guarantee that our machines are designed for the best performances.

*Sendzimir tension
reel mandrel*







Aluminum foil mill stands

MANUFACTURING

Castellini workshop is equipped with modern and high-precision machine tools, with an hoisting capacity up to 250 t. The facility is organized into separate areas for machining and for assembly and testing, each served by dedicated teams of specialized workers.

Assembly of machines includes mechanical parts, hydraulic equipment as well as board piping and wiring. The absence of interference in mechanical parts is checked by test movement. Customer is everytime welcome and always involved in the different steps of our production process.





▲ Spare mandrel segments finishing

▶ Selective roll coolant





► *HAGC piston machining
on vertical lathe*

The high quality of our equipment is granted by a group of strategic elements: in house manufacturing for most of the parts, assembly and testing of all the equipment in Castellini workshop as a must, strict control of the supply chain, long time partnership with specialized sub suppliers.



ROLLING MILL EQUIPMENT

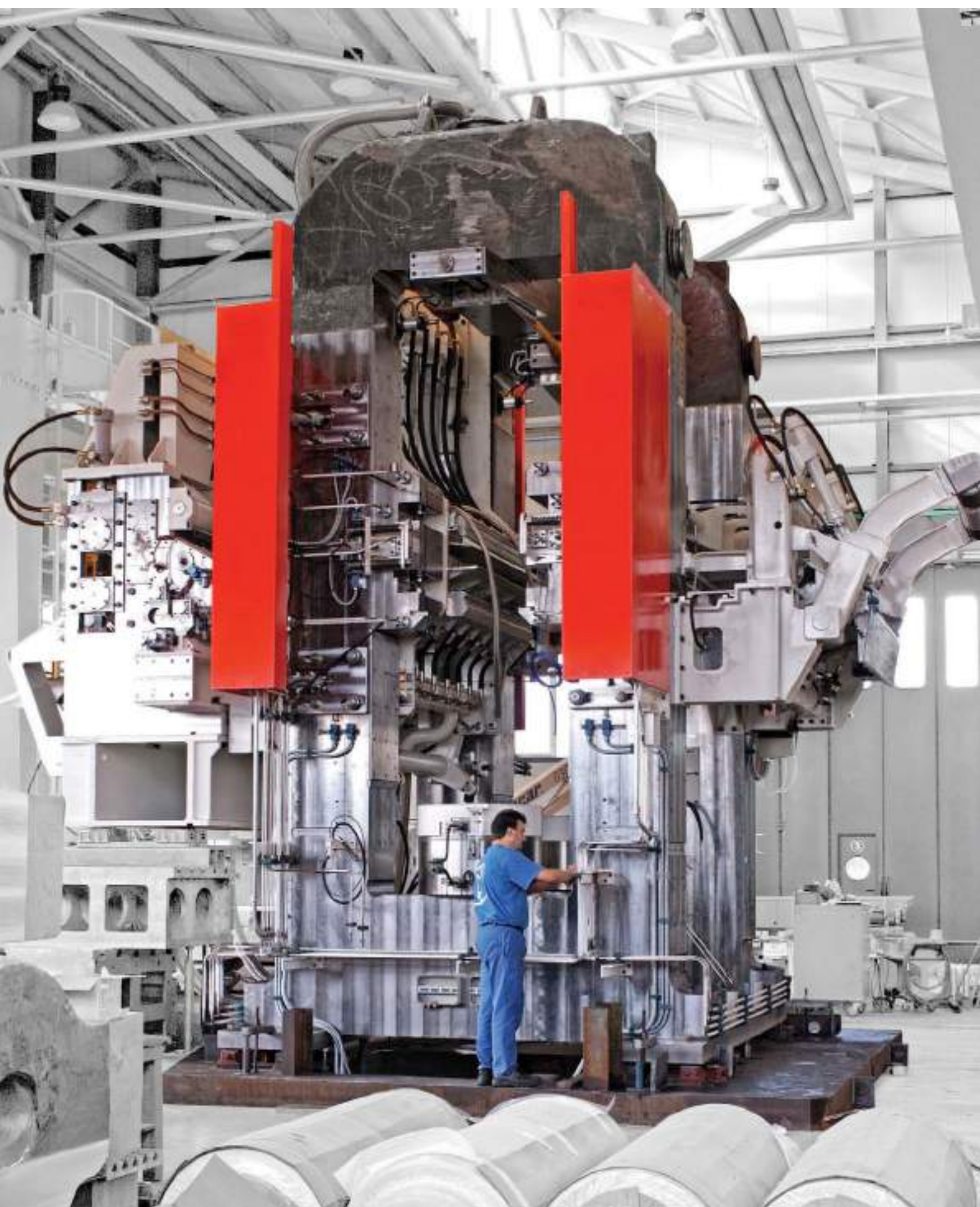
With a long dated experience in manufacturing Rollin Mill machinery of any design for the major Plant Makers, nowadays Castellini is a high-level mechanical and engineering company that is able to design independently and to supply complete turn-key solutions including Auxiliary Systems and Automation.

