

Editorial:
40 years
of passion
for steel
automation



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new 500ktpy bar mill

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Mittal Steel Corp: Bar & Wire rod mill for stainless steel



40 years of passion
for steel automation



EDITORIAL

40 Years of passion for steel automation

Dear Friends

I'm very proud to introduce this first number of our new AIC Magazine. This new adventure is beginning exactly when we are celebrating our first 40 years of story and we hope to reach the same result for this magazine.

The target of AIC Magazine is to bring added value to our partners giving information about AIC world and latest news from the market and technical innovations.

In this number we are celebrating our 40th anniversary and we are pleased to present some special case histories.

AIC is growing every year more in the world enlarging his presence in several countries and you can discover how from the list of projects and news presented. Some technical papers refer to specific needs of our customer, following our vision to be a TAILORED AUTOMATION company; some others are valid for everybody, such as the case of Safety system.

The safety for the people and the environmental is today the main driver for every responsible steel producers and that's why AIC invested many resources in the last years to develop solutions suitable for the steel industry taking into consideration the safety but also the performances of the plants. We can't accept any more to have avoidable risks in our working life but at the same time we can't survive without efficient plants.

In the present number you'll find a description of the safety attitude applied to North American standards mixing the deep experience developed together with our European clients in the last ten years, with the different standards adopted by American OSHA. The result is a great solution keeping all the previous milestones in the existing culture but applied in a more modern and efficient way.

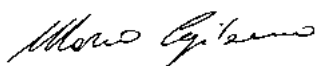
In the AIC family we welcome the new AIC North America technical director: Mr. Roger Wallberg. He is based in Oregon, USA and he will follow all the North American customers both as commercial and service contact. With his decades' experience in the meltshop and rolling mill business he'll bring additional benefits to our organization and our clients.

Please let me conclude this first editorial thanking all the people that gave us the chance to be here today: Let me start with our team, women and men, who with their passion and sacrifice have been sharing our dream every day since 1975, without forgetting who is not working anymore with us.

To conclude, with all the partners: customers, suppliers, competitors and friends who trust in our view of the future and help us to be better every day more.

Thank you everybody, we are only at the beginning of a fantastic trip but we are lucky to walk it with you!

Your faithfully



Marco Capitanio

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new 500ktpy bar mill**

"Following a several years long partnership with Thai Steel Profile Co. Ltd., AIC received the order of the electrical and automation part of the new rolling mill that will be installed in Rayong, Thailand."



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**Gerdau Siderperu:
Start\Stop shear automation**

"AIC has successfully accomplished the roughing shear revamping project in SiderPeru, Tren 2, located in Nuevo Chimbote, Ancash - Peru and received the final acceptance certificate."



**Gerdau Whitby:
cooling bed entry & exit upgrade**

“AIC has successfully accomplished the cooling bed area upgrade project in Gerdau structural mill located in Whitby, Ontario-Canada, during the last christmas shut-down and received the final acceptance certificate.”



**Mittal Steel Corp:
Bar & Wire rod mill for stainless steel**

“Indian greenfield steel rolling mill deploys state-of-the-art integrated control solution and achieves optimal production rate within days of hot testing.”



INNOVATIONS

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**Gerdau Jackson:
DC drives according
to UL508A and OSHA
prescriptions for lock out**

“AIC is completing the first step of the Gerdau Jackson TN project, focused on a complete replacement of the Main DC drives for the whole rolling mill stands.”





Mr. Roger Wallberg

Welcome Roger Wallberg new AIC North America Corp. Technical Director

Since 1st of April 2015 Mr. Roger Wallberg is the new Technical Director of AIC North America Corp.

Mr. Wallberg will be the first contact for all the North American partners and he'll be in charge of all the technical needs of the client since the pre-bid discussions up to the after start-up service management coordinating all the AIC resources available worldwide.

Mr Wallberg was born in Sweden and he started his career in ABB Sweden 1980 working as commissioning and service engineer, continued to work for ABB in North America from 1989. From 2006 he was working as a system and process engineer for Cascade Steel Rolling Mills. He will bring 35 years of experience in automation applied to steel industry.

AIC management welcomes Roger in the CAPITANIO TAILORED AUTOMATION family wishing a prosperous collaboration.



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AIC confirmed as main partner of Thai Steel Profile for a new 500 ktpy rolling mill

Following a several years long partnership with Thai Steel Profile Co. Ltd., AIC received the order of the electrical and automation part of the new rolling mill that will be installed in Rayong, Thailand.

The new 500 ktpy rolling mill, planned for commissioning within the end of 2015, will include 18 stands (horizontal, vertical and convertible), 3 Start Stop shears, a 78 meters long cooling bed and a bar counter.

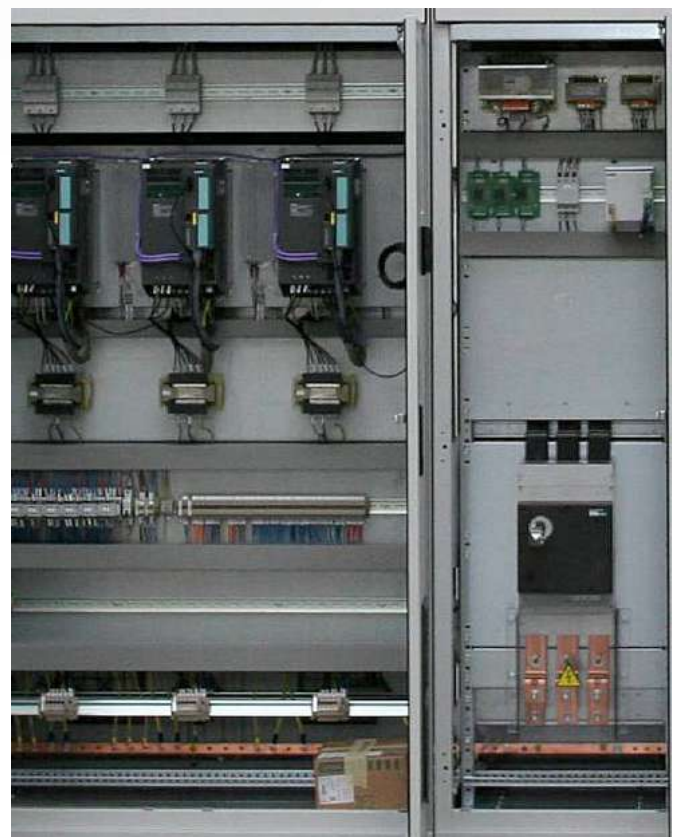
Production will range from 9 to 40 mm diameter rebar, including two- and four- slit modes for smaller diameters.

AIC scope of supply includes all drive panels (DC for main drives and AC for auxiliaries), DC and AC motors, sensors, PLC and IT equipment for the control of the entire rolling mill.

AIC automation will control the rolling mill from the billet out of the furnace to the finished bundle delivery, with specific solutions for rolling mill, Start/Stop shears, cooling bed area, bar counter, bundling, HMI and PDA systems. The entire new system will be equipped with standard devices, as one of AIC commitments is to avoid supplying black-box solutions, to protect customer investment in time and freedom of choice.

All panels, control desk and IT equipment will be built and tested in AIC workshops, ensuring the quality standard that always distinguished AIC supplies.

This is for AIC and Thai Steel Profile the third major project together, following the revamping of the existing rolling mill (commissioned in 2012) and the upgrade of the same rolling mill to extend its product range to coils and profiles (to be commissioned in 2016).



Command and control panel supplied by AIC to Thai Steel Profile

AIC ends a notable revamping project of ORI Martin Brescia rolling mill

AIC has successfully accomplished a main revamping project of the ORI Martin's rolling mill, Brescia plant, during the latest shutdown of the end of the year.

The job has been divided into two steps and it began the latest August 2014 with the target to dismantle a set of obsolete DC Drives and to replace them with state of the art equipment.

During the first phase AIC replaced the drives of 2 stands of bar rolling mill before the cooling bed, the drive of Start/Stop shear cooling bed entry and the drive of head/tail Start/Stop shear (with deviator); this latter machine is managed through 2 DC motor in axis both mechanical and electrical, controlled by two 1600A DC drives in master/slave configuration.

The second step has been focused on the supply of a new MCC panel for the control of the mill lubrication unit and a 2100A DC drive suited to command of the new OH stand, installed by the customer upstream of the mill. This new stand will allow the customer to increase the range of the billets he may roll and to improve the flexibility in face of possible higher productive potentialities.

The great cooperation between AIC and ORI Martin allowed a really fast and successfully commissioning of the new equipment, up to improve the foreseen production schedule.

The new supply will also ensure a reduced stress on the mechanical components and a reduction in terms of energy consumption, thanks to the optimization of machinery software control and a related lower current consumption.



Ori Martin is one of the most important Italian steel group. The plant in Brescia was founded in 1933 and can now boast on EAF for the production of billets in continuous casting configuration as well as bar rolling mill and wire rod line for special steel. It is also equipped with thermal treatment systems. Ori Martin has its core-business for many years in the production of special steel for mechanical industry and mainly in the automotive field, thanks to a range of more than 200 different steel families.



Command and control panel supplied by AIC to ORI

AIC Successfully ends a notable revamping project in Acindar, Arcelor Mittal group

AIC has successfully accomplished a main revamping project in Acindar, part of Arcelor Mittal group, at Tren Bonelli in San Nicolas - Argentina, during the main shutdown in last February.

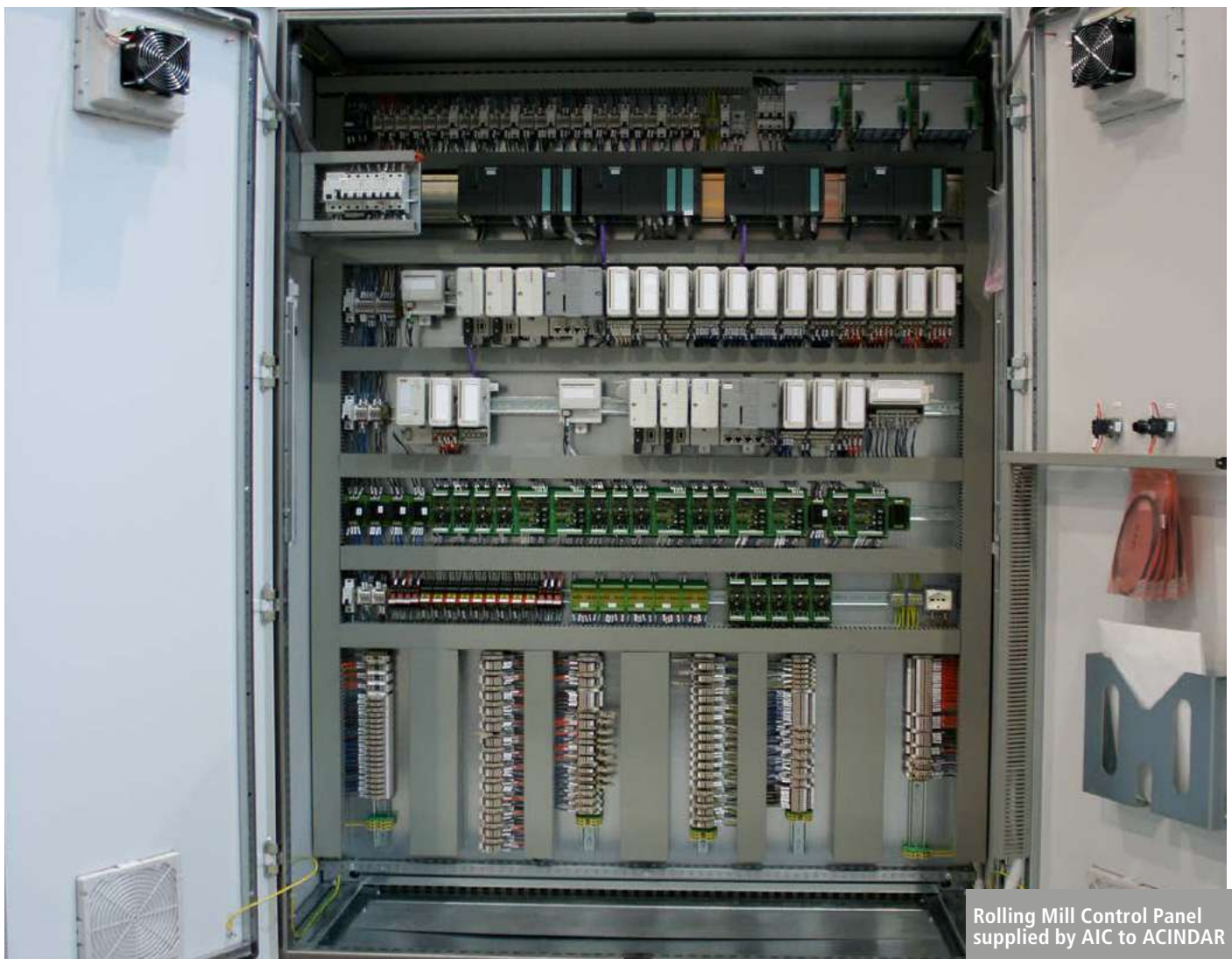
During the only-one main shutdown of the year the complete revamp of rolling mill automation was planned, excluding only the roughing group.

