SMS () group LEADING PARTNER IN THE WORLD OF METALS

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Adding value to your success through Spare Parts and Technical Services



SMS group in South Africa Spare parts and Technical Services

Top and bottom knife carrier for the pendulum shear at ArcelorMittal Saldanha Works

The SMS group is the Leading Partner In the World of Metals

From South Africa we provide our local market with the latest in technology, technical services, & spare parts for metallurgical plant. In this regard we recently manufactured, supplied, assembled and installed the top and bottom knife carrier for the pendulum shear at the Arcelormittal Saldanha Works.

The process involved manufacturing and machining of the top and bottom knife carrier castings (27.120 tons and 7.700 tons respectively) inclusive of the main studs for the crankshaft at our SMS Siemag China workshop and delivering this order to our client according to schedule. Quality inspection was carried out by our team of experts in the presence of our client's representative.





With the manufacturing of these castings and studs completed in strict adherance to drawings & specifications, these castings and studs were shipped via sea freight to South Africa and delivered via road transport to the Saldanha Works.





Our local team of experts assembled the top and bottom knife carrier on site inclusive of a new crankshaft, new bearings, hydraulic cylinders and relevant spare parts.

This assembly was done on an assembly & storage stand for retrofitting online during the client's scheduled shut-down.

During the Saldanha Works scheduled shut-down our local team of experts was once again on site to assist with the rigging out of the old top and bottom knife carrier assembly and installation of the new assembly. Our site team professionally removed and re-installed these 96 ton assemblies. This pendulum shear, the only one of its kind in South Africa was successfully commissioned and handed over to the client at the end of the shut-down.

We are very proud of our site team who performed this important task with great skill and without incident whilst on site at the Saldanha Works.

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SMS group in South Africa Technical Services

Slab caster - old equipment given new life

The SMS group is the Leading Partner In the World of Metals

The SMS group in South Africa received an order to repair the support structure for the oscillator at the slab caster at one of our local clients. This involved the manufacture, supply and installation of the support beams and columns. This installation was extremely critical to ensure the oscillator was installed at the correct level after the new support structure has been installed.



This order was an excellent example where a mechanical global expert from our service division worked together with our local service division and this resulted in successful completion of this order.

This order was executed over a period of four weeks and the scope of work included the removal of the corroded support beams, columns and also the guide rails for segment 4 and 5.

After removal, the new beams and columns were installed together with the new segment 4 and segment 5 guide rails.



This slab caster which was originally commissioned in 1977 was given a new lease on life by this site installation.

Due to the value that the customer experienced by having our expert on site, the customer further extended our experts stay by a further two weeks in order to gain maximum benefit from his knowledge.

After the installation the customer reported a significant increase in machine availability.



SMS group in South Africa

Technical Services

Hydraulic inspection – Trouble-shooting and training in Africa

The SMS group is the Leading Partner In the World of Metals

From South Africa we provide our African market with the latest in technology, technical services, & spare parts for metallurgical plant. A key client in Africa who is rated amongst the largest Copper Mines in the world recently placed an order on us for one of our hydraulic experts to provide on-site technical assistance.

The objective was to provide on-site trouble shooting and training to this client. Based on certain problems that was being experienced, an hydraulic expert from our service division assisted this client in solving their hydraulic problems at their matte settling furnace.

This week long inspection and training allowed us toget information's about the wear and condition of the hydraulic system components like pumps, accumulators, cylinders, proportional and pressure setting valves.

This enabled current problems to be identified and recommendations made to rectify. Whilst on site a long standing problem with electrode slipping was solved resulting in immediate production and availability improvement.

The maintenance team at this client also received training on preventive maintenance activities, fault findings and rectifications as well as the testing of components.





Clogged and deformed air breather found during troubleshooting

A detailed report listed all the detected system discrepancies and improvement possibilities. This report together with recommendations helped this client to upgrade its systems and maintenance to the state of the art performance which in turn will allow them to optimize maintenance tasks efforts and improve reliability.



