

X-Roll<sup>®</sup> MultiFlex Treatment  
Technology – Customized properties  
for high-grade plates



# Some things you need to know about X-Roll® MultiFlex Treatment Technology

## As full system supplier we offer you

- The opportunity to produce a wide spectrum of steel grades, including ultra-high strength and wear-resistant plates with precise mechanical properties and unique final quality
- The X-Roll® MultiFlex Technology comprises our entire experience in the field of plate production. Among other advantages, you will experience:
  - Sustainable heating technology
  - Flexible cooling strategies
  - Precise and uniform temperature setting in the plate
  - Enlarged leveling range by the X-Roll® MultiFlex Leveler
  - Capable process cooling model, being able to adapt to all process requirements
  - The modular structure of X-Pact® allows seamlessly linking to various levels of the plant's electrical and automation system
  - Services to achieve a performance increase in existing plants
  - Digitally managed services to increase the effectivity of your maintenance team

## When investing, you will earn:

- Access to the growth markets, e.g. wind energy, power engineering, tubes and pipelines by supplying high-grade plates
- Because you will be able to offer even niche products profitably
- By efficiently developing new products, supported by our most capable material property model
- Because the ramp-up curve will be steep, thanks in particular to our Plug & Work integration test
- By energy-efficient, clean and durable operation ensured by customized water-treatment plants
- When utilizing our broad portfolio of services covering the entire life cycle of the equipment and digitally managed maintenance services
- By providing your plant with our digital solutions and profit from ecological and economic benefits, because valuable resources will be saved and plant operators may concentrate on operational and strategic tasks



### X-Roll® MultiFlex equipment from SMS group comes with numerous advantages:

- Range of proven and innovative machine functions
- Maximum flexibility during production
- Process control at the limits of physics
- Harmonized interaction between machine functions and technological process with X-Pact® automation
- State-of-the-art machine and plant concepts
- Economical and energy-efficient production of a wide spectrum of steel grades, special steels and special grades with extremely demanding qualities
- Production of high-strength and wear-resistance plates with precise mechanical properties and unique final quality

## Contents

X-Roll® MultiFlex Treatment Technology	4
Advantages at a glance	5
History	7
Core components	9
Roller-type shot blasting machine	11
High-temperature roller hearth furnace	12
X-Roll® MultiFlex-Quench	14
Low-temperature furnace	19
X-Roll® MultiFlex-Leveler	21
Water treatment plant	27
Primer line	29
X-Pact® electrical and automation systems	30
References for X-Roll® MultiFlex heat treatment lines	33

# X-Roll® MultiFlex Treatment Technology



SMS group heat treatment lines enable the economical and energy-efficient production of a wide range of special steel grades with extremely demanding qualities. In particular, these include high-strength and ultra-high-strength plates with excellent flatness and precise mechanical properties. These plates are employed in growth sectors such as wind energy, power engineering, tubes and pipelines, mechanical engineering, crane technology, and the construction industry. In addition, special steels or special grades, which are considered as profitable niche products, can be easily produced with X-Roll® MultiFlex treatment technology.

A distinction is made between the following heat treatment processes:

- Normalizing
- Quenching
- Quenching and tempering

SMS group has built several complete heat treatment lines for the plate manufacturing market. The combination of the new X-Roll® MultiFlex technology in the quench and the leveler enables the production of particularly high-strength materials with the necessary flatness to meet market requirements both now and in the future.

By predicting the mechanical properties with the material property model for the complete heat treatment process, operators can optimize the whole process and develop new products in a cost-effective way. SMS group supplies the entire process chain from a single source and thus ensures the highest quality.

## Advantages at a glance

- Flexible, future-oriented overall concept with proven and innovative system components.
- Energy and time-optimized furnace concept thanks to the close, harmonized interaction between furnace and quench.
- The X-Roll® MultiFlex-Quench offers exceptional flexibility, a wider product range for standard, special and new grades, as well as higher uniformity and performance compared to conventional roller-type quenches.
- In addition to the possibility of automated leveling, the X-Roll® MultiFlex-Leveler offers a choice of strategies for eliminating various complex flatness defects and minimizing internal stresses. The leveling of hot plates with a reduced yield point prevents surface cracks in very hard materials. The ability of various leveling strategies, individual roll and drive adjustments of all rolls and the possibility of using the extended roll mode increase the leveling range considerably.
- Powerful physical, online process models for furnaces, X-Roll® MultiFlex-Quench and X-Roll® MultiFlex-Leveler. The whole coordinated plant and process technology from a single source is rounded off by a uniform hardware and software structure.
- Steep ramp-up curve, thanks in particular to the Plug & Work integration test.
- Reduction in the number of production tests and thus costs by calculating the mechanical properties using the material property model for the entire heat treatment process.
- Long-term technological support from an expert technology team at SMS group.



Exit-side view of the X-Roll® MultiFlex-Quench as the core component of the plate heat treatment line from SMS group.

**SMS group has extensive experience with products for the heat treatment of plates.**

### Customers include:

- Ruukki, Finland
- SSAB, Sweden
- Dillinger Hütte Saarstahl AG, Germany
- Ilseburg Grobblech GmbH, Germany
- Dillinger, France
- ArcelorMittal, Belgium
- VDM Metals, Germany
- Acroni, Slovenia
- Baosteel, China

# History of plate cooling technology

The key process for setting the material properties comprises mainly water cooling. Laminar cooling systems with U-shaped tubes are widely used and have been a feature of rolling mills since 1950. Advancements in materials have meant higher cooling rates and more flexible cooling patterns are required.

In 1966, the Drever Group USA introduced the first roller-type quench. Mannesmann Demag developed the first plate cooling system in 1979. The merger between Drever and SMS group took place in 2006. As a result, SMS group has accumulated extensive experience in the development of plate cooling and quenching systems.

Early 2000 saw a growing demand for higher cooling rates combined with good flatness levels. That is why the new spray cooling system with pinch rolls and new cooling headers for plate cooling was developed.