The job consisted in replacing the old mill control that was based on ABB AC450 plc's with a brand new system based on ABB AC800 platform installed in a state of art equipment, to have the complete mill managed by the same platform.

The revamp was including as well brand new technology for clutch-brake and start-stop shears managed by SIEMENS Simotion controllers to guarantee best performances in cut precisions and as well new

control for braking slide and moving rakes to improve discharging of the material and positioning on the rakes. In the same project as well all the code from the moving rakes exit area has been rewritten completely to improve cycle timings, including straightening machine and cold cut shear.

The perfect cooperation between AIC and ACINDAR allowed in only three weeks of shutdown a successfull commissioning of the new equipments, bringing back to production the plant with customer satisfaction.



Rolling Mill Control Panel supplied by AIC to ACINDAR

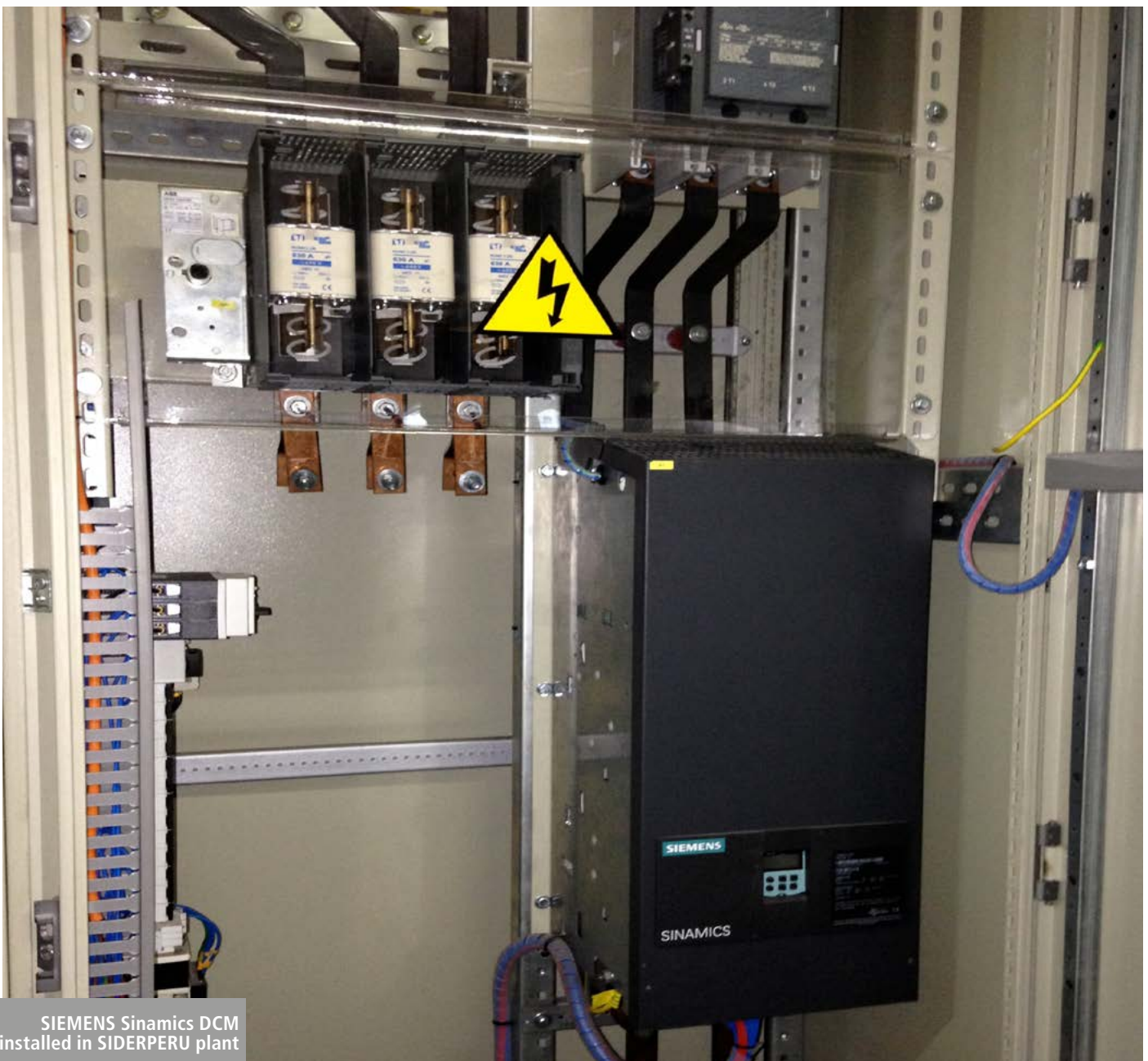
AIC gets final acceptance certificate for a revamping project in Siderperu, Gerdau group

AIC has successfully accomplished the roughing shear revamping project in SiderPeru, Tren 2, located in Nuevo Chimbote, Ancash - Peru and received the final acceptance certificate.

The job consisted in replacing the complete automation and power control of the Start/Stop roughing shear installing a SIEMENS Simotion technology after a previous successful project regarding the cooling bed entry shears commissioned last October, as to confirm the good job done at that time.

The roughing shear has been brought from an AC motor and drive configuration to a DC configuration using SIEMENS Sinamics DCM drive to reuse an existing DC motor and to improve cut precision.

The collaboration between SIDERPERU and AIC started last year has been so strengthened with this job.



SIEMENS Sinamics DCM installed in SIDERPERU plant

New medium and small section mill automation in Corpacam

AIC proudly announces that the new section mill, recently established in Guatemala by the Corporación Acerera Centroamericana, started production last month of February.

The rolling mill includes two production lines, one for the small sections and the other for the medium sections products and it is going to produce a great variety of profiles, some of them not available in Guatemala at the moment, but imported from other countries.

The project consisted in the complete rolling mill automation starting from the reheating furnace to the cooling bed area, including the following sections:

- Reheating furnace automatic billet charging, discharging and temperature control
- Single stand reversible roughing mill
- Five stands roughing mill to feed the small and medium section lines
- Five stands medium section line

- Ten stands small section line
- Four clutch-brake shears
- Two Start Stop shears
- Hydraulic apron
- Two star-top cooling beds
- Roller tables, pinch rolls and auxiliaries
- Water treatment
- Main control pulpit
- Local desks
- Supervisory computers and data acquisition system

To achieve the required performance, AIC used state of the art Siemens PLCs and motion controllers, real time field bus networks and HMI operator and maintenance stations.



Corporación Acerera Centroamericana new section mill in Guatemala

AIC received Final Acceptance Certificate from Aceros DM for MV drive system

In December 2014 Automazioni Industriali Capitanio received the FAC from Aceros DM for the MV drive system suited to command the 10 passes block of the wire rod line installed in San Luis de Potosi, Mexico.

The target of the project was to replace the two existing DC motors coupled in series to reduce maintenance costs and activities and to improve the reliability of the original system installed in 2005.

The scope of supply consists in:

- MV Transformer 6MVA / 13.8/3.3KV / 21% Z
- Siemens SM150 MV drive 10.5MVA / IGCT
- Siemens MV synchronous motor 4.8MW - 650/1000rpm - 150% O/L
- Existing Siemens S7 automation interface with the new drive
- Erection supervision
- Cold & hot commissioning & production assistance
- Training

The equipment has been delivered in October and after only two days of hot test the contractual performances were reached.

The new configuration allow now the plant to roll at a maximum speed of 100m/sec against the previous 88m/sec with a reduction of energy consumption of about 20%.

AIC and Grupo SAN collaborate since the '80s in the field of electrical and automation revamping and performance improvement of the rolling mill plants.

Aceros DM is part of Simec group. Since 2001 Simec has acquired companies that have established itself as a leading producer of special steels in Mexico and the United States, as well as in the rebar, merchant and structural shapes in Mexico.



MV drive panel supplied by AIC to Aceros DM

Full electrical revamp of a Cooling Bed Area in a record time

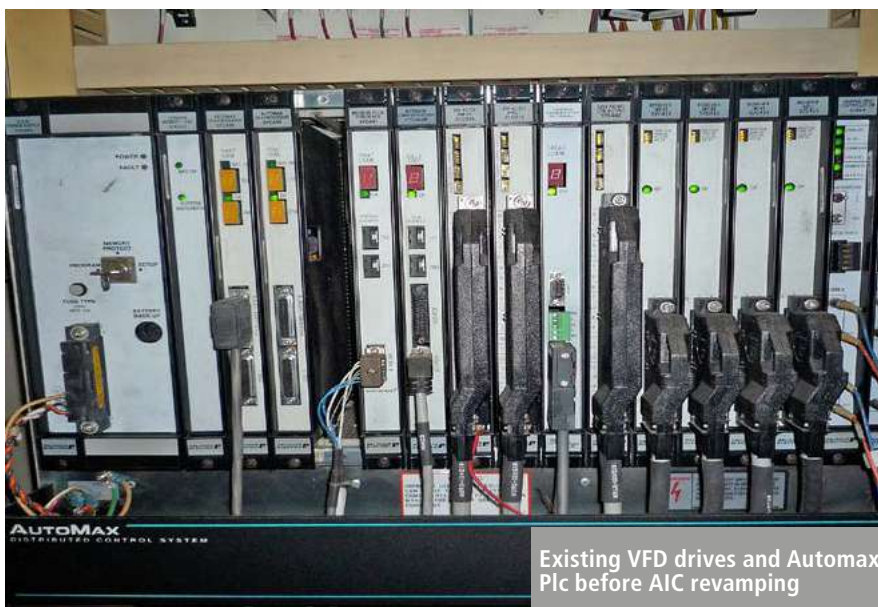
AIC gets final acceptance certificate for a revamping project in Gerdau Whitby.

Challenge

The project consisted in the upgrade of the cooling bed zone that was managed by a MODICON plc, RELIANCE AUTOMAX plc was managing the axis controls and other AUTOMAX were managing power modules of the dc drives. Critical point for the customer were the few spares present in plant and the impossibility to find new ones.

Project began months in advance the shutdown phase due to the

minimum time available for the Christmas shutdown of the plant. Criticality of the project included the activity of placing the new automation system in several existing networks, such as the Profibus network of the mill control system originally managed by an ABB plc, and the MB+ network of the packing area and level 2 interface that is managed by MODICON plc's.



Existing VFD drives and Automax PLC before AIC revamping



Existing Modicon PLC and DC Drives before AIC revamping

Solution

AIC decided to integrate axis control and level 1 automation in the same platform, able to manage part of the tracking as well, thanks to the calculation speed and the amount of memory available. Moreover the connectivity possibilities with the other platforms present on the plant made ControlLogix from AB to be selected.

Customer desired to have fully integration of the drives with the plc Ethernet network and the possibility to browse and change parameters

using plc programming language, for this reason AB PowerFlex755 VFD drives were chosen, for the DC drives the choice went to the ABB DCS800 because of their guarantees in terms of reliability.

To speed-up the software engineering process all complete data exchange present in plant was replicated in AIC workshop at the end of panel construction to test and simulate every situation before shipping panels to the customer.