SMS group in South Africa Projects & Technical Services

Ladle Furnace #3 for ArcelorMittal Vanderbijlpark Works

The SMS group is the Leading Partner In the World of Metals

The SMS group in South Africa received two orders from one of our key clients, ArcelorMittal Vanderbijlpark Works for the design, manufacture and supply of certain components for ladle furnace number three for their Oxygen Steel Making plant.

Our scope of work included the manufacture, non- destructive testing, delivery to site, installation, alignment and functional testing of the electrode holding and manipulation system.

It also included the engineering, manufacturing, NDT testing, supply, installation, alignment and functional testing of a new ladle furnace roof.



These orders were based on extremely short contractual time schedules which required various critical milestones to be met during the project execution phases. This placed a huge responsibility on both our project management and execution teams as well as the client to deliver this project on time.

Progress on the project execution was tracked on a weekly basis by our expediting team and detailed feedback was forwarded to our client in the form of regular project plans and progress reports.

Our experienced site execution team arrived on site and proceeded to install all the ladle furnace equipment within our scope of supply, ahead of schedule after meeting and adhering to ArcelorMittal Vanderbijlpark Works strict health & safety requirements.

We are very proud of our project and site team who completed this project with great skill and without incident ahead of schedule.







This was another excellent example where our SMS group service division in South Africa worked together with our relevant technology division in Germany to ensure successful completion of a project.



SMS group in South Africa Projects & Technical Services

Engineering, Manufacture, Supply and Installation of the Pallet Conveying System at Hulamin Ltd.

The SMS group is the Leading Partner In the World of Metals

The SMS group in South Africa received an order from Hulamin for an upgrade to their S6 Cold Rolling Mill coil conveyor pallet conveying system. Hulamin is an Aluminium producing plant situated in Pietermaritzburg.



During our pre-site installation meeting we were informed by our client that the biggest risk that we would face during installation was the risk of fire by flame cutting and grinding as they use kerosene, a combustible hydrocarbon as their rolling medium for their cold rolling mill.

A detailed risk management strategy was immediately developed and implemented to mitigate the possibility of any fire occurring.

We are very proud of our site team who completed this project with great skill and without incident whilst on site at Hulamin. This upgrade to the coil conveyor pallet conveying system will enable Hulamin to do coil back-to-back rolling. Originally the plant was planned for the back-to-back rolling but not all equipment was installed. Coil handling for back to back rolling was previously realized by utilising the bay crane.

The foundation in the area for the new pallet conveying system was inspected and measured by our SMS group experts. All relevant dimensions for the foundation and the embedded steel were according to the original foundation drawings and therefore fully accepted by SMS.

The equipment for this pallet conveying system included the engineering, manufacture, supply and installation of a new turn table, five roller frame tables and two pallet assemblies.

Our experienced site execution team arrived on site and proceeded to install this new equipment in a very high risk environment.



This project was another excellent example where our SMS group service division in South Africa worked together with our relevant technology division in Germany to ensure successful completion of a project.



SMS group in South Africa

Technical Services

Equipment and process inspection at Hulamin Ltd. AGC cylinder trouble shooting, Change out procedures and Reduction in system temperature.

The SMS group is the Leading Partner In the World of Metals

The SMS group in South Africa received an order in 2015 from Hulamin for an equipment and process inspection of the hydraulic systems of the hot mill. Hulamin is an Aluminium rolling mill plant situated in Pietermaritzburg.

The objective of this inspection was to analyze the actual system status in order to optimize maintenance, reliability and performance. A detailed report was supplied that listed all the detected system discrepancies as well as improvement possibilities. The recommendations that were put forward will help Hulamin to upgrade their systems and maintenance to best practice.

The summary of actions / findings were as follows:

- Identify and resolve causes of a high temperature system.
- General setup recommendations addressing cleanliness, leakages, maintenance and oil aging.
- HGC cylinder pressure testing and seal changes, where necessary. Recommendations on testing schedules.
- Inspecting accumulator conditions with explanation of how the accumulator can affect mill production.
- Basic conditions of bending cylinder.
- Maintenance management recommendations including storage area recommendations.
- Detail instructions on action points.
- Recommendations on relevant available condition monitoring equipment
- Training of plant personnel.

Some of these recommendations included the maintenance of modern hydraulic systems.