SMS group has further developed the spray-cooling system concept and the conventional roller-type quench and adapted it to the heat treatment process. The progressive development of the mill's proven, rigid design resulted in the X-Roll® MultiFlex-Quench. All the features of established plate cooling systems and quenching systems were combined and innovatively planned in advance.



**1966**

Bethlehem Steel, USA  
Drever Group  
develops first quench



**1979**

First laminar cooling system supplied to Illitsch Mariopol/Ukraine  
3 m plate mill



**1999**

Merger of  
Mannesmann  
and SMS



**2005**

First spray cooling system supplied to Baosteel/China  
3 m plate mill

1960

1970

1980

1990

2000

2005



X-Roll® MultiFlex-Quench.

**MultiFlex-Quench®**  
the best of two technologies!!



**2009**  
Roller quench supplied by Drever International to MMK/Russia 5m plate mill



**2016**  
**1. MultiFlex-Quench®**  
Acroni/ Slovenia



**2020**  
**2. MultiFlex-Quench®**  
Salzgitter/ Germany



**2022**  
**3. MultiFlex-Quench®**  
NUCOR/ USA



2010

2020

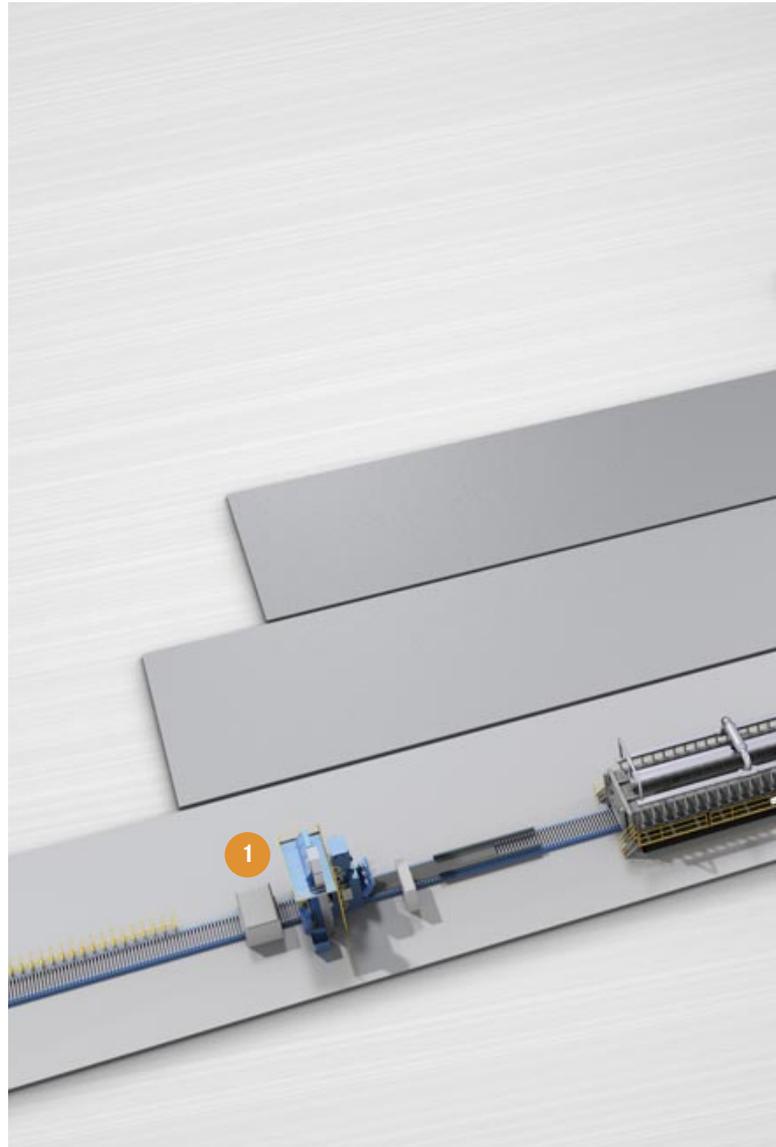
# Core components

## A heat treatment line for top-quality plates essentially comprises:

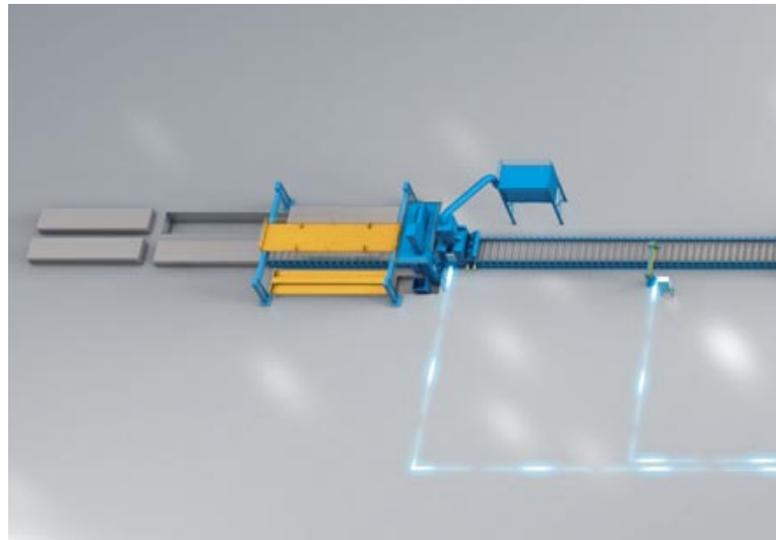
- Shot blaster for surface cleaning
- High-temperature roller hearth furnace for heating and austenitizing
- X-Roll® MultiFlex-Quench for cooling and adjusting the material properties
- Cooling bed or cooling roller tables to cool down the normalized plates
- Low temperature furnace for tempering special materials and stress-relief annealing
- X-Roll® MultiFlex-Leveler to optimize the flatness and reduce the tension
- Water treatment plant to provide the necessary quantities of water in the desired quality
- Last but not least: Our world-leading X-Pact® electrical and automation systems ensure your system is fit for the future.