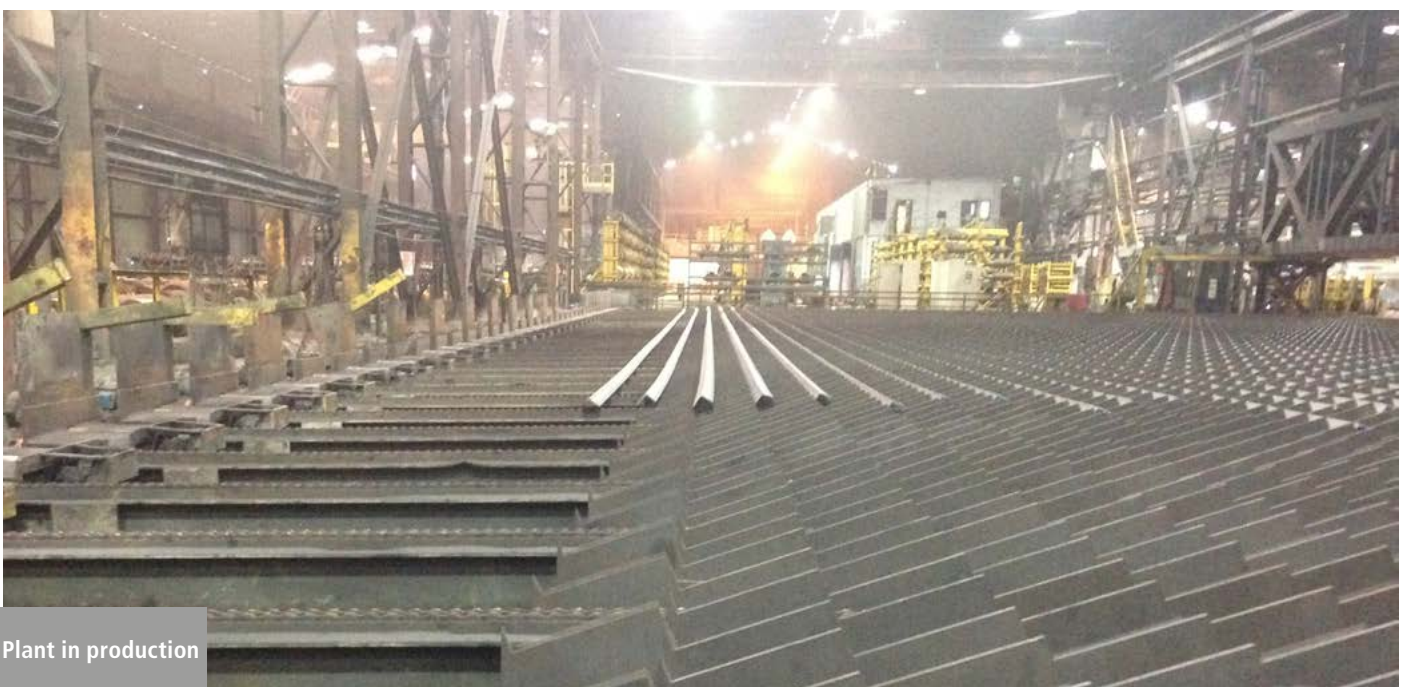
New VFD drives and ControlLogix PLC supplied by AIC



One of the new DC Drives supplied by AIC

All panels supplied by AIC are certified ETL for Canada, AIC is as well approved workshop for the Canadian and USA market.

To better integrate the new automation and drives control in the plant with the minimum changing for the operators Existing HMI's and pulpits interfaces have been completely reused, as well to assure a fast restart in production of the plant after the short shutdown.



Plant in production

Automazioni Industriali Capitanio S.r.l. conquers complexity and time constraints thanks to Integrated Architecture

Indian greenfield steel rolling mill deploys state-of-the-art integrated control solution and achieves optimal production rate within days of hot testing

Background

Automazioni Industriali Capitanio S.r.l. (AIC) is a global system integrator, which designs, manufactures and markets automation systems, primarily for the metals industry. For almost forty years it has successfully designed, produced and commissioned industrial automation systems for the management of process automation in the iron and steel industry. This success is thanks to its deep expertise in various system typologies, including melt shops, continuous casters, long products rolling mills for bars, wire rods and sections, water treatment plants and dedusting systems.

It offers a broad range of capabilities based on numerous electrical technologies, including medium-voltage switchgear, medium- and low-voltage transformers, AC & DC drives panels, motor control centres (MCC) and distribution Panels and PLCs and safety PLC automation panels. In addition it can also undertake the design, build and installation of main control desks and local control stations, SCADA & OP Systems, CCVE Systems, totally integrated PLC safety systems, electrical erection, commissioning and turn-key electrical projects. Products are always tailored to match the precise requirements of customers all over the world.

“The Indian customer awarded the order for mechanical element of the project to a Swedish company; while we handled the electrical side – working to the Swedish company’s specification and with the input of an Indian consultant.”

Today AIC is one of the leading suppliers of electrical & automation solutions for the world’s metals industry – long products steel rolling mills in particular – with more than 700 installations in more than 40 different countries – many of which use Rockwell Automation solutions. The company’s headquarters is in Brescia, Italy and can offer support to its customers all over the world. In addition to its Italian operations, AIC North America Corp, New York, USA and AIC India Ltd., Kolkata, India support the local markets.

In a recent greenfield rolling mill project in India, it combined its own expertise with the product and domain experience of Rockwell Automation to develop a completely integrated control solution within incredibly tight time constraints.

Challenge

The project was undertaken on behalf of an independent Indian steel producer and comprised the design, build, testing and commissioning of the electrical systems for a long stainless-steel product (bar and wire rod) hot-rolling-mill, which would sit alongside existing facilities, including another mill.

According to Marco Capitanio, managing director at AIC: “The Indian customer awarded the order for mechanical element of the project to a Swedish company; while we handled the electrical side – working to the Swedish company’s specification and with the input of an Indian consultant.”

Interaction between all parties continued at all phases of the project, which was broken down into multiple discrete segments – commercial, kick off, engineering (design), engineering (software), manufacturing of the electrical equipment in our Italian workshop, internal testing (including s/w), shipment to India, erection, cold and hot commissioning and finally support and training.

The mill, developed for stainless and special steel bars, rods and sections, comprised multiple stations, including stands, shears, blocks, finishing lines and cooling beds, all of which required different types of electrical infrastructure, and all ultimately controlled from a number of local command desks and a main command desk.

“To compound the scale and complexity of the installation,” Capitanio elaborates, “was the short timescales in which we had to complete the project. This was further complicated by the different working methodologies used by ourselves, the Swedish OEM, the project consultant and the Indian customer. However, as a global company, we are used dealing with different practices and procedures and took this all in our stride.”

Solution

AIC specified, sourced/built and installed all the main and auxiliary motors, all the main and auxiliary AC and DC drives, all PLCs, all main and local control desks, all software for the PLCs and HMIs, the HMI & database system and the networks; while also providing the necessary services towards successful project completion (engineering, commissioning and remote support).

The equipment supplied by Rockwell Automation was at the heart of this very impressive installation. Four Allen-Bradley® ControlLogix® 5000 programmable automation controllers provided the primary control for the line, communicating via 3,500 I/O with no less than 42 racks along its entire length. The racks housed a variety of modules depending on their position and function, but in total 19 DC Allen-Bradley PowerFlex® drives were used including PowerFlex 2000A standalone regulators (SAR) and control cards. 69 AC Allen-Bradley PowerFlex755 drives were also used to control the roller tables, shears pinch rolls, laying forming head and the bar and coil handling, along with four FLEX™ soft starters for the pumps.

Allen-Bradley PanelView™ Plus HMIs were used for some operator panels with FactoryTalk® SCADA running on PCs at the various control stations. Two networks were deployed: EtherNet/IP® for SCADA, HMI and the drives (the drives are in a redundant configuration) and ControlNET® for the I/O.

“We use axis control supplied by the ControlLogix PAC to control the Start/Stop shear and the laying head,” Capitanio explains, “and the system is very efficient. The performance in terms of tolerance (cutting/positioning) is very good. The AIC automation & HMI software also gives the customer integrated management of each area of the plant using just one platform, from the reheating furnace all the way up to the handling of the finished products.”

Results

“Our Indian customer has now got a fully integrated control architecture, which as well as helping during commissioning also allowed them to reach nominal capacity within just a few days of the hot testing,” exclaims Capitanio. “Even though the start up and project time was shorter than market average for India, we achieved all the primary objectives with the projects timeframe.”

AIC’s customer also benefits from remote access. In the first instance an employee was left on site to deal with any issues. “We left one guy on site,” Capitanio explains. “Now there is no need, we can do it all remotely. Maintenance is also much easier with the Rockwell Automation® Integrated Architecture®.

“We have been working with Rockwell Automation since before 2000,” Capitanio concludes. “Since our first project, we have established a great working relationship. Its people are very flexible and its products are very good, offering the high performance we demand. Problem solving is always quick and easy. In this project we also involved Rockwell Automation in India, so there was a good interaction at a local level.”



Rolling Mill control pulpit



Marco Capitanio during inauguration ceremony

Solutions

A Rockwell Automation solution was installed, which included:

- Four Allen-Bradley ControlLogix 5000 programmable automation controllers, communicating with no less than 42 racks
- 3,500 I/O
- 19 DC Allen-Bradley PowerFlex drives
- Allen-Bradley PowerFlex 2,000A standalone regulators (SAR) and control cards
- 69 AC Allen-Bradley PowerFlex 755 drives
- Four Flex soft starters
- Allen-Bradley PanelView Plus HMIs
- FactoryTalk SCADA running on PCs at the various control stations
- EtherNet/IP for SCADA HMI and the drives and ControlNET for the I/O



Stainless steel & super alloy

Results

- Optimal production rate achieved from the first production phases
- Project completed successfully within short timeframe, due in part to Integrated Architecture
- State-of-the-art automation technologies
- This is the first rolling mill in the world with the new PowerFlex DC Drives for main stands
- Each control desk is designed with a user-friendly approach and the customer's operators can manage their plant without any difficulty or trouble



Inauguration ceremony

Advanced Control Solutions for Flying Shears to improve both efficiency and reliability of rolling mill

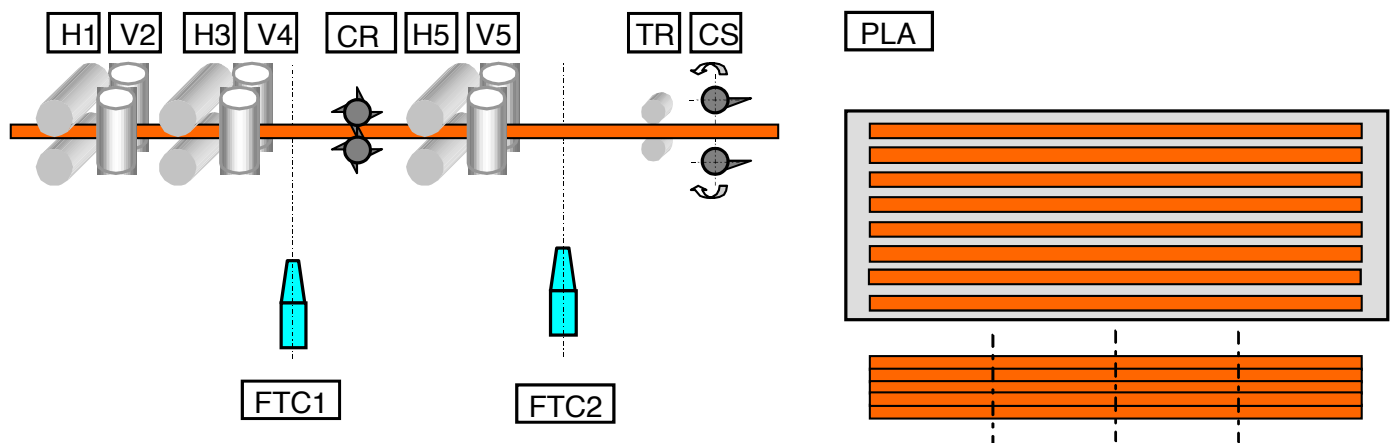
Introduction

The paper is presenting state of the art automation solution to implement high performances control for shears in long product rolling mills. The main benefits of the systems are the increase of safety and productivity, the reduction of costs as well as the efficient and consistent utilization of the equipment.