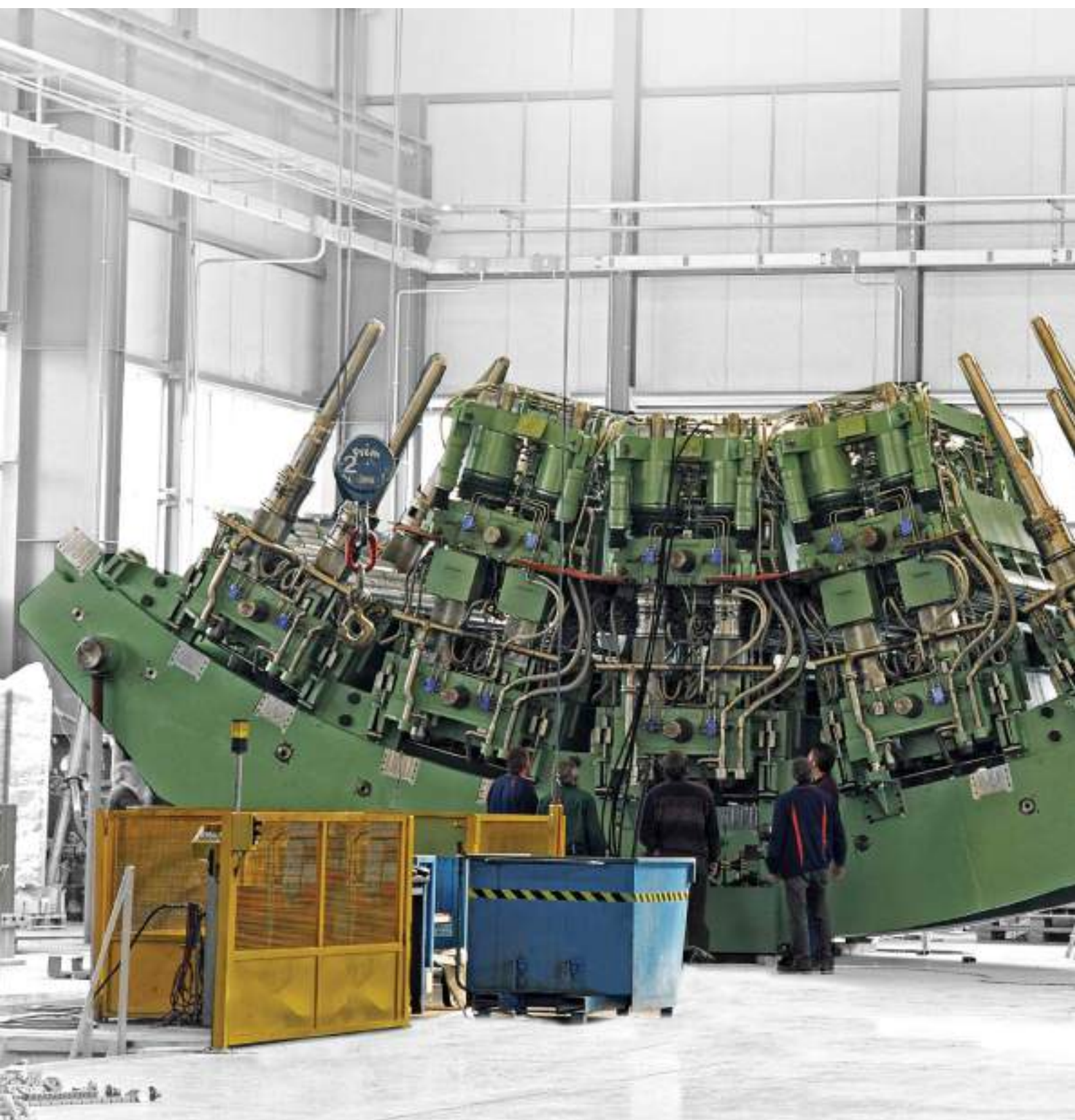
A cusotmer that is looking for a single noble equipment can find in Castellini a valuable partner for the development of high technology, taylor made "quality packages".