## Additional equipment can individually further improve the quality of the applied sheets.

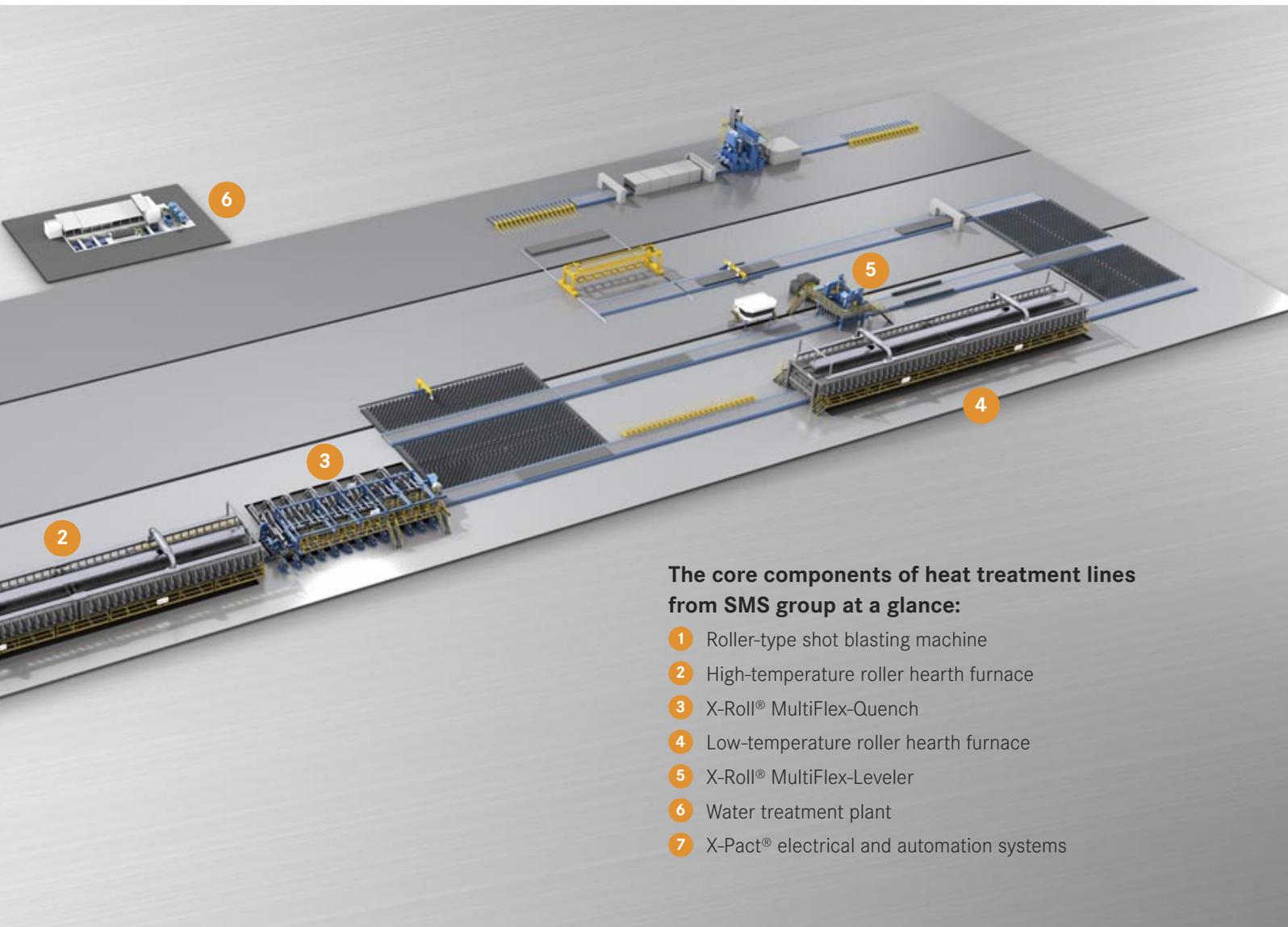
- Coating and primer line
- Flatness measuring equipment
- Flame cutting equipment
- Inspection systems
- Loading, packaging and shipping areas



Core components in the heat treatment line for plates supplied by SMS group.