It was also noted that costs due to damage of hydraulic components and systems, and the loss of production because of excessive machine downtime could be greatly reduced, if not eliminated, provided that maintenance personnel are adequately qualified and thoroughly trained in hydraulic maintenance practices and procedures.

Modern hydraulic practices could ensure inspection points according to different periods of service, e.g. daily inspection points, monthly inspection points and inspections shortly before an extended shutdown.

Identifying improvement potentials and optimizing processes are vital to your business. So, if you require a quick evaluation of your equipment's current state, the best starting point is a fact-finding audit.

This involves an expert SMS team assessing your relevant business areas, for example maintenance and production, as well as the associated equipment. We can also analyze other business units which are not directly involved, such as production or administration. Then, we document the results and present them to you in an action plan for future improvement.



This technical service was another excellent example where our SMS group service division in South Africa worked together with our relevant technology division in Germany to ensure successful completion of an equipment and process audit.



SMS group in South Africa

Spare parts and Technical Services

R1 Reduction gearbox inspection and repair at ArcelorMittal Saldanha Works

The SMS group is the Leading Partner In the World of Metals

The SMS group is the Original Equipment Manufacturer (OEM) for the Hot Strip Mill at the ArcelorMittal Saldanha Works. As the OEM we were mandated to do the inspection and repairs on the Roughing Mill Reduction Gear Box.



Our SMS group experts together with the ArcelorMittal Saldanha Works maintenance team opened up the reduction gearbox and removed the gears. A closer inspection of this gearbox revealed pitting and flaking on the bull gear teething. The root cause of the identified failure established that high pressure loads on the gear teeth flanks resulted in the damage.

Our SMS group experts managed to relieve the gear teeth flanks where failure was visible and on assembly also managed to adjusted the contact pattern to shift the load rating more to the centre and to the opposite side of the double helical gear.

Our SMS group Experts also managed to conduct visual inspections on other hot strip mill reduction gearboxes where other failures were also identified.

Together with this inspection and repair service, the SMS group also installed a temporary online Condition Monitoring System to monitor any further developments of pitting and fatigue cracking while a spare set of gears is being procured.





The SMS group assembles gear sets and gear units in our own workshop and can set optimum contact patterns with the aid of eccentric bushes. That means our gear units arrive on site ready for installation.



SMS group in South Africa Technical Services

Installation of Condition Monitoring of the S6 Cold Rolling Mill Hulamin Ltd.

The SMS group is the Leading Partner In the World of Metals

The SMS group installed our Genius Condition Monitoring System onto one of the cold rolling mills at Hulamin. Hulamin is an Aluminium rolling mill Plant situated in Pietermaritzburg.

The objectives of the Genius CM monitoring solutions supplied to Hulamin are:



To monitor the vibration in the roller bearings in the gear boxes of drive train and in the rolls To monitor the mill stand vibration

This was done to assist Hulamin in avoiding chatter marks and cracks on the rolled aluminium products.

In order to meet the above mentioned objectives, SMS group supplied a modulated online Genius CM plant monitoring solution. Genius CM is a SMS group proprietary monitoring solution for metallurgical plants and rolling mills. The Genius CM System supplied covers a wide range of Monitoring Modules and are defined as follows:

- Roller Bearing and Gear Box Condition Monitoring
- Process Chatter Monitoring for Cold Mills
- TmM Temper
- HdM -

MDVA -

MiDaS -

- Temperature Monitoring
- Hydraulic Monitoring for servo valves and contamination detection



The Genius CM online modules provide continues signal analysing methods in the time and frequency domain in order to be a state-of-the-art plant and process monitoring tool.

Potential machine defects, process-dependent conditions or excitation sources can easily be identified from the signal patterns and these vibrations can be used to correlate with the natural modes of the machine or process parameters to analyse the actual overall condition of the equipment.

The analysing methods meet the state-of-the-art of bearing and gear box diagnostics as well as the analysis of roll chatter.

This enables Hulamin to respond to the ever higher market demand for higher quality and productivity.

Client Testimony: Mr Tim Hawkins: General Manager: Process Engineering at Hulamin.

At the beginning of 2015, we installed the Genius Condition Monitoring System at our S6 cold mill primarily to improve surface quality.