The topics are:

- Control system applied on new or existing machines & electrical equipment and for both: Brake\Clutch, Start\Stop & rotating shears
- High performances, tolerances and cut repeatability
- Solution based on standard market electronic and information technology products with specific mathematical algorithms, deep know how and field experience
- Solutions for:
 - Roughing\Intermediate shears for optimization & pre-optimization bar length cut & cropping
 - Dividing shears with strict precision at high speed
 - Wire rod front head & tail positioning
 - Axis control to optimize motor usage

Fig.1 - Typical layout of long product rolling mill



Description:

- H : horizontal stand
- V : vertical stand

- CR : intermediate cropping shear
- PR : pinch-roll

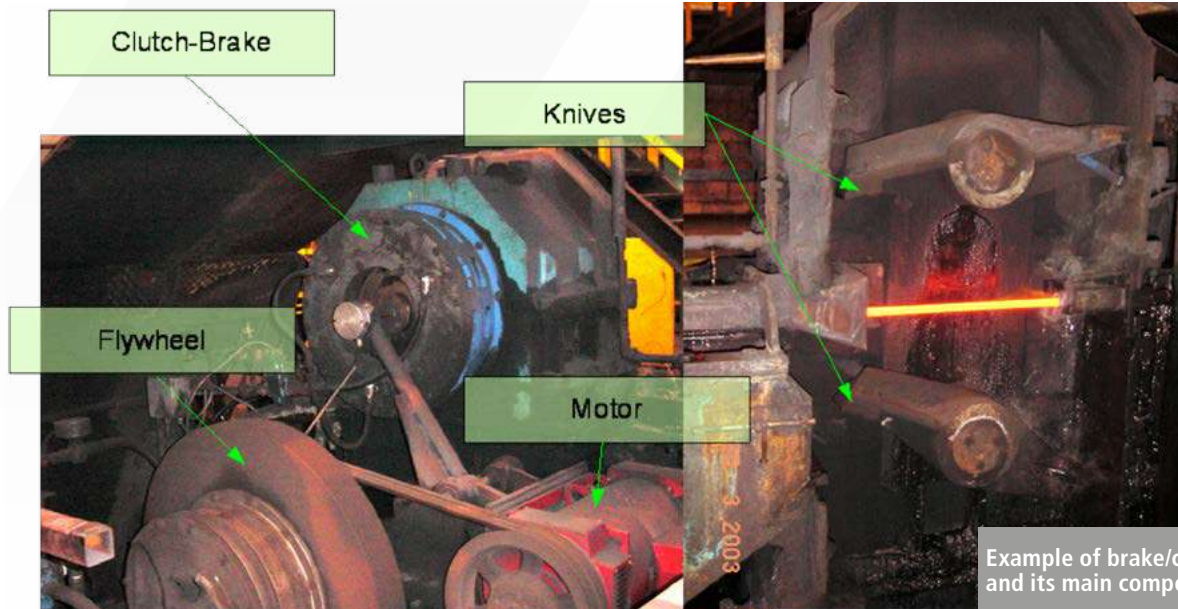
- SH : Start-Stop shear
- CB : cooling bed

- HMD : hot metal detector

Typical mechanical configuration of shears

Clutch and brake shears benefit of new automation, though accuracy and repeatability are limited by clutch and brake system performance. Main advantage is the possibility to fine tune clutch and

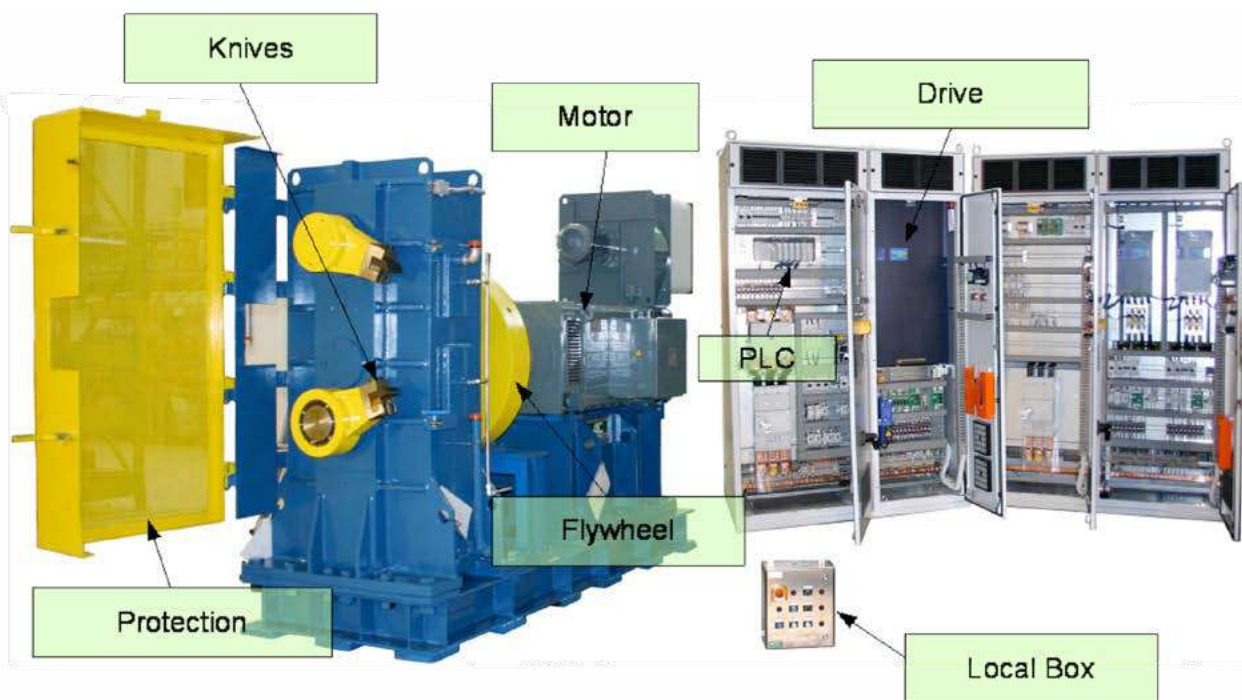
brake timing to optimize accuracy and friction material life. Moreover, a new control system improves cutting repeatability by minimizing the electrical error.



Example of brake/clutch shear and its main components

Start/Stop shears are very similar to the clutch and brake shears, but in this case the motor and the shear gear box are permanently connected. This kind of shears needs a very accurate blade position

control to assure high precision and reliability. In existing application, usually it is not necessary to replace the entire system, but it is enough to apply a new motion control system to the existing drive.



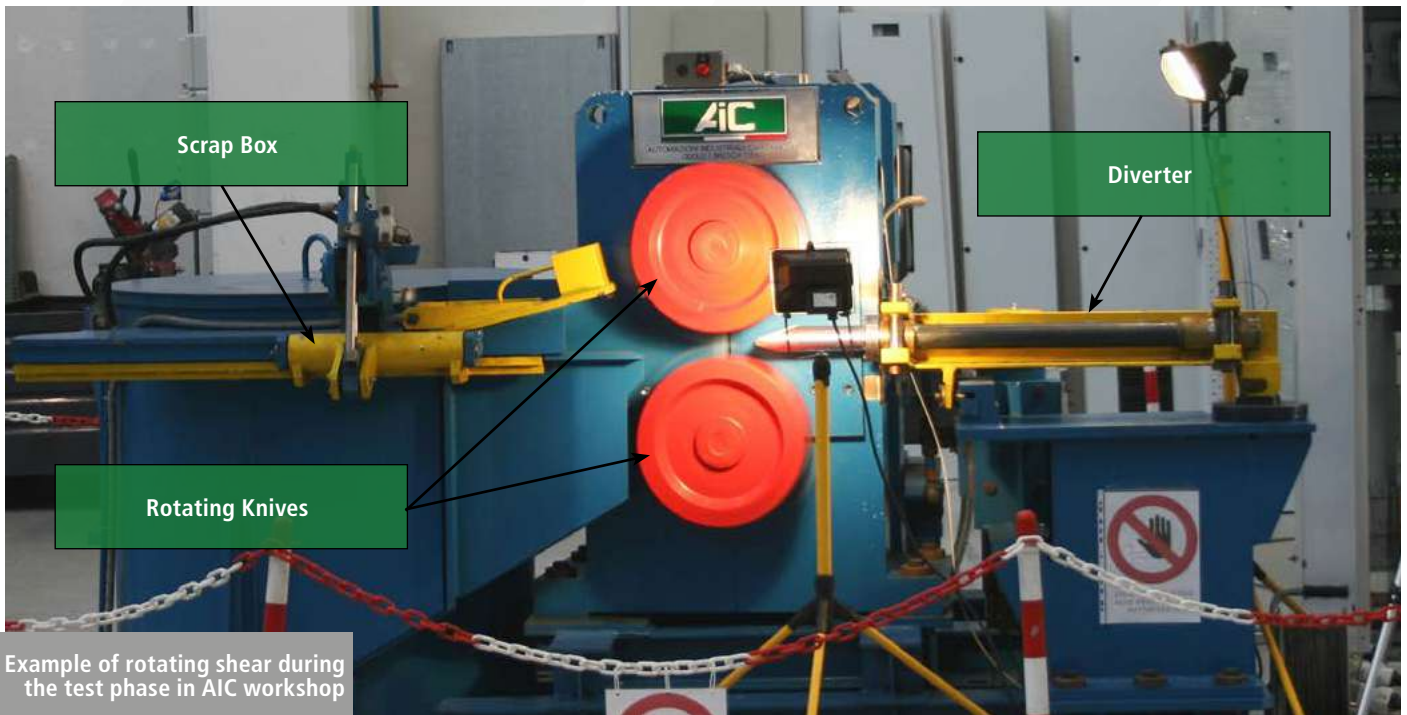
Example of Start/Stop shear with related DC Drive Panel

Rotating shears are the leading edge technology when high speed and accuracy are required. These targets are achieved by an optimized combination of motion control strategies aimed to get the best performance with the minimum effort from the machine. Fast dynamic motion applied to rotating blades and diverter are necessary to deliver highly versatile and accurate rotating shears, capable of doing head and tail crop, scrapping and cut to measure

at a speed of up to 100m/s.

A peculiarity of rotating shears is the synergy between a high inertia system (the shear blades) and a low inertia system (the diverter). The big challenge is to use the same motion control system for both parts, optimizing it for the two different tasks.

This is the approach followed by AIC, requiring deep knowledge in both steel process and motion control technologies.



Example of rotating shear during the test phase in AIC workshop

Optimized motion control

AIC combined know how in steel processing and high performance motion control is the key factor to the optimized behavior of high performance shears.

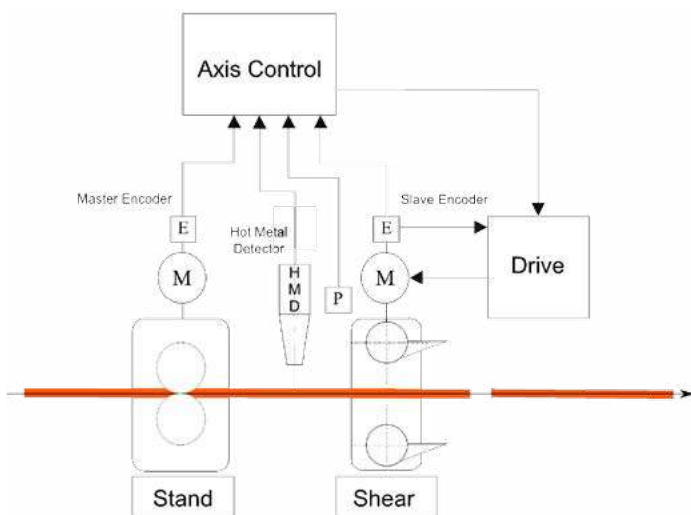
Both Start-Stop and rotating shears take advantage of AIC motion optimization technologies. These include dedicated motion planning algorithms, drive parameter optimization and fine tuning parameters recording.

All presented control technologies are flexible and support different set ups, that are required for different products and different mechanical arrangements, such as shears with a combination of flying and crank arms and optional flywheel.

Optimized parameters for different productions are easily selected by an integrated recipe system, and combined with automatically computed motion paths bring several advantages:

- Reduce mechanical stress and wear
- Reduce operating noise
- Reduce electrical stress on both drive and motor
- Reduce energy requirements
- Allow a cost effective selection of motors and drives

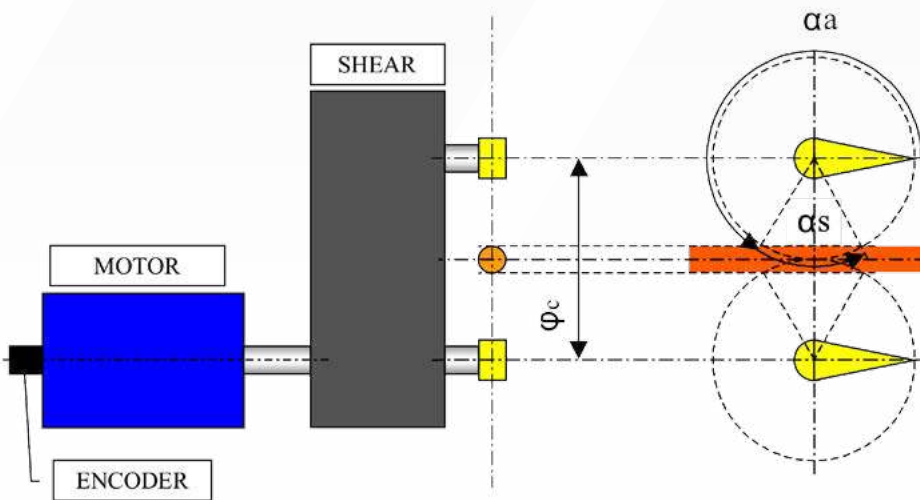
Shear control system block diagram:



The main components of the system are:

- Axis control. It is the heart of the control system. It controls the position of the shear knives to assure precision and repeatability of the cut length. To perform this function it receives as inputs the encoder of the stand, the encoder of the shear, the hot metal detector and the proximity switch and generates as output the speed or torque request for the shear drive.
- Master encoder. It is the incremental encoder connected to the stand motor used to detect the material position.
- Shear encoder. It is the incremental encoder connected to the shear motor used to detect the shear knives position.
- Hot metal detector. This sensor is necessary to determine the head and the tail of the bar for the bar position tracking.
- Shear proximity switch. This sensor it is used to reset the shear position at the moment of the cut.