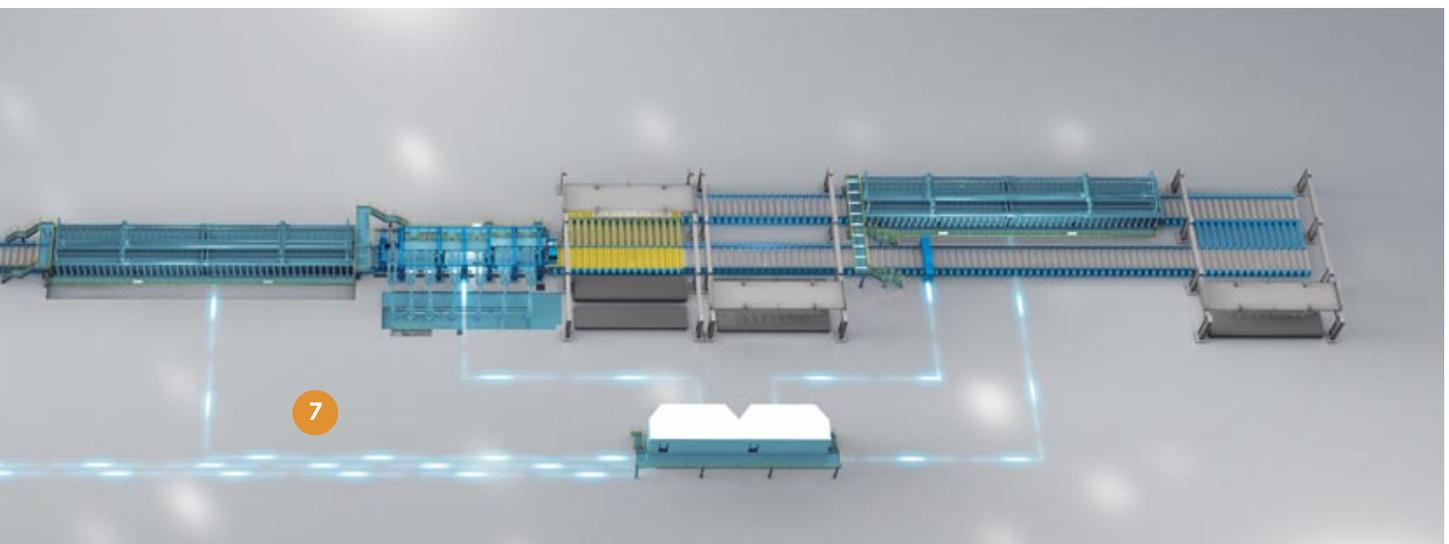


Information superhighway providing system integrity.



**The core components of heat treatment lines from SMS group at a glance:**

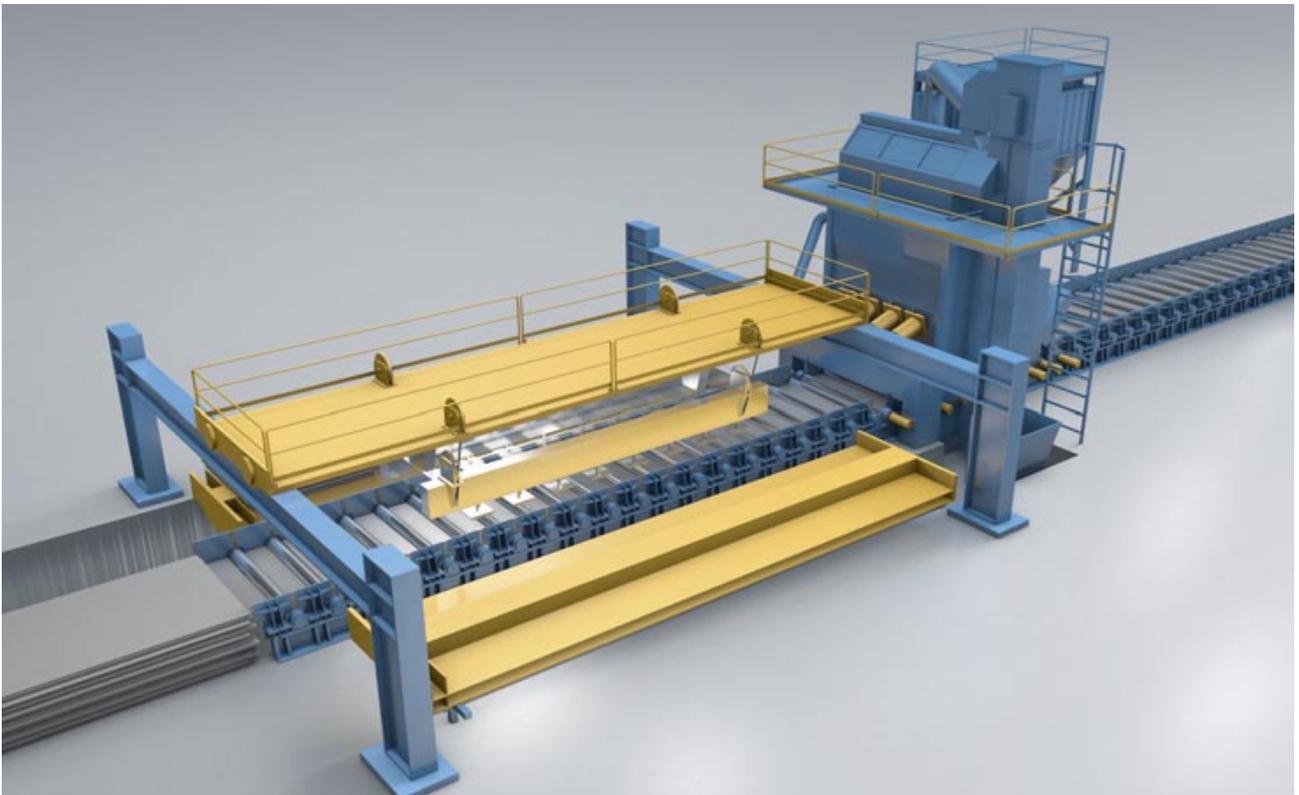
- 1 Roller-type shot blasting machine
- 2 High-temperature roller hearth furnace
- 3 X-Roll® MultiFlex-Quench
- 4 Low-temperature roller hearth furnace
- 5 X-Roll® MultiFlex-Leveler
- 6 Water treatment plant
- 7 X-Pact® electrical and automation systems



# Roller-type shot blasting machine

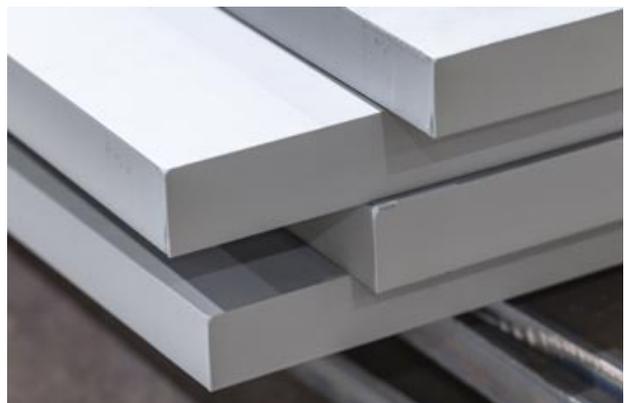
## Primer line

The roller-type shot blasting machine cleans the plate surface of scale and impurities, so that an even heat transfer is guaranteed when the plate is heated in the furnace and cooled in the X-Roll® MultiFlex-Quench.