Since the system has been commissioned and optimized, it has provided Hulamin the means to monitor and control the causes and effects of mill chatter. Since then, there has been no requirement to scrap any coils for mill chatter despite running the mill at historically high speeds with demanding pass schedules.

Additionally, the system provides predictive information that improves our mill reliability.

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The CM is a standalone software linked to the process automation software. The CM server can be connected to the internet via the network port and in this way remote condition monitoring analysis can be done as well as remote support. This saves time and money.

For the analysis, failure diagnosis and evaluation of alarm events, Genius CM utilizes both stored models and the signal data collected. Recorded data are evaluated for trend analyses. As soon as failure occur, Genius CM provides the appropriate diagnostic support on the basis of the web-based software in the entire company network. In addition to this, the system also offers heuristic methods for failure analysis.

SMS group as an Original Equipment Manufacturer (OEM) supply specialised trouble-shooting services by means of remote support with

- Preventive diagnostics.
- Failure identification/interpretation.
- Elimination of failure.





Our experts for torque and vibration analysis of rolling mills and drive trains have vast experience in all types of rolling mills throughout the world. SMS group pools this experience and supplies an excellent supporting service to Hulamin to ensure they achieve optimal Total Cost Of Ownership over the lifecycle of their plant.

The Benefit of the Genius Condition Monitoring system are as follows:-

- No unplanned downtimes or follow-up damage to key drive components, e.g. spindles
- High plant efficiency
- Reduction of downtimes due to fast diagnosis and remote maintenance service
- Utilization of the full component service life, therefore lower operating and maintenance costs
- Increase/guarantee of product quality with special process optimization tools
- Cost savings from elimination of unnecessary or over-frequent maintenance
- Improvement in general reliability, with the prospect of lower insurance premiums



1. Monitoring of toothing -(Gear mesh frequency) MDVA - Diagnostic Vibration Anaysis.

2. Bearing damage - Temperature Monitoring

3. Gear unit lubrication - (Dirt particles, oil flow, water level) HDM - Hydraulic Monitoring

4. Spindle monitoring - (Torque) TAS - Torque Analysis System (Currently NOT installed at Hulamin)

5. Process monitoring - MiDaS - Mill Diagnostic System

This technical service was another excellent example where our SMS group service division in South Africa worked together with our relevant technology division in Germany to assist our client.



SMS group in South Africa

Technical Services

Design, manufacture, installation and commissioning of 2 new steering rolls and the upgrade of one existing steering roll in the heating furnace of the Cold Mills North CAPL2 – ArcelorMittal South Africa Vanderbijlpark Works.

The SMS group is the Leading Partner In the World of Metals

This full turnkey solution resulted in a collaboration between SMS group Technical Services SA who provided the manufacturing and onsite installation of the mechanical equipment, Drever who provided the expert engineering design for our technologically successful steering system and our EMG Automation branded world class automation technology and design.







The motivation around our technology:

- Our technology increases the safety factor in and around the furnace area.
- The EMG Vivaldi based system uses EMG electro-servo cylinders instead of normal hydraulic cylinders. The benefit of this is that no hydraulic power packs are required. The area around a furnace is an area where you do not want any oil leaks as this causes a fire hazard.
- The Vivaldi radar based system has a much higher controlling accuracy compared to inductive systems as well as capacitive types of sensors.
- The control loop of an EMG Vivaldi based control system with iCON controller is much faster and more dynamic compared to older types of controller and sensor combinations.
- The quality of product produced is increased due to our superior accuracy and dynamic communication of our equipment and technology.
- Our technology has been development to ensure an increase in reliability of operational processes and also reduction in maintenance.
- Should there be a failure on a sensor the repairs can be done while the line is running. The only requirement is centering of the frame (a standard built-in function of the control system) and maintenance of the sensor. There is no need to stop the line and let the furnace cool down, repair sensor and then heat up the furnace again. This is substantial reduction in downtime should there be an issue with sensors.

This modernisation enabled the ArcelorMittal South Africa Vanderbijlpark works to realise considerable benefits. It allows for the processing of better quality and wider strip material that is centered in the furnace. It also prevents damages to the refractories in the furnace and this significantly reduces downtime.