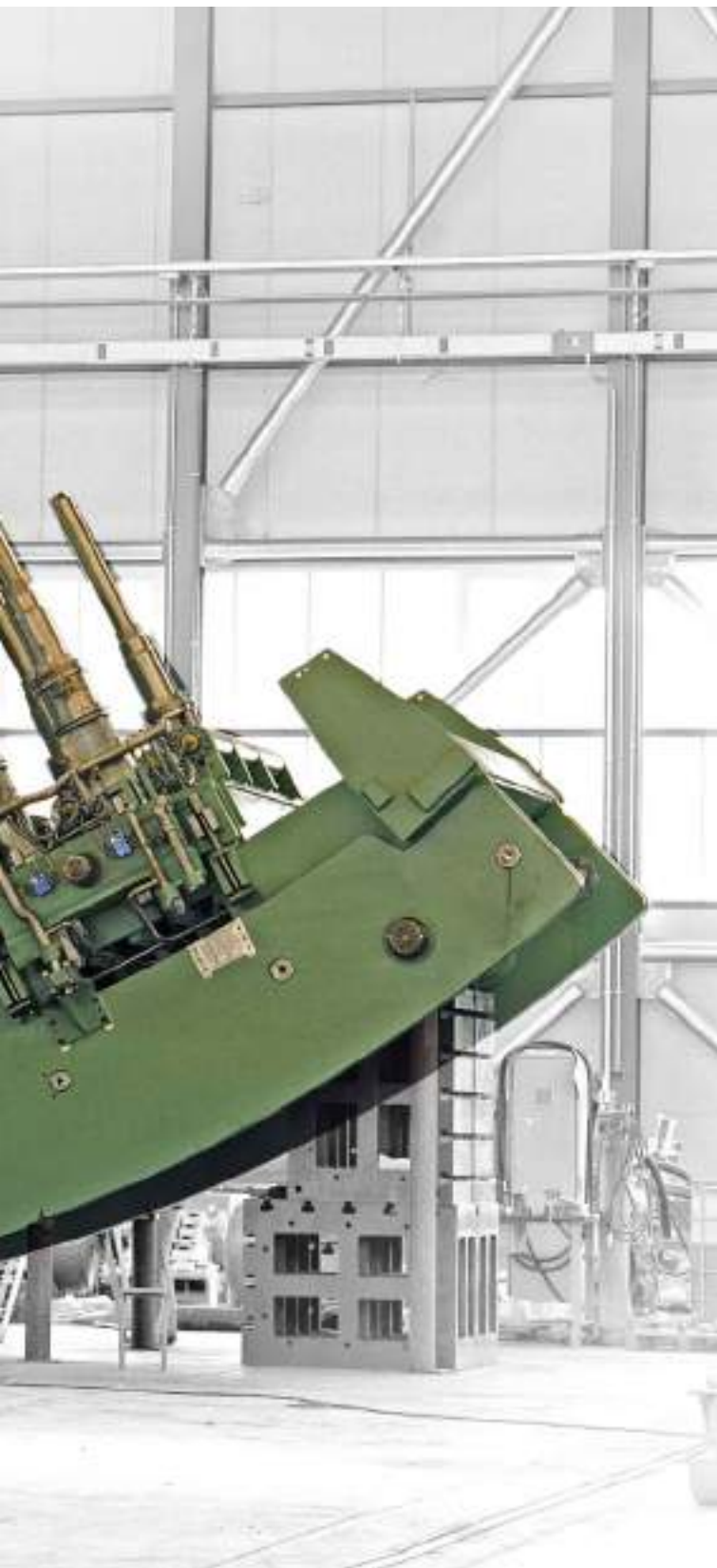
Rolling mill stands

Castellini provides 2Hi and 4Hi stands for Hot and Cold Rolling. Completely manufactured, assembled and tested in our workshop in Northern Italy according to a strictly quality protocol, our Rolling Mill Stands feature the most modern design concepts available to the industry today as:

- HAGC system (Hydraulic Automation Gauge Control) for on-line regulation of the mill
- Bending Blocks for Strip Crown & Flatness Control
- Work Roll Shifting devices for Schedule Free Rolling







*Bow segment for
continuous casting*

Slab production equipment

Castellini manufactures all critical components for Continuous Casting lines, from complete Casting Moulds and Segments and Hydraulic Oscillating Systems to the water cooled casting rolls of multiple span design for long-life service.

Castellini design for caster segments can also include:

- Hydraulic cylinders for gap setting, as per process optimization
- High efficiency spray nozzles for secondary cooling
- Air oil bearing lubrication



Slab caster segment





Shears

Among our portfolio there are various shears required for different stage of strip and plate production process:

Downstream caster machine: Pendulum Shears and heavy duty Hydraulic Shears for slab cutting (with cutting force up to 20000 kN).

On strip production plant: Crop Shear and Drum Flying Shear:
For plate mill finishing area: Side Trimmer and Dividing Shears (rocking type).