*Arrangement of the shot blasting machine and the primer line.*

Complete primer lines consist of individually adaptable conveyor systems, a preheater, a shot blaster, the color coating system, and a downstream dryer. A gas-heated preheater unit also allows the processing of material that is stored outdoors. The dryer dries the protective layer, which is applied by the automatic painting machine, so that the plates can be removed immediately from the exit area of the system for further processing or shipped to the end customer. The waste heat from the preheater can be used to save energy.



*Final treated plates.*

# High-temperature roller hearth furnace

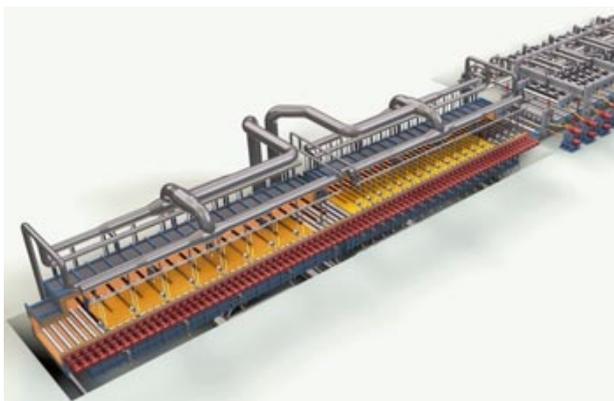
Furnace can also be realized with fully electrical heating system.  
**We make your green steel even greener!**  
 SMS sustainable heating technology for a clean future!

The plates are austenitized in an indirect-fired roller hearth furnace with an inert gas atmosphere. This minimizes the formation of scale on the plate surface and prevents marks on the bottom side. For the heating process, modern low-NOx recuperative burners for minimal emissions and energy-efficient operation are used.

Dividing the furnace into two sections in combination with a special plate operating mode enables excellent temperature uniformity over the entire plate, regardless of its length. This functional package for the high-temperature roller hearth furnace provides the conditions for perfect quenching of the plates in the X-Roll® MultiFlex-Quench.



Roller hearth furnace with indirect heating and inert gas atmosphere (panoramic photo)



Two-section furnace



Excellent temperature uniformity of the heated plate at the point of transition to the quench

# X-Roll® MultiFlex-Quench

The high degree of flexibility, the broad product portfolio and the excellent flatness results offered by the X-Roll® MultiFlex-Quench are setting new standards for plate production in heat treatment lines.

The X-Roll® MultiFlex-Quench concept features many options and upgrade opportunities over different extension stages that meet the needs of the customer and of the current and future production program.



*X-Roll® MultiFlex-Quench with entry on the left side.*

Flexible cooling strategies enable the production of standard and special materials as well as newly developed grades with the highest quality requirements.



### Overview of cooling advantages

- Large cooling areas on all cooling beams (finer nozzle distribution / optimized cooling header design)
- Special nozzle construction, safe nozzle arrangement under the cooling header / guide surface, large impingement zone, robust construction
- Width distribution of the cooling header
- Self-cooling mode of the bottom cooler header with low pressure in standby mode, in order to prevent dirt particles from clogging the nozzles
- The high pressure section can also be switched to low pressure mode
- Proven cooling model from SMS group equipped with full range of functions (e.g. cooling pattern and cooling stop temperature)
- Different cooling strategies possible (selective speed change within one sequence)
- Individual cooling stop temperature
- High range flow variation
- Active hydraulic clamping for plates over the entire length for optimized plate flatness
- Pressure transducers in each hydraulic adjustment cylinder allow flatness deviation control
- Identical components - same design for the high and low pressure sections for easier maintenance.



*X-Roll® MultiFlex-Quench with entry on the right side.*



*X-Roll® MultiFlex-Quench with entry on the left side.*

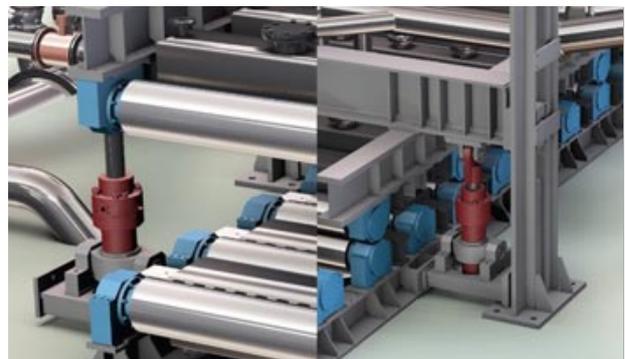
Switchable pressure ranges enable all cooling patterns from extremely slow cooling right up to abrupt quenching with freely selectable cooling stop temperatures. Headers and nozzles, which were specially developed for the process and plant type and have been extensively tested, determined and verified in the laboratory, including their functionality and parameters, complete the plant profile.

A uniquely designed MultiFlex slit nozzle, developed and patented by SMS group, in the entrance area of the quench offers the highest possible cooling rates close to physical limits. Such special applications are necessary for special heat-treated steels with high wear resistance combined with high ductility at low temperatures.

The X-Roll® MultiFlex-Quench can be equipped with separate nozzles to create a water mist for treating crack-sensitive tool steels. The system is able to implement cooling rates and patterns accurately. This helps to shorten the average cooling period for special tool steels, particularly those that are crack-sensitive.

The possibility of choosing variable X-Roll® MultiFlex-Quench cooling stop temperatures enables not only increased production capacities but also energy savings for tempering furnace operation. In terms of thicker plates, the variable stop temperature even allows for extremely energy-efficient self-tempering. The X-Roll® MultiFlex-Quench is divided into several segments.

During the cooling process in the segments, the plates are guided and clamped between numerous pinch rolls. The active hydraulic clamping of the pinch rolls leads to a perfect flatness result, especially with thin plates. A combination of position and force control ensures that the pinch rolls are brought into the correct position and controlled accordingly. Pressure transducers in each hydraulic adjustment cylinder ensure the operational safety of the equipment as well as special functions such as flatness deviation control.