This technical service was another excellent example where our SMS group Service division in South Africa collaborated with Drever and EMG Automation GmbH to assist this client.



SMS group South Africa

Technical Services

Design, supply, delivery and commissioning of two Torsion Torque Retaining systems for Argon-Oxygen Decarburization (AOD) 1 & 2 at Columbus Stainless (Pty) Ltd.

The SMS group is the Leading Partner In the World of Metals

Columbus Stainless has been supplied with two torsion Torque Retaining Sytems by the SMS group for their AOD converter at its steel plant in Middleburg, Mpumalanga, South Africa.

The aim of this Modernisation was to minimize the destructive forces acting on the gear unit, the bearings and foundation during AOD converter operations – was fully achieved in every respect. What's more, installing the new electrohydraulic torque support has resulted in a substantial reduction in uncontrolled vibrations of the gear unit and the converter vessel.

SMS group supplied the torque support as a compact electrohydraulic unit. Significant advantages of our converter tilt drive technology are as follows:-

- Active damping of vibrations (reduces the vibrations of the vessel, gear box, and foundations).
- Elimination of damage to spherical plain bearings.
- Reduced loads on foundations and mechanical equipment
- Decoupling of the converter from the foundations during blowing results in significantly longer equipment lifetimes.
- Increased benefit from the much longer service life of gears and bearings.



Before the revamp, SMS group examined the condition using special sensors (accelerometers) which were connected to a measuring and data recording system.

The same measurements and recordings were repeated after the new torque support had been installed and the collected data was compared with the previous measurements. It was certified that the contractually guaranteed values had been met.

Columbus Stainless is fully satisfied with the results, especially in view of the increasing availability and higher production reliability of the AOD converter. In addition, the maintenance effort for the gear unit will be drastically reduced.

This modernisation was another excellent example where SMS group South Africa collaborated with our experts in Germany to deliver optimisation for our client. The end result – SIGNIFICANT INCREASE IN AOD CONVERTER AVAILABILITY AND SAFETY.



SMS group South Africa Spare Parts Supply

Manufacture and supply of complete pre-assembled internal assemblies for modernised roughing and finishing mill gearboxes at ArcelorMittal Saldanha Works

The SMS group is the Leading Partner In the World of Metals

ArcelorMittal Saldanha Works in South Africa orderd three large case-hardened wheel-sets with Advanced Gear Design for use in the hot strip mill in roughers R1 and R2 and in the finishing line.

With the new SMS Advanced Gear Design elastic deformations of gear components are compensated by a specific gearing geometry. An ideal homogeneous load distribution is achieved under high load. By replacing conventional gearings with SMS spare parts including the Advanced Gear Design the transmissibility of the torque and the reliability of the existing gears can be significantly increased.

A contact pattern inspection was part of the wheel-set acceptance which took place in the presence of the client before the wheel-sets were sent to South Africa.

Through this workshop inspection, ArcelorMittal Saldanha was able to gain an insight into the manufacturing workflow of the gear components.

Gear contact pattern

The tooth contact distribution (the contact pattern) changes at different load conditions.

The main reasons for this are:

- Shaft bending
- Shaft torsion
- Tooth bending
- Deformation of the bearing components
- Movement of the shaft in the range of the bearing clearance
- Elastic deformation of the gear housing

The Advanced gear design compensates elastic deformation of the gear components with the help of a special tooth geometry. This results in a homogenous contact pressure distribution at load conditions.



Tooth profile - and tooth flank modification







With our expertise, resources, engineering support and equipment know-how, we are a single source for upgrades, spare parts, maintenance and field services for the metals industry drivetrain equipment.

SMS group in South Africa Technical Services

SMS group - Successful achievement of Provisional Acceptance Certificate (PAC), using Augmented Reality (AR technology).

The SMS group is the Leading Partner In the World of Metals

SMS group received orders from ArcelorMittal South Africa for the design, manufacture, installation and commissioning of three integrated Duma Bandzink air-knife systems at their processing lines in Vanderbijlpark.