*Hydraulic shear
for slab cutting*



Plate levellers

Castellini designs and manufactures Hot and Cold Plate Level-
lers. The design parameters are chosen according to our custo-
mers product mix. The geometry of the cassette (rolls disposi-
tion and diameter) is selected according to the plate thickness
and mechanical properties.

The design concep of our levellers also includes:

- Top split Bending Frame, hydraulically actuated for Bending operation
- Servo-hydraulic Levelling Gap Adjustment (HAGC) for Tilting and Skewing operations
- Quick Roll Cassette changing device

Top leveller cassette



Hot plate leveller



Hot rolling mill downcoilers

Castellini supplies coilers for Hot Rolling, including all the auxiliary equipment that is part of the coiling area, that means hydraulic adjustables iderollers, pinch rolls, threading device and coil handling equipment.

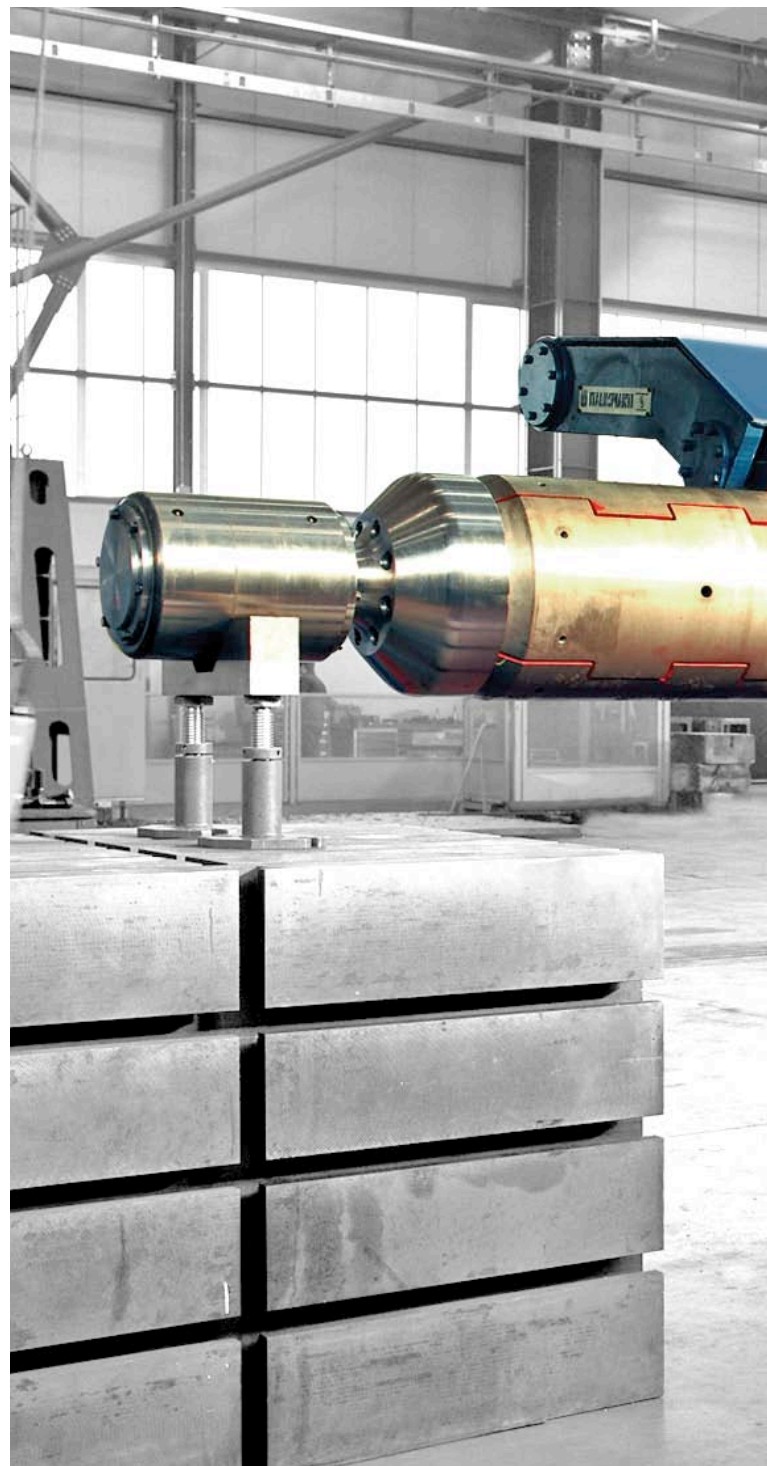
Design of our hot coilers also includes:

- Hydraulic Wrapper Rolls in position or pressure control
- Entry hydraulic Pinch Roll

Payoff and tension reels

Castellini designs and manufactures coiling and uncoiling equipment for Cold Rolling Mills and Strip Processing Lines, for steel and aluminum plants, such as:

- Payoff and Tension Reels with standard-type or plug-in-type mandrels and shifting frame for coil centering
- Belt Wrappers



▲ Assembled payoff reel

◀ Coiler mandrel detail



Processing lines equipment

Among the wide range of equipment supplied by Castellini there are also machines for steel and aluminum Processing Lines. Basing on customer's requirements, these machines can be provided complete of motors, on board piping and wiring, ready for on-site installation.