*Pinch roll adjustment.*

Type of heat treatment	Comment	Conventional quench	X-Roll® Multi-Flex Quench	Steel grade/ application
+Q	Quenching	Yes	Yes	Abrasion resistant and stainless grades
+QT	Quenching and tempering	Yes	Yes	QT steels, mechanical engineering, tool steels < 0.40 % C
N + C	Normalizing + fast cooling; cooling stop temperature > Bainite start temperature	No	Yes	More delicate microstructure; higher strength at constant share of alloys
QST	Quenching and self-tempering; Tempering of the hardened surface by core temperature	No	Yes	Abrasion resistant plates, steel for bridges, construction steel
Q + P	Quenching and partitioning with cooling stop temperature; Between Ms and Mf.; afterwards direct annealing	No	Yes	Plates with uniform, higher elongation values than general structural steels; Set residual austenite / martensite; Earthquake-proof buildings and bridges; pipes according to strain-based design
	Quenching and partitioning until cooling stop temperature Ferrite start; afterwards holding time for partial austenite/ ferrite transformation; afterwards hardening until ambient temperature is gained (no annealing)	No	Yes	
Aus-tempering	Quenching and tempering with cooling stop between bainite start temperature and Ms-temperature; afterwards direct annealing at the same temperature (isothermal treatment)	No	Yes	High-strength full bainitic grades: heavy plate possible
Sensitive cooling	Quenching with specified cooling rate and cooling stop temperature	No	Yes	

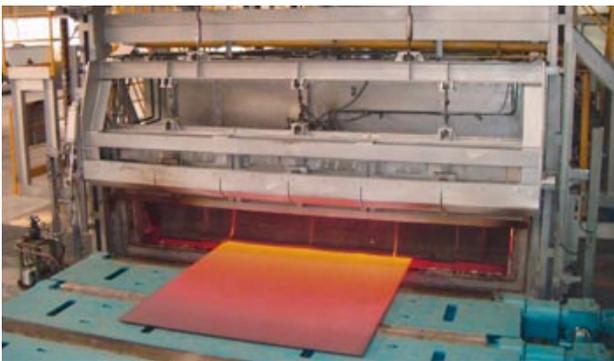
Table: Comparison of cooling strategies with cooling strategies with and without application of the X-Roll® MultiFlex-Quench.

# Low-temperature furnace

The final material properties of the hardened plates are attained in the low-temperature furnace. Like the high-temperature furnace, the tempering furnace is also designed as a roller hearth furnace.

Open firing with on/off-control is used to ensure high convection and uniform temperature conditions in the furnace. Optionally, both can be further increased by adding an exhaust gas recirculation system.

This enables extremely precise and uniform temperature setting in the plate, even at the lowest target temperatures. The low-temperature furnace is equipped with low-NOx burners and energy-efficient recuperative heat recovery too.



*Uniform temperature distribution at the furnace exit.*



*Open fired tempering furnace.*

Furnace can also be realized with fully electrical heating system.  
**We make your green steel even greener!**  
SMS sustainable heating technology for a clean future!



# X-Roll® MultiFlex-Leveler

In addition to high-strength material properties, the market nowadays demands excellent flatness and low internal stresses in the plates. The new X-Roll® MultiFlex-Leveler is setting new standards in terms of final flatness and residual stress distribution in the material.

The state-of-the-art leveler design offers a choice of strategies for eliminating various complex flatness defects. The leveling range is extended significantly not only with the fast single roll adjustment feature and individual drives for all leveling rolls, but also with the use of the E-Roll-Mode (Extended-Roll-Mode). Specially developed back-up rolls for maximum load transfer for this type of machine were tested and proved on SMS group's own back-up roll testing facility. The bending system that offers the option of making specific leveling gap adjustments as well as the highly dynamic main adjustment system round off the profile of the X-Roll® MultiFlex-Leveler.

The water cooling systems for the leveler enable hot plates to be leveled with a reduced yield point. As a result, surface cracks in very hard materials are prevented.

The leveling model for adjusting the leveler is active in all phases of leveling and ensures the highest quality results in the leveling process. For the most modern materials and complex flatness defects, the optimal setting is automatically selected. In addition, the digital approach of the model allows continuous learning, which means that the process and result are continuously improved and new materials can also be easily learned. In combination with a flatness measuring device for direct control of the result and for recording the quality, value-adding synergies can be achieved in the shortest possible time.

The flatness measuring table and flatness measuring device in the exit area of the leveler complete the leveling process and enable the operator to check the result immediately. In addition, an automatically generated report certifies and documents the high flatness quality of the plates.

The integrated scale discharge from the machine in conjunction with the combined brush and scale suction system ensure a clean working area and contribute to optimum qualities and results as well as the longevity of important machine components.



*X-Roll MultiFlex-Leveler entry side.*



*X-Roll MultiFlex-Leveler exit side with flatness measuring table.*



X-Roll® MultiFlex-Leveler from SMS group.

## Leveling advantages at a glance

- Leveling of standard materials, special and future grades through flexible implementation options
- SMS group leveling model with full range of functions (automatic leveling strategy, overstretching and threading specifications) for handling a wide variety of complex flatness deviations
- Convenient strategy selection of different leveling strategies for each leveling pass
- Enlarged leveling range due to single roll adjustment, 11, 9, 7, or 5 roll modes, basic gap shifting and smoothing pass
- Optimized leveling of thin gages based on basic gap shifting
- Adaptation of the adjustment system and storage options for downstream products
- All leveling rolls provided with individual drives with load balancing control
- Highly dynamic main adjustment and bending system for specific adjustment of the leveling gap
- Special threading modes for transport-critical products, especially thin plates
- Specially developed, tested and proved back-up rolls and back-up roll structure for easier maintenance
- Cleaning device for quick cleaning of the leveling roll surface without roll set removal in order to preserve optimal plate surfaces and portability
- Optimized machine calibration functions

# High-performance finishing system for heat treatment line

The high-performance finishing line, also from SMS group, completes the heat treatment line by interconnecting the various facilities. These robust, environmentally-friendly and low-maintenance roller tables, cooling roller tables, cooling and inspection beds with feed and discharge devices, transfer devices, transport cars, plate storage areas, lifting and centering device, and measuring table for flatness measurements are all designed for a wide range of applications.