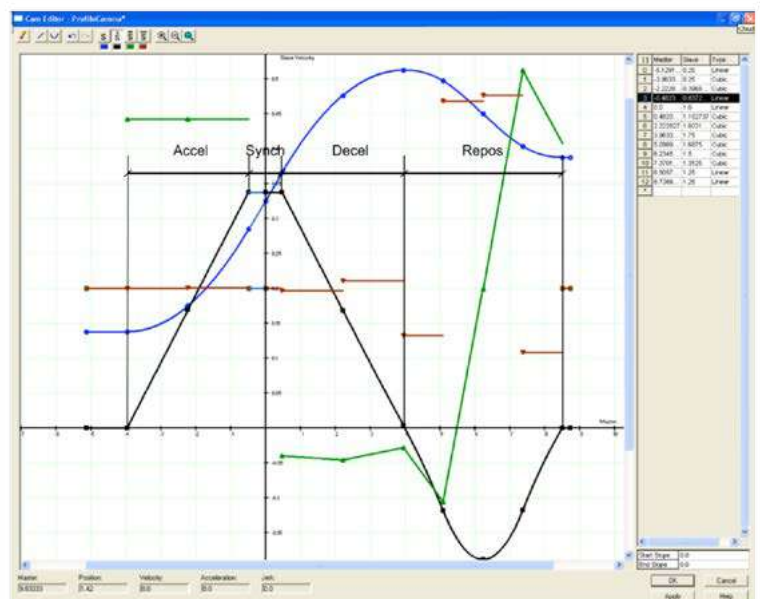
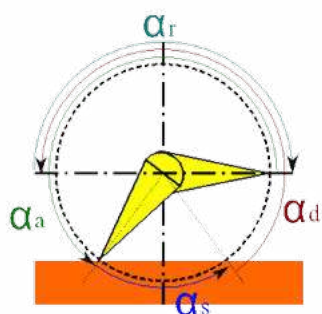
Start-stop shear typical configuration:

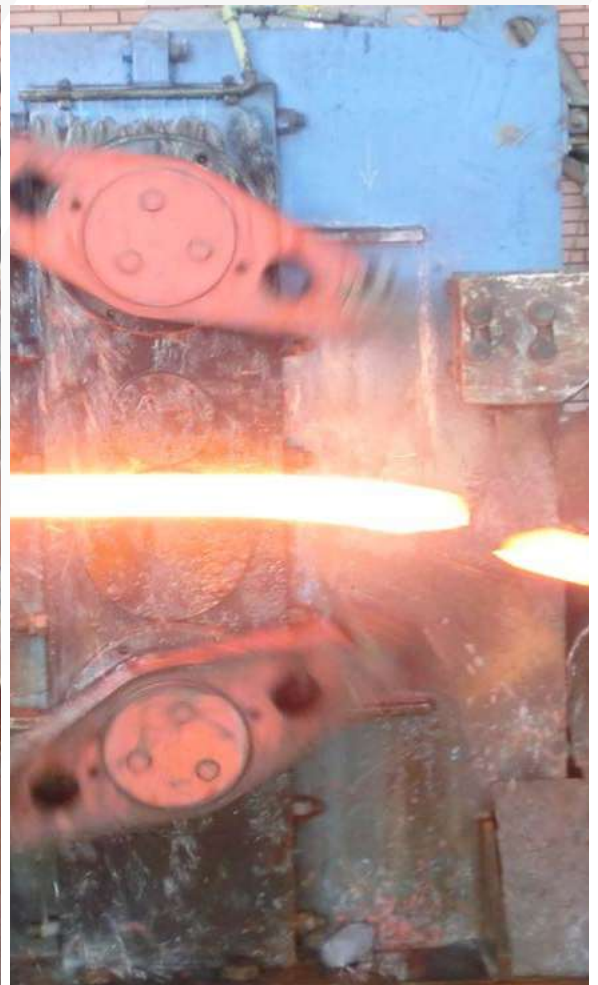


Details of knives

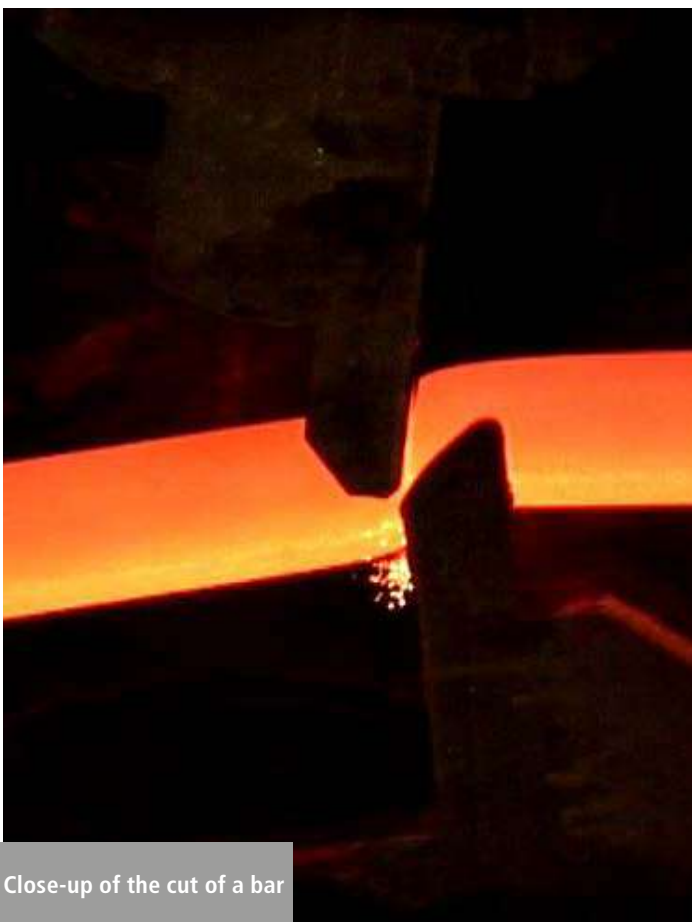
The Start-Stop shear cycle can be summarized in the following phases:

1. **Acceleration.** The motor starting from the home position accelerate to the speed needed to perform the cut (synch speed).
2. **Synchronization.** The motor remains at constant speed from the moment the knives impact on the bar until they exit from the synch angle.
3. **Deceleration.** During this phase the motor decelerate from the synch speed to zero speed.
4. **Repositioning.** Starting from the stop position the motor is moved to the initial home position ready for the next cut.





Details and images of cut cycle



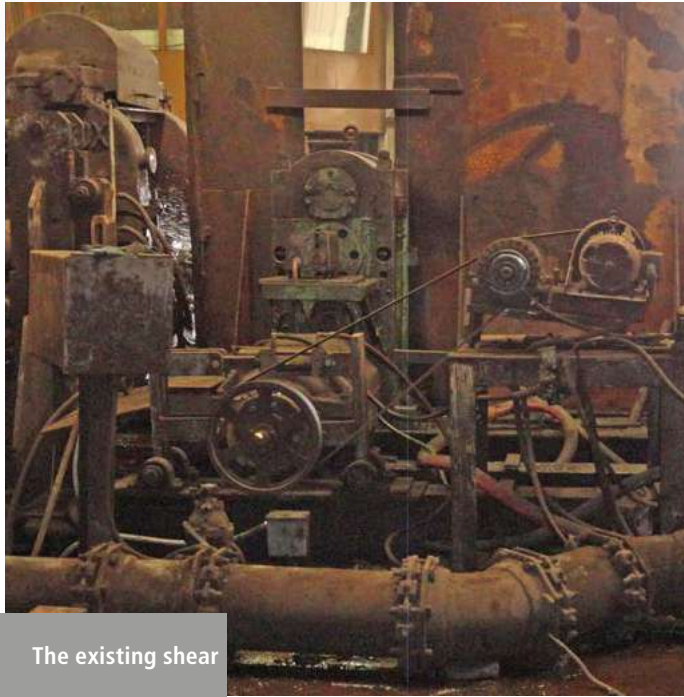
Close-up of the cut of a bar

Case histories: revamping of obsolete control systems and new automation solutions

W Silver Inc – El Paso, TX : Conversion from Ward Leonard to Start\Stop control for cropping shear

The long-time know how in shears control system supplies or upgrades allow AIC to help one of its customer to deeply modify an old cropping shear, controlled by a Ward Leonard technology.

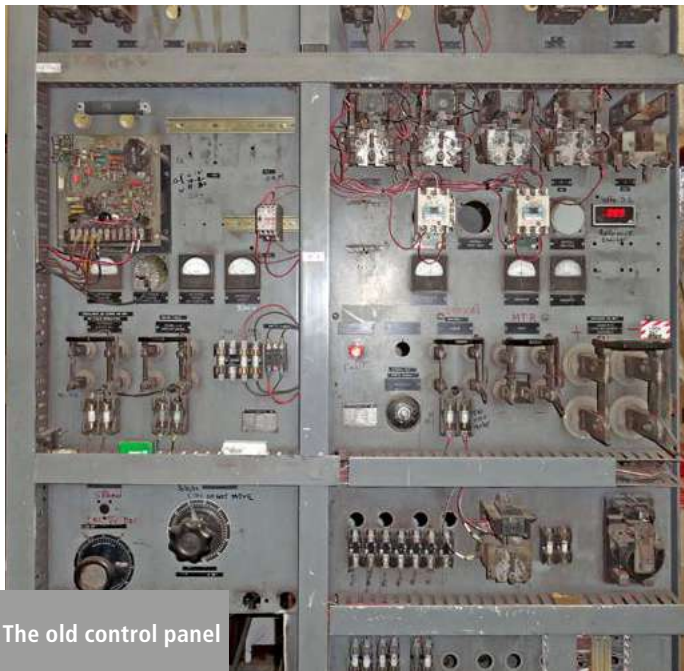
This existing system was implemented through mechanical cams and a set of proximity switches that often caused regulation and precision problems; furthermore a similar kind of control system was almost lacking of spare parts and represented a possible threat of plant stops.



The existing shear



The new DC Drive Panel (UL Listed)



The old control panel

AIC manufactured and commissioned a new DC Drive panel, designed according to NEMA rules and UL listed, suited to control the existing DC motor (50HP, 230V, 180A at 650 rpm) with a Rockwell Automation DC Drive PowerFlex, rated 667A.

The scope of supply included the PLC control system upgrade and

the integration of the shear control into the general automation control system as well as into the HMI supervision system, allowing the customer to achieve a great improvement of shear management and, at the same time, a radical rising of precision, repeatability and reliability of the cut cycles.

ORI Martin – Ceprano, Italy: Conversion from brake\clutch to Start\Stop shears

During a last year project, AIC successfully completed a revamping of n°2 existing shears placed after the finishing stands, installed in ORI Martin Ceprano plant – Italy.

The first step of the job was the mechanical revamping of the machines, accomplished by an AIC's mechanical partner and targeted to transform the shears from brake\clutch to Start-Stop, through the elimination of

both clutch and brake and the coupling with new motors.

The re-design of the machines was completed by the supply of a proper DC motors (286 kW, 400V, 795A at 660rpm) and a new DC Drives command system, realized with Ansaldo DC Drives 1600A (installed on a new control panels).



Shears after mechanical upgrade



New auxiliary DC Drives panel

The last step of the job has been the design & commissioning of a new PLC control system with axis control, based on Allen Bradley ControlLogix platform; the scope of supply included not only the head/tail control cut, but also the better control of head/tail positioning in Laying head, thanks to a fine regulation and synchronization of

respectively head/tail cut length.