Some examples:

- Coil Openers and Static Shears for Coil Inspection lines
- Coil Cars and Coil Handling equipment
- Rotary Side Trimmers with Scrap Choppers
- Strip Flatteners
- Drum Shears



▲ Rotary side trimmer

◀ Hydraulic crop shear



SPARE AND WEAR PARTS



HAGC cylinders

During the last ten years Castellini manufactured more than 50 HAGC of any size, ranging from the smallest for aluminum foil mills to the ultra large used for 5000 mm wide plate mills. Experience of Castellini includes both long and short stroke cylinders, top and bottom mounted of any design. Solid modeling design and FEM analysis are extensively used to optimize the HAGC design.

Components, correct dimensioning and surface treatments have been improved over the years to grant the lowest possible hysteresis and maximize the dynamic performances of Castellini's HAGC cylinders. Hydraulic arrangement is carefully studied with the same purpose.

Dummy Stands for HAGC testing

Our standard procedures for Inspection & Testing of all the new or re-conditioned HAGC cylinders includes:

- Material test
- Geometrical test
- Functional test
- Dynamic test

To grant the best conditions in terms of accuracy and safety, HAGC functional test is performed on a dummy stand and always includes check for maximum pressure, stroke and oil leakage.



Refurbishing of HAGC cylinders

We provide reconditioning service for used or damaged HAGC cylinders. Castellini internal procedure is the guideline for every repairing intervention. It comprises accurate inspection of equipment, report of status and definition of required repair activities. Replacement of damaged components and wear parts, restoring of internal coatings, check of all dimension are then followed by complete test described before.

Our service team is also available to inspect the goods at site in order to establish if the cylinder can be economically repaired or it must be wasted and replaced with a new one.

- ▲ *Dummy stand for HAGC testing*
- ◀ *Heavy plate mill HAGCs*
- ▼ *HAGC bolt controlled thiggyenning*







Bending and shifting blocks

Castellini Officine Meccaniche manufactures Work Roll Bending Blocks and Shifting Equipment of any design for hot and cold mills, for ferrous and non ferrous materials.

These include E-blocks for hot & cold rolling mill for steel and aluminum, conventional Mae-West blocks, special heavy bending blocks for Wide Plate Mill and Steckel Mill. On the basis of such large experience,

Castellini is offering bending and shifting equipment of any design, both OEM and of optimized design as well as top class spares and refurbishment services. After the complete assembly, every single bending block is tested according to Castellini internal document "Procedure for testing of the Bending blocks" that includes among others: control of pistons' stroke, pressure test and oil leakage test. For testing of bending blocks it can be used a special dummy stand: this permits to reach the maximum pressure avoiding contact between piston and cylinder flange and then the risk of damaging flange screws.

Also hydraulic cylinders of shifting equipment are checked for stroke, pressure and oil leakage.



▲ Heavy plate mill bending blocks

► 3D section of a bending block



Steckel mill downcoiler mandrel

Mandrels

Castellini supplies coiler mandrels of different design for hot rolling mill downcoilers, cold rolling mill and processing lines payoff and tension reels. Specific design is chosen according to the duty requirements (in example hot / cold application, torques and strip tension, process speed, interface with existing equipment). Range of design includes typical link & wedge type for hot rolling mills, sleeve type for payoff reels, wedge & counter-wedge type for tension reels and recoilers, high torque type for cold rolling mills. Great care is dedicated to design details and implementation of solutions which reduce risk of failure and help during maintenance activities, in example Double Star Grease Distribution system (patented). During the assembly, particular attention is reserved to verify the correct match of the sliding

surfaces of the wedges, and the proper distribution of grease between them. Once completed, every mandrel is tested, feeding the hydraulic cylinder at the test pressure. Minimum and maximum expansion diameters are checked, as well as the absence of oil leakage from the cylinder and the rotary joint. All these operations ensure the smooth functioning of expanding mechanism and then the high reliability of the machine. Castellini Service is also offering a service of repair and refurbishment for used mandrels (both for scheduled maintenance and in case of failures). Refurbishing always includes the complete disassembly of the mandrel, an accurate inspection of all the structural components by NDT tests and all the necessary repair and replacement actions.