Due to the COVID-19 related traveling restrictions implemented by the South African government, the Duma-Bandzink technology experts (Europe) could not travel to site for Provisional Acceptance Certification testing. For this reason Augmented Reality technology was used to successfully achieve PAC.







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AR is a technology that expands our physical world, adding layers of digital information onto reality, while at the same time placing our technology experts (that are sitting at their computers elsewhere in the world) right into the plant. AR appears in direct view of the user, while still giving the user the ability to use his hands freely for whatever tasks he is required to perform.

The current equipment in use by SMS group is a head-mounted device, which snaps onto safety helmets and can be used with safety glasses. A high-resolution micro display fits just below the line of sight of the onsite engineer and views like a 7" tablet. The unit functions with completely hands-free voice control.

This AR technology transports our international technology experts closer to the machines, much faster. Local engineers can perform expert tasks with guidance from technology experts who are based elsewhere in the world. The technology experts have full view on their computers of what our local engineer see & do. The technology experts provides our local engineers with detailed visual & voice guidance, also making comments & mark-ups to the drawings which is displayed in the small screen in the eye sight of the local engineer. Our technology experts in turn will have their full support team such as designers, field experts, commissioning engineers etc. next door to them for quick response and reference.

This successful achievement of PAC, using AR technology again provided our clients the advantage of having a local SMS group engineer on site to understand the situation; who is supported by a remote international technology expert.



For this instance of PAC test all parties involved could witness the performance tests and still keep the required safe working distances in the pulpit as a few role players were required to work from home. During the waiting times between coils, the technology expert could explain adhoc questions to the plant operators via the local SMS group engineer, creating a learning environment for all involved.

This is just another example of how SMS group & Duma-Bandzink used technology as an enabler for our mutual clients to use their equipment optimally & safely.

REFERENCE CASE



SMS group in South Africa Technical Services

SMS group provides high quality and reliable copper mould tubes which improves operational lifecycle of the mould tube.



CASTER SPECIFICATIONS	
Caster	Curved mould, 5 strands, 5m radius
Casting Type	100% open casting
Mould	Copper, 900mm long
Production Range	115mm square
Cast Speed(s)	2.5m/min up to 3.0m/min
Carbon Range	0.05% to 0.65%



Benefit of SMS group Mould Tube Supply

- □ High quality
- □ Increase operational lifecycle
- □ Reduced breakouts
- □ Ability to product to any mould design
- Potential to develop current design further
- □ Competitive pricing
- Competitive Leadtime





SMS group The world's first carbon-neutral steel plant

The SMS group is the Leading Partner In the World of Metals

Carbon-neutral green steel, made with renewable hydrogen. A futuristic dream, set in a distant future? No – this is reality: a totally new, green steel facility to be built in northern Sweden making use of SMS group expertise and equipment. This hydrogen-based direct reduction plant will be fully integrated, transforming virgin raw materials into finished steel. Works will start in 2022 and the site is expected to be operational by 2025.



H2 Green Steel, Sweden The world's first carbon-neutral steel plant will be supplied by SMS group and is about to start-up in 2025.

The H2 Green Steel project is an exciting step in the transition of the European steel sector towards carbon neutrality. Based near Boden, in northern Sweden, H2 Green Steel will be the world's first renewable hydrogen-based integrated steel mill.

H2 Green Steel opens up the prospect of zero CO2 steel – a true revolution in a sector that currently emits two tons of the greenhouse gas or more per ton of steel produced. SMS group is proud to be a partner in the project.

Our metallurgical know-how and our engineering skills combined with our digital expertise and plant technology consultancy enable us and our partners to forge a greener metals industry. It also allows us to make a fully circular use of metals. We are now fully focused on this vision, and together with our partners, we are on our way to turning metals green.

SMS group will, together with Paul Wurth and its consortium Midrex, provide partner **MIDREX®** direct reduction plant, the EAF based melt shop, a CSP® Nexus plant as well as an cold advanced rollina and processing complex for the production of a broad product mix including Advanced High Strength Steel and automotive steel grades.



We are very proud to supply the technology for the world's first large scale all-green steel plant. Hydrogen based green steel is the future of primary steelmaking, and we are all working at full speed to deliver the key technologies to start a new era of steelmaking.