The implementation of this job allowed the customer to achieve an improvement of productive performances from 24 m/s with brake/clutch shears up to 30 m/s with Start/Stop shears for both wire rod lines 1&2.

Feralpi – Lonato Italy: Rotating shear before wire rod block

The target of the job was the supply of a state of the art control system for a rotating intermediate shear designed to perform head, tail, and cobble cut in a high speed wire rod line.

Mechanical setup included a double pair of rotating blades, installed with an angle from the pass line to help discharging cut pieces, and a low inertia, high speed and high precision diverter.

Rotating blades of the installed shear are driven by a DC motor 250kW – 400V – 683A – 2400 rpm and Ansaldo DC Drive, while diverter is connected to a special fast response and water cooled brushless drive. Both blades and diverter are controlled by a PLC ControlLogix based motion control system in order to meet the design requirements:

- High cut length precision
- Possibility to cut any length, independent from the blades cutting radius
- Maximum cutting speed up to 30 m/s

All targets were achieved by AIC integrated approach, from drive selection to specific motion control algorithms and commissioning planning.

Commissioning of such a high speed machine required specific tools, like high speed cameras with frame rate up to 1000 frames per second that allowed AIC technicians to prove motion paths to be as designed before hot tests. This helped save both time and cost for hot commissioning since the shear worked fine from the very first bar.

Conclusions – optimization of each solution

The shears are the most critical equipment in a long products rolling mill and poor performances of those machine dramatically affect the whole mill. The most important part of a shear is its electrical & automation, especially in the Start\Stop and rotating types; for this reason an excellent control system is mandatory for an efficient process.

Shears have different locations and functions that require several and proper types of controls based on mathematical calculations and algorithms all aimed to optimize each different areas of the plant.

Typically rebar and wire rod productions require shears with high speed control while medium section requires bigger power control, in all cases the designer need deep process know how and experience.

In the case histories the shear control was totally integrated in the mill architecture with great benefits in terms of maintenance, troubleshooting and yield improvement.

As presented above the experience can be the key factor to approach the revamping of the plants and in particular for the shears. In some cases it was possible to improve the speed from 24m\sec to 30m\sec or to improve the tolerances up to $\pm 1\text{cm}$ just replacing the automation part without impact on plant layout or mechanical equipment.

The mechanical and electrical upgrade from old brake\clutch to Start\Stop shear type helped the producer to achieve better performances and to reduce the maintenance and operational costs.

In conclusion a skilled system integrator is the strategic partner to find the most suitable solution according to desired results of the application and different production.



Example of Start/Stop shear for Bar Rolling Mill



Example of Start/Stop shear for Bar Medium Section Mill

Automation control system for different solutions of modern Roughing mill

Introduction

The increasing need of several steel producers to combine flexibility, rolling speed performances and high quality of finishing products is pushing mechanical and automation suppliers to find and develop solutions with a high technological impact, able to ensure quick answers to changing and dynamic market requirements.

Furthermore possible dimensional constraints of production site, both for green field projects and revamping ones, don't allow sometimes to implement typical configuration of rolling mill for long products, due to the absence of enough spaces for installing a continuous roughing mill of horizontal & vertical stands.

In this paper we'll present some four hands projects, developed by AIC's technical department side by side with the most important mechanical suppliers to optimize different roughing mill groups and to minimize the rolling time, thanks to an innovative engineering approach and advanced strategies and methodologies of automation software packages.

The experience and the results of these jobs demonstrate that innovative mill configuration allow to achieve a reduction of mechanical and erection costs as well as smaller footprint.

AIC is a global system integrator and supplier of Electrical and Automation systems for the whole Metals industry.

In the next figure we show a traditional continuous roughing mill managed by AIC's electrical and automation system.



Traditional Continuous Roughing Mills of H+V stands



Example of typical main control desk

Different solutions for state of the art roughers

In the last years AIC successfully implemented several project of roughing mill automation, each one designed and developed with different main mechanical suppliers, according to space requirement and constraint and to productive/quality needs of the final customer.

Some of the most significant examples of modern Roughers are as per follow:

- Enhanced 3Hi stand, to meet the target of capital cost savings and to manage big motors with easy starting process
- Blooming mill with fixed reversible stand
- Horizontal Sliding reversible stand
- Horizontal + Vertical reversing stand
- Horizontal + Vertical Sliding reversible stand

3hi stand

The most classical design for single stand roughing mill is 3HI, often equipped with a fixed speed motor.

Even though very old and usually completely manual, this design can nowadays be equipped with automated auxiliary devices that keeps it

Blooming mill with fixed reversible stand

Automation & control system for a compact and very flexible blooming mill for special steel has been designed and installed in cooperation with Siemens VAI by AIC, based on enhanced one fixed reversible stand.

The solution described below is very interesting due to high configurable setting and the capability of rolling a large range of billet dimensions and to allow the production of wide range of final products as H, U or round profiles.

The configuration of mechanical group included:

- Furnace exit roller way, divided and managed into 5 sections
- Roughing mill exit roller way to existing intermediate mill, divided and managed into 4 sections
- Fixed reversible rougher suited with nr. 2 motors in electrical & mechanical axis for the control of main rolls and nr. 2 motors in electrical axis only for gap adjustment
- Upstream and downstream hydraulic alignment devices complete of fingers suited to properly turn the billets
- Upstream and downstream hydraulic tilting devices
- 4-section transfer carriages in electrical axis

The upstream and downstream roller way is now managed by existing motors (preserved with a significant economic saving), controlled by AC multidrive panel suited with IGBT DC Bus supply.

successful where cost effective applications are required.

For example electrically controlled manipulators, whose alignment is continuously guaranteed by PLC, can greatly help the operator achieve high and consistent throughput, especially if dedicated hi definition cameras are installed.

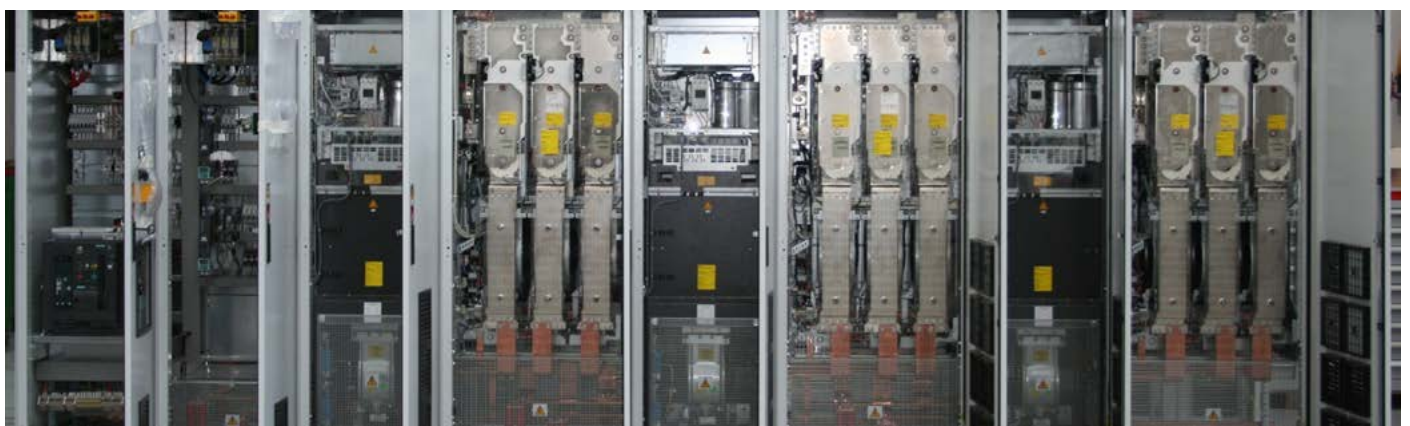
The speed control of the rolls of blooming mill is performed by two Siemens 1800kW AC motors (master & slave) with double winding, each controlled by nr. 4 Siemens Inverters in multidrive configuration (900kW each), with nr. 3 DC Bus suppliers with IGBT technology (1100kW each).



4 Main DC Drives Panel for Blooming Mill control with Nidec-Ansaldo



ABB DC Drive



Roll gap adjustment

The roll gap adjustment (opening and closing) is controlled by two AC motors in electrical axis; they can ensure great positioning results:

- $\pm 0,25\text{mm}$ during the positioning movement
- $\pm 0,01\text{ mm}$ at the end of positioning phase

Before each rolling pass, the top roll position is adjusted using screw down, according to the bottom roll position and the required gap between the roll cylinders. For the lower roll screws, the homing function means that the screws move down till they are not moving anymore (mechanical stop), in this case this point is considered as the home position. The positioning feedback is read by nr. 2 incremental encoder aboard of AC motors and nr. 2 absolute encoder directly

connected to the screws, in order to verify the right position.

Homing function means to read the actual encoder value and to store it in the PLC and consider it as offset

Although the two screws are mechanically uncoupled, a careful alignment control must be ensured to avoid mechanical seizing of the screws. To ensure this, the automatic control system continuously performs an electrical axis control on the motors.

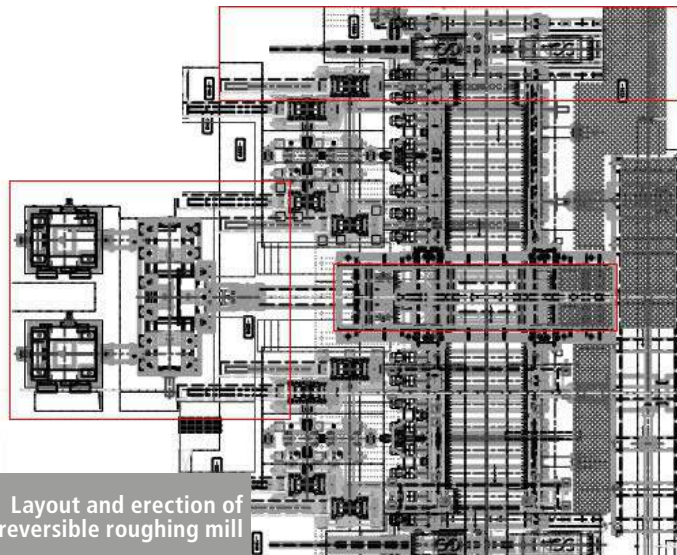
To perform a proper roll gap adjustment both the screws start at gap speed V_{gap} , set on HMI, in order to reach the set point position; the axis are position controlled during all phases.

$$d_{DS} = d_{bottom} - \frac{\phi_{bottom}}{2} - \frac{\phi_{top}}{2} - d_{gap-DS} \quad @v = v_{gap}$$

$$d_{OS} = d_{bottom} - \frac{\phi_{bottom}}{2} - \frac{\phi_{top}}{2} - d_{gap-OS} \quad @v = v_{gap}$$

dDS	(mm)	Reference position for DS screw
dOS	(mm)	Reference position for OS screw
dbottom	(mm)	Bottom roll position
Φ_{bottom}	(mm)	Bottom roll diameter
Φ_{top}	(mm)	Top roll diameter
dgap-DS	(mm)	Roll gap DS
dgap-OS	(mm)	Roll gap OS

The set point position must always be reached coming from the top and the screw stops when the set point position is reached.



Layout and erection of reversible roughing mill



Upstream and downstream Alignment & Tilting Devices

In order to ensure an optimal travel in and thread in of the bloom against the reversible stand (at the speed scheduled into the PLC program) the entry and exit manipulator automatically aligns the material in front of the correct groove according to the schedule; the manipulators are singly controlled through hydraulic motors with a positioning feedback by absolute encoders.

They can reach an alignment speed about 400 mm/s with a precision of $\pm 1\text{ mm}$ and a pressure on the bloom of 170 bar.

The manipulators are also equipped with fingers that are used to make material tilting, depending on the rolling needs.

Each positioning task is controlled by a proportional valve and a position value read into the PLC.

Rolling cycle into the roughing mill

The bloom or the billet from the reheating furnace, after a descaling process, is discharged on a new entry roller way and transferred into the upstream alignment devices at a speed about 3 m/s; in this position the billet is stopped, pressed, measured (width measuring) and it can be also tilted, depending on the rolling recipe. The material then gets guided to the center of the working groove (set by rolling recipe) and it can be finally inserted and rolled after receiving all consents of right positioning of the machine (rolls gap, upstream and downstream alignment and tilting devices).

Each rolling pass is based on 3 main phases:

- Bloom charging
- Bloom threading and unthreading
- Bloom discharging

In these phases the rolling speed can change according to the recipe parameters (usually a low speed during charging and discharging and a high speed during rolling).