▲ Measurement of operative diameters and out board bearing detail

◀ Double Star Grease Distribution system (DSGD ®).
Specifically designed for hot rolling mill mandrels, it foresees an improved lubrication circuit which replaces most of the rigid and flexible piping with flanged connections, for an increased lubrication efficiency and easy maintenance.



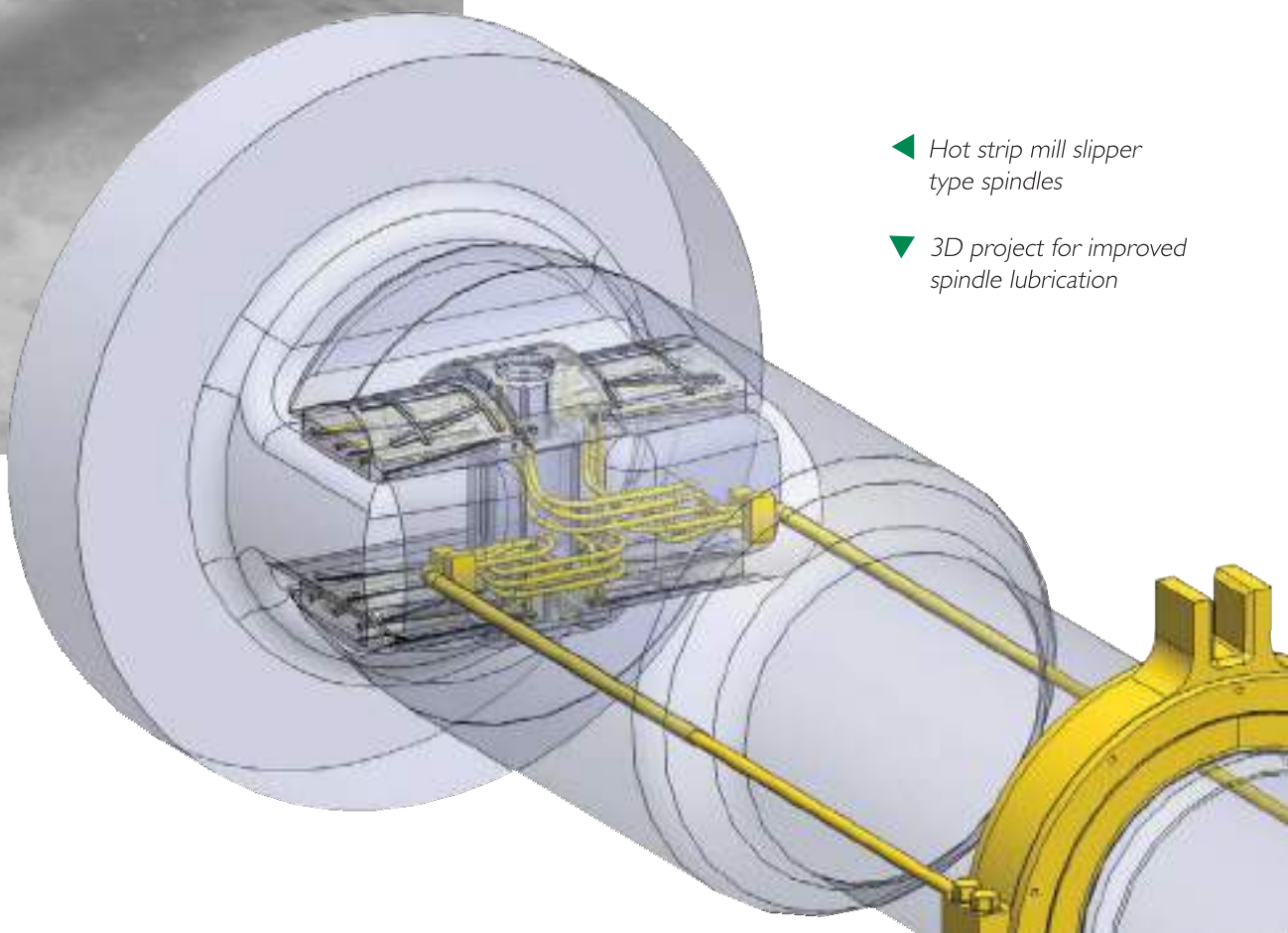


Spindles

In the wide range of OEM components and spare parts in which Castellini's manufacture excels there are heavy duty Slipper-type spindles for Hot rolling mills.

We provide complete sets, including rotary joint for lubrication and bronze wear slippers. Upon request, Castellini designs and manufactures slipper-type spindles to reduce the maintenance requirements.

For example, spindles have been provided with on board high-pressure grease pumps connected to several lubrication points, in order to minimize the bronze slipper consumption.