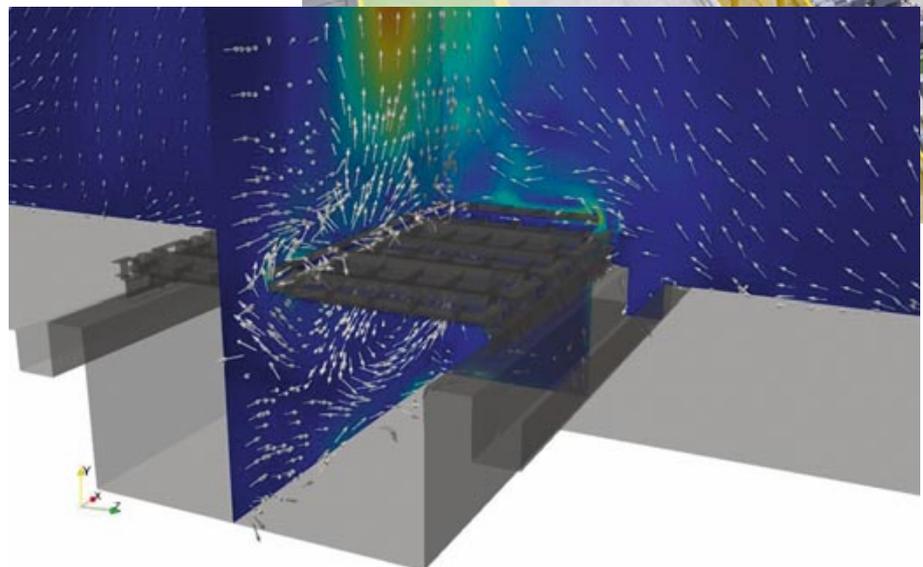
The contribution these facilities make to the working process is often underestimated. Sophisticated temperature management of the plates on the different roller table areas and the cooling bed is indispensable when producing special steel grades with extremely demanding qualities.

Surface-friendly, reliable, noise-reduced transport and the integration of the associated sensors in protected areas are ensured. The fluid power simulation therefore guarantees an intelligent, cost-effective foundation design. The optimal airflow in the cooling bed area ensures that the plates cool down evenly.

Another special feature is the new X-Roll® MultiFlex-Turnover system. The plate turner can be adjusted to the plate thickness, which significantly reduces noise emissions during operation.



X-Roll® MultiFlex-Turnover device.





# Water treatment plant

Another factor in the successful production of tempered plate is the water treatment plant. In addition to the water quality, the control of the water pumps is an important part of the automation. The water quantities calculated in the SMS group cooling model are transferred via an interface to the automation system of the water treatment plant.

The pressure pumps in the water treatment system are frequency-controlled. The pump curves and various operating values are saved in the SMS group cooling model, which not only calculates the required water throughput but also the speed and time required to operate the pumps with the required output. Control of the bypass valves is perfectly aligned with the cooling process.

With these features, the water treatment plant is optimally adapted to the process of heat treatment and thus supports the achievement of the high final product quality.



*Frequency-controlled water pumps*



*Sand filter*

Customized water treatment plants by SMS group are:  
**energie efficient,  
clean, durable,  
perfect!**



*Cooling tower*



*Water basin*

# X-Pact® - Electrical and Automation Systems



*X-Pact® automation cabinet with 8 real-time control systems for the plant automation.*

The manufacture of high-strength steels involves complex processes that place high demands on plate cooling and the downstream X-Roll® MultiFlex-Leveler. For this purpose, SMS group has developed the online process-cooling model, which is the centerpiece of the X-Roll® MultiFlex heat treatment line.

The physical-mathematical process-cooling model adapts to the requirements of the heat treatment line. Its primary objectives are the precise forecast of the required amount of water as well as energy efficiency. The model can be operated in fully automatic mode by using a preselected cooling pattern. The mechanical properties can be determined using the SMS group material database.