The automation system controls the alignment devices settings:

- In the bloom charging phase they have to be maintained larger than the billet, in order to allow it to go forward
- In the bloom threading and unthreading they can be used to press the bloom (upstream or downstream), in order to allow a better alignment into the groove and to avoid the overturn of the billet.
- In the bloom discharging phase the billet must be stopped in the manipulators in order to allow a 90° rotation (if required), straightened, measured and then translated to start with a subsequent rolling pass.

The AIC automation system is designed and developed to allow from 1 to 11 rolling passes, with different settings according to easy and user-friendly recipes (summarized in only one HMI screen); it allows to reach up to 225 different set-up for each pass, for a total number of 2475 possible set-up for each billet.



HMI Screen showing roughing mill synoptic

Results and Targets achieved

After this revamping project, the roughing process is now completely controlled by the automation program, without any need of manually setting of the operators; the machine can operate by a remote control from main command desk (positioned more than 40 meters away) thanks to special cameras equipped with infrared filters, allowing to check both the positions of the machines and the billets, avoiding problems related to reverberations of very high temperatures.

This reversible blooming mill ensure a significant improvement of the flexibility of the plant, because it requires only about 30 minutes for changing the rolls of the stand and it allows a quickly shift to a different rolling campaign for another production range (just through a different recipe set on HMI).

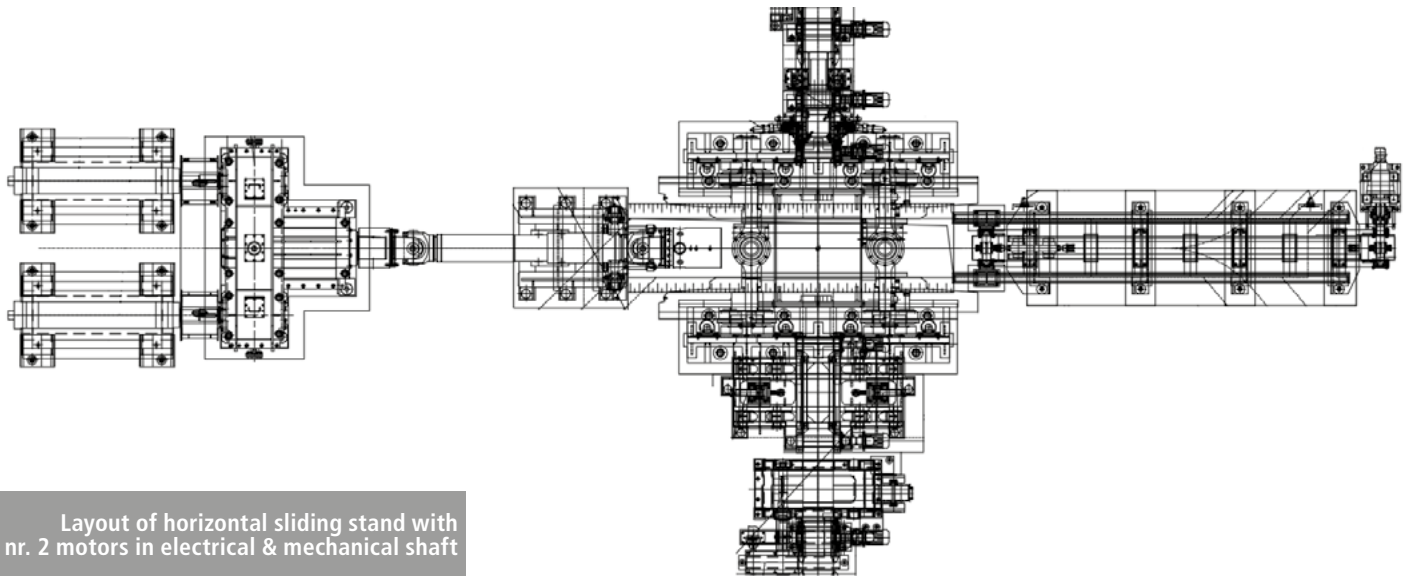
Another great result is an excellent repeatability and profile accuracy of the resulting bar that is going to be loaded into the downstream finishing rolling mill.

Roughing mill with horizontal sliding reversible stand

A different solution for a compact and very flexible roughing mill for special steel was designed and installed in an Italian plant for special steel production, based on horizontal sliding reversible stand.

As per mechanical layout below, this roughing mill solution is based on an horizontal sliding stand, controlled by two 900 kW Ansaldo

DC Motors (600V); these motors are in mechanical & electrical axis configuration and are connected to the machine by spindles; they are driven by two main DC Drives Panels with a power current of 2500A each. During the starting and reversing phases, acceleration and deceleration ramp of the DC drives is about 3s (usually with a total current limit of 5000 A), allowing very quick speed reversing.



Layout of horizontal sliding stand with nr. 2 motors in electrical & mechanical shaft

The roughing mill can be set up to 8 passes with a constant roll gap and, due to the horizontal sliding movement, with a fixed rolling line; the stand shifting is implemented through a proportional servo valve in order to ensure the right positioning to the next selected working groove without having to modify the rolling line.

This easy but efficient process can be made with the same flexibility for each single pass: the easy turning and shifting tasks require no further movement of the billet into the working groove, so the rolling cycle can be completely automatic, without requirement of any operator

activity. To ensure an efficient control of rolling direction upstream and downstream alignment devices are also installed: they are digitally controlled with a setting feedback through solenoid valves.

On one side of the sliding stand a tilting device is installed, managed by a proportional servo valve and by a positioning feedback through an absolute SSI encoder; moreover a positioning feedback of the stand as well as alignment devices are implemented through a linear transducer (Temposonic type).



Manipulator upstream sliding stand



Reversible sliding stand



Particular of rolling rolls

Results and Targets achieved

The revamping job was planned and designed side by side by the mechanical & electrical suppliers to meet the customer needs of updating the existing 3Hi roughing group with a state of the art sliding and reversing solution. The ultimate aim of the update was to reduce the number of stands changes of the downstream intermediate continuous mill.

AIC scope of supply in this project included complete turn key electrical equipment:

- MV Switchgear for continuous mill
- MV/LV Transformers

- DC motors for roughing mill
- Power control & PLC panels for roughing and continuous mill, complete of new DC Drive Panels for new 8 stands
- PLC SW and HMI in client/server configuration
- PLC Safety system

Thanks to this new roughing mill and a new complete automation system the customer can now reach an efficient production rate, even higher than the initial target of the investment (rolled t/h).

The project's performances were achieved in just one and a half days after the start-up of new control system with billets of 6 meters length.

Horizontal + vertical fixed reversible stands breakdown mill

A different approach to compact roughing mill design that avoids installation of bar turner and movable alignment devices is the horizontal + vertical reversible stands group. This solution can be designed in two different variants: with fixed stands and with sliding stands.

AIC developed a fixed stands solution for a customer's plant where a wide range of special steel is produced: heat treated profiles, plates, angles with a range of about 1500 different products/year and a theoretical plant productivity of 200 kt/y.

In this project stands are equipped with automatic gap adjustment and automatically adjustable entry / exit guides.

One of the main differences, from the process automation point of view, between single stand and double stand solution, is that in the latter case each pass must be treated as a cascade of two stands, and process parameters must be controlled accordingly.

AIC solution for rolling mill process automation, RACS (Roll mill Automation Control System) was designed from the very beginning to

be very flexible, and can be successfully implemented also for this very specific application.

RACS enables the automation to control all rolling parameters, like:

- stand speed
- load-in signals
- load-in overspeed
- tension control
- min/max and mean rolling torque

All rolling parameters are controlled exactly the same way as for multi-stand continuous rolling mills, and the same happens for the operator desk interface and parameters.

This uniformity of operator interface provides a very easy learning process for operators that already work on an intermediate/finishing continuous mill controlled by the same RACS system.

Tight integration between RACS standard system and the specific application auxiliary devices (gap adjustments, entry/exit guides etc.) is crucial to leverage the best of both systems and achieve best performance level by optimizing all movements.



H+V fixed reversible stands and Drives panel



Roughing mill with housingless horizontal + vertical sliding reversible stands

An advanced solution for a state of the art roughing mill for special steel has been designed and installed in Metallurgica Marcora, Cuggiono plant (Milan – Italy), based on horizontal + vertical sliding reversible stand.

A similar solution allows to reach significant benefits, with a very compact layout and without the need of manipulators / tilting devices

to turn the billet (needed in solution with just a single reversible stand).

The electrical scope of supply included:

- Nr. 2 923kW Ansaldo DC Motors
- Main DC drives panels suited to drive new stands
- PLC & HMI system



H+V Reversible Sliding Stand and related control desk

Set-up and automation cycle

The two sliding stands are managed through an hydraulic positioning control, with positioning feedback by absolute encoders.

Similarly to the fixed H+V reversing stands, AIC rolling mill control standard solution (RACS) is used to control rolling speed adjustments of the stands.

A very tight integration between RACS system and stand positioning automation (all done by AIC) is the base to achieve high throughput by doing as many movements as possible in parallel. An HMI system was also included in the project.

Optimization of each solution as a key target

The described compact and technological solutions for modern roughing mills allow steel producers to obtain several benefits from a technical and economical point of view.

Besides a capital investment saving, thanks to a reduction of stand costs and related electrical and erection costs, the customer can rely on a highly flexible system, able to ensure high production quality.

From the electrical & automation point of view, the H+V breakdown mills, while consisting in only two sliding or fixed stands, can be configured and managed like a traditional rolling mill, taking great advantage of know-how and settings. As a matter of fact the operator can control the rolling process through the AIC's RACS system, especially developed for long product rolling mills, and its several different kinds of task-specific regulators, each one with a dedicated set of parameters.

For example, in order to achieve the maximum quality of the rolled

The production cycle is now completely automated from the reheating furnace discharging:

- Roller way automation of reheating furnace exit
- Chain transfer for threading (first pass)
- Rolling phase depending on the charged recipe
- Continuity control and related alarm on HMI signalling lacking threading
- Optimization for an anticipated positioning of the machines

material, the rolling process shall minimize the stresses on the material and shall thus monitor and adjust the rolling tension on the material during the process (tension control) in the roughing area.

RACS has been successfully implemented for quantity-focused systems (for example construction steel mills) and quality-focused systems (for example profile and special steel / super alloy mills); it is designed to let the user focus on very few, necessary parameters, while the other ones are set during commissioning and then recorded in recipes, freeing the user from the necessity to continuously check and adjust internal parameters

To meet the quality and efficiency customer's needs each shown solution is highly customized and optimized, in order to always ensure the best set up and performances.

Quad Infotech

Quad Infotech is a software engineering and design company that has been designing systems for the steel industry for over 20 years.

Quad Infotech's unique combination of steel making and rolling process knowledge makes it an ideal provider of systems for the steel industry. Quad Infotech has focused on the following main areas within the steel industry:

- **Process Management and Control (QMOS)**
- **Manufacturing Intelligence (MI)**
- **Energy Management (Energy Methods)**
- **Information Visibility and Awareness (APEX)**

Process Management and Control (QMOS)

The QMOS system is the only Manufacturing Execution System (MES) that is specifically designed and developed for the long and sectional steel industry. Its process specific functions combined with highly comprehensive, graphical and user friendly screens provide a unique

user experience unlike any other systems in the industry. The ability to create a highly informed and collaborative work space is also a unique aspect that makes QMOS stand out among the competition.



QMOS covers all aspects of planning, scheduling, production and quality control in the Rolling Mill and the Melt Shop.