◀ Hot strip mill slipper type spindles

▼ 3D project for improved spindle lubrication



Roll Chocks

Roll chocks and wear plates play a key role in the spare inventory of a mill. To smoothly run a Mill three or sometimes four sets of fully assembled Work Rolls are necessary inside the mill, ready for change and in the Roll-Shop.

Castellini is one of the best reputed producers of chocks both as supplier of leading engineering groups in the metals industry and for the spare parts market.

Our experienced crew, top class machining facilities and testing procedures bring to you chocks of certified quality for tight tolerances required nowadays and long life of the equipment.



*Backup roll chocks
of different design*



◀ Screwdown spare parts
(screw, nut, hub)

▼ Screwdown worm
gear reducer

Screwdown assemblies

Castellini designs and manufactures heavy duty screw-down assemblies for Plate and Hot Strip Mills. The groups are complete with screws and main nuts and with screw-down drives (symmetric reducers, spindle shafts, clutches and brakes).

Each set Screw + Nut is inspected L.T. on the entire surface. Full stroke engagement and Contact print test are used to check the contact rate between screw and nut working surfaces. The Screw + Nut backlash is checked in three engagement positions.



Assemblies

Castellini provides customers with spare and wear parts of highest quality, precisely machined according to drawings or re-engineered to perfectly fit with existing equipment.

Our added values are mostly: wide experience in technical solution used on existing production plants (30 years as spare parts supplier), awareness of customer needs and demands, flexibility in listening and implementing maintenance team suggestion and requirements. We have learnt that our customer mostly focus on quick response, interchangeability, pragmatic approach and easy maintenance and now these are our guidelines.

Because of our comprehensive knowledge focused in the area of Spare Parts Services, we cover the full spectrum of key components for production plants. Thanks to our internal structured organization, independently from dimension of order (single part or large quantities spares request), we react always in time at a competitive price.



Plate mill scrapers



Service

**KEEPING YOUR PLANT RUNNING
IS OUR #1 PRIORITY.**

Castellini service team has been established for supporting our customer on installation, operational and general after sales support. From reparation on site of damaged equipment to remote assistance from our technical office, organization is structured for cover all range of customer needs. Beside that , our team takes care of site survey for collecting all data for potential implementation of existing equipment (revamping, refurbishing or reparation).

Our commitment and dedication extend across border and time zones, for supporting you full time until the resolution of problem.