The following are the main modules that QMOS offers:

- Planning and Scheduling of the Melt Shop and the Rolling Mill (PSC)
- Melt Shop production management and control (MSP)
- Melt Shop equipment management for Ladles, Molds, Tundish, Roofs, Lances, etc. (LMS)
- Billet Yard management (BYM)
- Quality Control (QCA)
- Rolling Mill production management and control (PRR)
- Finishing Operations for Bundles and Coils (BTC)
- Off line and post processing management for finished material (FIN)
- Setup Shops
 - Roll Shop Management (RSP)
 - Guide Shop Management (GSP)
 - Stand Building/Bearings and Chocks (BCI)
 - Shear and Saw Blade Management (SBI)

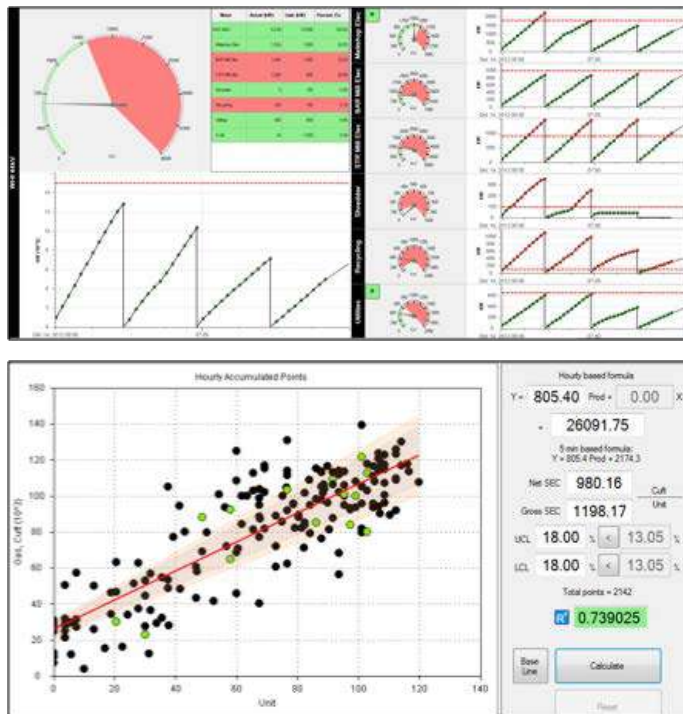
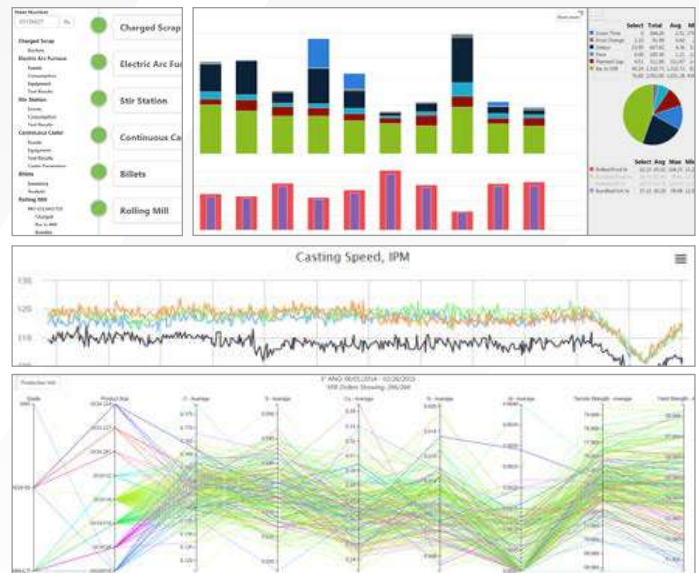
QMOS is the main MES system in over 30 steel producing facilities in North America.

Manufacturing Intelligence (MI)

An extension to the QMOS system, the MI system provides advanced, web based and highly graphical analytical capabilities. The users can slice and dice through the vast production, performance and quality data collected by QMOS in various dimensions. The MI system allows the process engineers to get to the information that matters, quickly and effortlessly.

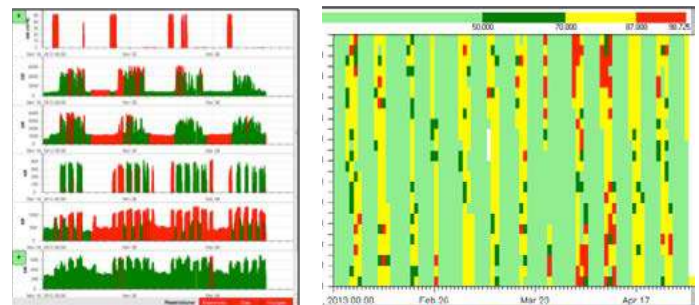
Some of the features of MI include:

- Melt Shop and Rolling Mill production and performance analysis
- Delay Analysis
- Quality and Test Results Analysis
- Order history and production calendars
- End to end production genealogy including process parameters



Energy Management (Energy Methods)

In order to address the growing need to effectively monitor and manage the energy consumption in the steel industry, Quad Infotech has developed a cutting edge enterprise energy management system called Energy Methods. The Energy Methods software provides the steel corporations to capture and gather all energy, cost and production information from all locations into a central system. Powerful analytics and reporting tools allow for all KPIs to be captured and analysed at different levels such as department, plant or corporate.



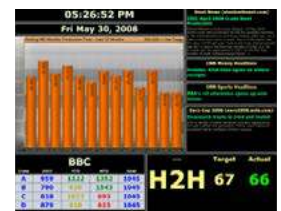
Information Visibility and Awareness (APEX)

One of the greatest challenges of an information system is to keep everyone in the organization up-to-date and with the latest plans as well as the production and performance information. The users at the plant level as well as the corporate level have different information needs. The plant users need real-time information on the state of production while the corporate users need to have up-to-date information of the KPIs. To address these needs, Quad Infotech has developed the APEX system. APEX allows for creation of graphical reports, big screen displays and slide shows that can broadcast real-time production information to a targeted audience. It can also take information from multiple databases and combine the data together into unified reports and slideshows.

The reports can also be sent to the recipients email. APEX makes all of this possible without the need for any programming.

The highlights of the APEX systems are:

- Multiple database access
- Highly graphical and comprehensive reports, in Real-Time
- Reports designed for large screen overhead displays and slide shows
- Report delivery via email
- Alarms and notifications
- Web portal and dashboard
- No programming required



Gerdau Completes the Commissioning of the QMOS MES System in its Ft. Smith Plant

Gerdau has completed the commissioning of the QMOS MES system at its Fort Smith specialty steel plant. QMOS will be responsible for receiving all orders from the business system and providing work instructions for the entire production line from the dual furnace melt shop to the direct charging caster all the way to the post processing lines.

The advanced quality management tools of QMOS will help the Fort Smith to better track and manage the complex customer requirements. At the same time, the analytical tools allow the quality engineers to better monitor the consumption of scraps and additives in order to create more efficient and cost effective recipes.

QMOS will help manage the activities of Fort Smith's multiple finishing process lines eliminating the traditional paper based reporting and improving the information accuracy throughout the entire process. All delays and test results are captured and final production and performance numbers are reported back to the business systems.

Fort Smith utilizes Quad Infotech's APEX system for creating web based reports, live displays and alarm notifications. The APEX system enhances the visibility of critical production and performance information throughout the plant as well as the corporation. The operators as well as management can readily have access to real-time critical information.

Gerdau Completes the Commissioning of the QMOS MES System in its specialty steel Integrated Plant in India

Gerdau Steel India Limited (GSIL) has completed the first phase of the commissioning of the QMOS MES system at its integrated steel plant in Tadipatri, India.

QMOS receives all orders from the GSIL SAP system and provides necessary tools for managers to validate production and confirm data in SAP. With comprehensive tracking of consumables, temperature zones and Ladles weights, QMOS seamlessly integrates the Blast Furnace with either of the 2 active BOF converters. The specialty steel facility uses QMOS to further track downstream operations at the LMF, VTD and Caster.

The integrated quality spec system in QMOS combined with improved billet testing features and interfaces allow the Blast Furnace and SMS operators to view and track the quality status of each heat and billet throughout production. Analysing the quality results with respect to additives and casting parameters such as temperatures, speeds, oscillation and mold levels, amongst many others, is made easy with the unique analytical tools provided by the QMOS Manufacturing Intelligence (MI) application.

In phase 2, QMOS will be implemented for the rolling mill and finishing operations.

Nucor Steel Texas implements Quad Infotech's Manufacturing Intelligence (MI) application

Nucor steel has implemented Quad Infotech's Manufacturing Intelligence (MI) application at its Jewett Texas plant. The MI application provides the process engineers with superior analytical tools for in-depth analysis of the production, performance and quality data. The MI provides the ability for the engineers to perform their analytical tasks in the fraction of the time as they are used to while gaining far better understanding of the process data. The highly graphical tools of MI provide the engineers with multi-dimensional view of the data with drill down capabilities.

Advanced QC analysis gives the quality engineers the power to visualize the quality behaviour of the Chem Size Groups which classifies the

various sizes based on chemistry and physical requirements. The genealogy of each production heat is available along with historical process parameters. At the same time, the quality engineers can assess the efficiency of the productions recipes and work towards more efficient and cost effective ones.

Process engineers can perform analysis on all process delays based on multiple production criteria and conditions. They can gain detailed understanding of the problematic areas throughout the mill and plan on preventative or corrective actions.

NEXT EVENTS

AISTECH EXPO:
May 04 - 06 2015 at AIC's booth #2665...

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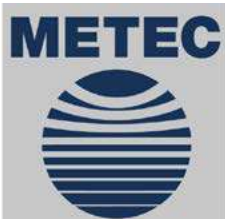
MADE IN STEEL:
May 04 - 06 2015 at AIC's booth G13, hall 12

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20th - 21st - 22nd MAY 2015
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Düsseldorf, Germany
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Gerda Jackson TN: DC drives according to UL508A and OSHA prescriptions for lock out and arc flash risk reduction

AIC is completing the first step of the Gerda Jackson TN project, focused on a complete replacement of the Main DC drives for the whole rolling mill stands.

Along with these high power control panels, AIC has also designed and developed a state of the art safety solution, in order to allow the operator safe access to the stands for every possible maintenance or repairing activity.

The safety for the people and the environment must be considered as one of the main drivers for every responsible steel producers. That's why AIC always looks for the most suitable solution for safety while keeping high performances of the plants.

The designed solution can combine both safe working conditions and efficient plant performances.

During the engineering phase of this job a safety design applied to North American standards has been required, mixing the deep experience developed together with our European clients in the last ten years, with the different standards adopted by American OSHA. The result is a great solution keeping all the previous milestones in the existing culture but applied in a more modern and efficient way.

From the point of view of the power control revamping, the core of the job are the 17 new DC drive panels, with the best technology available on the market for DC drives; the selected ABB DCS800 drives,

will be fully controlled via Ethernet/IP; furthermore every panel has been designed according to UL508A north American regulation, the standard for industrial control panels.

Thanks to its certification for the manufacturing of UL equipment and CSA listed, AIC delivered the whole supply already listed with an official Intertek authorization.



DC drive & automation panel

The panels are carefully designed to reduce as much as possible the risk of arc flash with several active protections; two systems were implemented to prevent the risk of arc flash:

- The first one is a system that quickly detects the arc, by sensing the flash, and immediately opens the low voltage circuit breaker and the upstream medium voltage circuit breaker; the system is able to interrupt arc flashes in a time of 30-50ms before they become a short circuit; in this way the arc is instantaneously kept out and the dissipated energy (kA2s) very low. In order to reduce the risk of arc flash it is also possible to properly use 'arc-proof' switchgears, but our implemented system offers a different and active protection; in fact most of the injuries happen with the panel door open (e.g. during maintenance); in this case a traditional arc-proof switchgear won't offer the minimum protection against arc flash.
- The second way to minimize the risk of arc flash is based on the remote control of the motorized circuit breakers: each DC drive main circuit breaker is completely driven by a dedicated system, mounted in a different physical position; in this way it is possible to open or close the power supply without any danger for the operators; in case of short circuit the operators are actually "far" from the panel, thus the risk of injury is minimized.

Another important millstone of the safety solution adopted from AIC is the safe stop system, completely realized with a safety PLC; this system controls the safety outputs according to the received safety inputs; redundant inputs, safety logic and double disconnection of the power source assure reliability of the safety emergency stop.

Part of this system is used also to manage the safety access to the mill; the functionality implemented permits to "ask" the system the access to the machine.

The system, according to the production in progress, controls the work process to have a safety stop without scrap; when the "safety state" is reached, a safety solenoid releases a key that can be inserted in a lock box; to exit from the "safety" state is necessary to insert the key back in the trap and give a reset command.

Functional and electrical safety, as well as the attention of the lock out / tag out procedures are the most important targets examined and followed during the whole engineering process; the very strong partnership and cooperation between the customer involving project, maintenance and production people and the technology supplier, starting from the beginning of the project up to the test of the equipment, allows both AIC and Gerdau to find the most suitable solutions from the point of view of the quality, the technical details and the tailored safety procedures.

In the following image a safety local control station is shown: it is equipped with released safety keys, connected to the safety PLCs and it allows safe access conditions to the rolling mill area according to the status of the stands, motors and field devices.



The full customer satisfaction during the FAT (Factory Acceptance Test) of the panels is another significant step in the cooperation between AIC and Gerdau, one of the most important steel group in North and South America and one of the leading steel producer in the world.

Released safety keys



AIC is a Worldwide Company

Our presence is wide: over 800 installations in more than 40 countries

"Since 1975 learning, listening and solving our Customers' needs"

We are also present in India since 2008 and in U.S.A. since 2011.

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