HAGC reconditioning



On site inspection

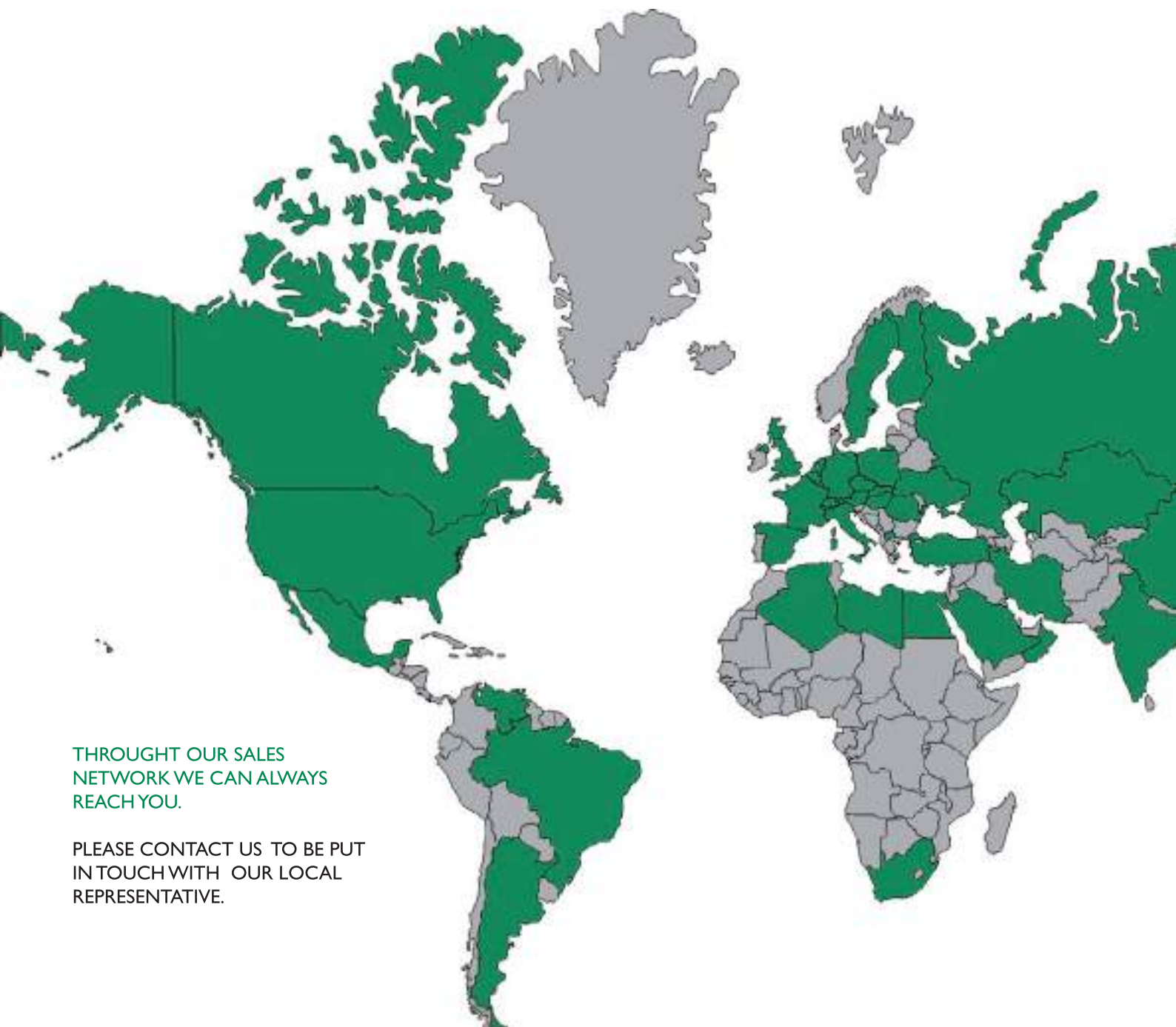


Training



On site support

GLOBAL network



THROUGH OUR SALES
NETWORK WE CAN ALWAYS
REACH YOU.

PLEASE CONTACT US TO BE PUT
IN TOUCH WITH OUR LOCAL
REPRESENTATIVE.

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REFERENCE LIST

Some Plants that use equipments manufactured by Castellini
(Equipments provided directly or through Contractor)

EPC CONTRACTORS

- + SIEMENSAI
- + DANIELI
- + SMS INNSE
- + FATA HUNTER
- + TENOVA
- + ANDRITZ



STEELMAKERS

- | | |
|-----------------------------------|------------------|
| Aperam | Belgium |
| Arvedi | Italy |
| Ahmsa | Mexico |
| Allegheny Ludlum | USA |
| Amag | Austria |
| Angang Iron & Steel | P.R. of China |
| Arcelor Mittal | Worldwide Plants |
| Bhushan Power & Steel LTD | India |
| BMZ | Belarus |
| Borcelik | Turkey |
| Canadoil | Thailand |
| China Steel | Taiwan |
| Comital | Italy |
| Corus Ijmuidien | Holland |
| CSN | Brasil |
| Dongkuk Steel | South Korea |
| Dragon Steel | Taiwan |
| Duferco | Belgium |
| Erdemir | Turkey |
| Essar Steel Limited | India |
| Jiangsu Shagang | P.R. of China |
| Jigang Steel | P.R. of China |
| Jindal Steel & Power | India |
| Jisco Steel | P.R. of China |
| KSP | Kazakhstan |
| Laiwu Steel Group | P.R. of China |
| Linfen Steel | P.R. of China |
| Lisco | Lybia |
| Magnitogorsk Iron & Steel Works | Russia |
| Manshan Iron & Steel | P.R. of China |
| Marcegaglia | Italy |
| Metinvest | Ukraine |
| Micron Steel | Malaysia |
| Mobarakeh Steel Company | Iran |
| Nanjing Iron & Steel | P.R. of China |
| Ningbo Steel | P.R. of China |
| Norsk Hydro | Norway |
| Posco | South Korea |
| Rautaruukki | Finland |
| Rio Tinto Alcan | Switzerland |
| Riva Group | Italy |
| Sabic Hadeed | Saudi Arabia |
| SAIL Group | India |
| Salem Steels | India |
| Severstal Group | Russia |
| Shangai Shenhua Aluminium | P.R. of China |
| SIDERAR | Argentina |
| SIDOR Siderurgica del Orinoco | Venezuela |
| SSI - Sahaviriya Steel Industries | Thailand |
| Tata Steel Europe | UK |
| Tenaris | Worldwide Plants |
| Thyssenkrupp | Europe |
| Tianjin Steel | P.R. of China |
| Trico Steel Company | USA |
| US Steel | USA |
| Voestalpine Stahl | Austria |
| Welspun | India |
| Wuhan Iron & Steel | P.R. of China |
| Wuyang Iron & Steel | P.R. of China |
| Xiantang Iron & Steel | P.R. of China |
| Yieh United Steel Corporation | Taiwan |



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