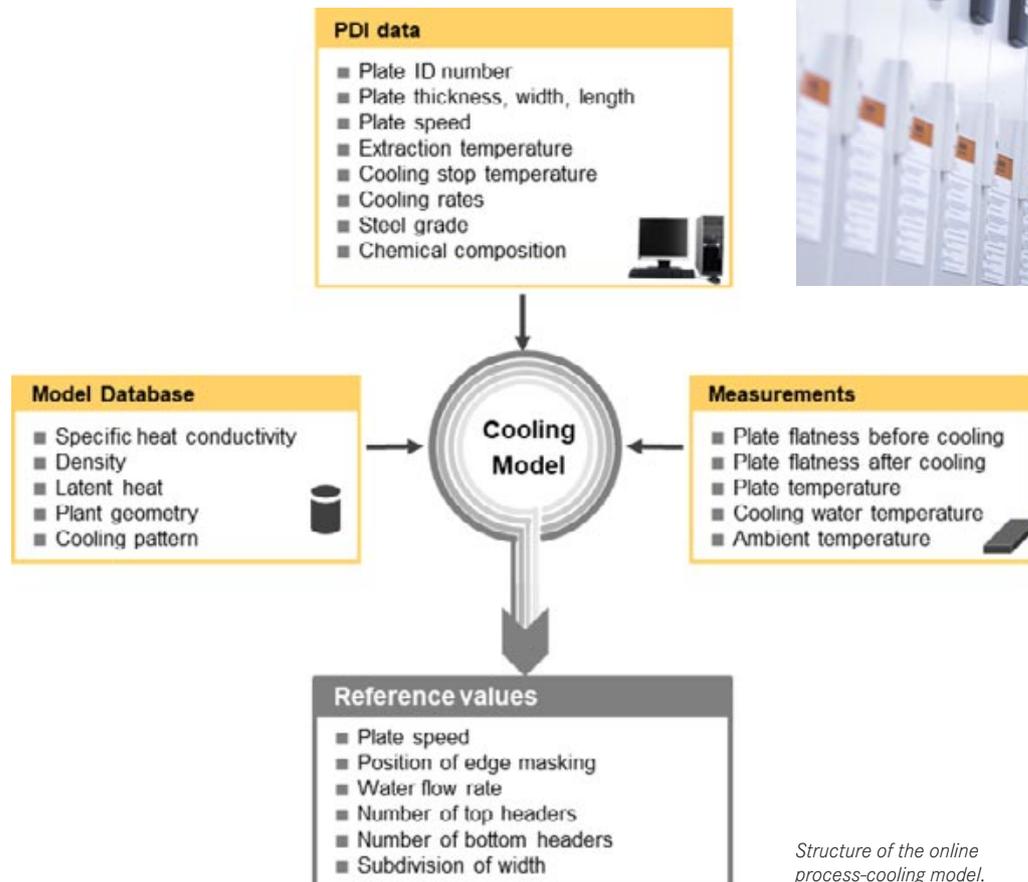
The database provides important physical and mechanical properties for all types of steel, depending on their chemical composition and temperature.

In addition, the mechanical properties, such as

- Hardness (in HV, HB or HRC)
- Yield strength
- Tensile strength

can be calculated in advance.

Temperature curves can be combined with continuous cooling transformation diagrams (CCT) in a material property model. The calculation of the mechanical properties after quenching or tempering is based on chemical composition and microstructure constituents.



Structure of the online process-cooling model.

Our world-leading X-Pact® electrical and automation systems ensure your equipment is fit for the future.

Thanks to its consistently modular structure, X-Pact® seamlessly links the various levels of the plant's electrical and automation systems. In addition to the technological process models, X-Pact® also includes all plant automation tasks such as drive technology and sensors. In close cooperation with our customers, we design tailor-made solutions and implement advanced technologies to meet our customers' requirements by offering full digitalization capability.

### X-Pact® Process Automation Control Technology: Premium quality through integrated solutions. X-Pact® advantages at a glance:

- Integrated modular solutions
- In-depth metallurgical process knowledge
- Technological expertise
- Long-standing experience
- Everything from a single source
- International line-up
- Trouble-free commissioning with Plug & Work
- Global, comprehensive 24/7 service

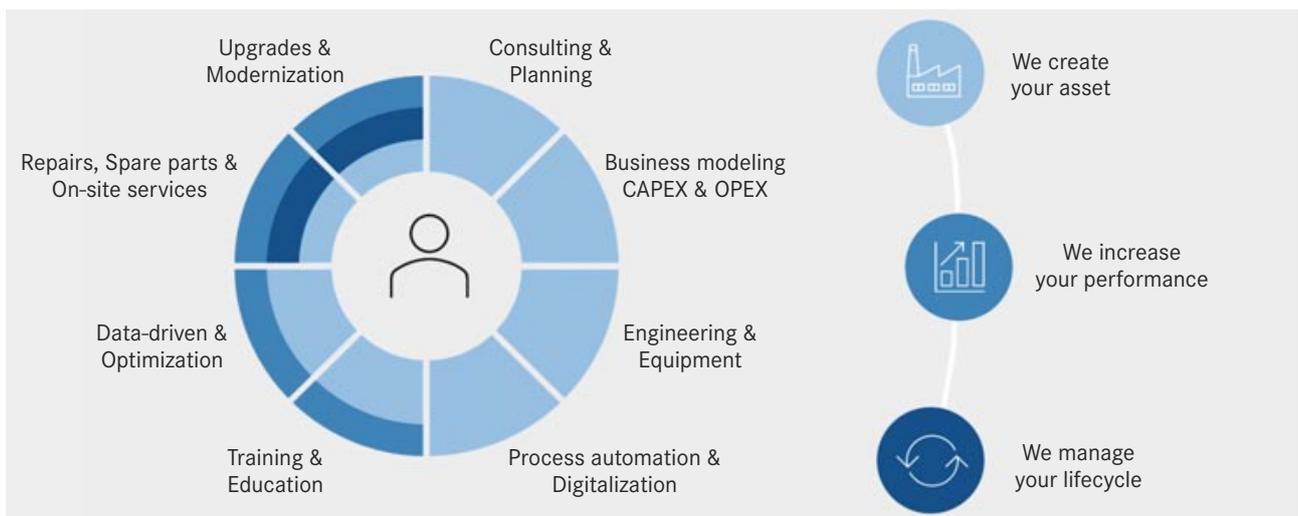
# Integrated service solutions

For SMS group service starts with planning and design of machines and plants, continues with commissioning and proceeds with support throughout the whole lifecycle of the equipment. Consequently, SMS group is expanding its service solutions portfolio to provide customers with the right offer in every phase of the lifecycle.

Complementary SMS group provides a worldwide network of experts and service centers as the regional service partner with short response times.

SMS group’s primary objective is to ensure equipment availability and performance. Hence, we strive to detect and prevent issues before they occur and are well staffed to execute equipment checks and further field services supported by digital solutions.

Our product specialists perform maintenance and repair services on-site customer’s premises or in our specialized regional service centers around the world to the highest OEM standards.



## Services for each lifecycle phase

SMS group increases performance and thereby creates customer benefits during the whole lifetime of the equipment by applying integrated service concepts. This means providing the right solution with the highest impact on customer performance for every phase of the equipment lifecycle.

After the initial design and commissioning, we offer service concepts based on individual customer needs to ensure the performance level of the equipment. These include, for example, original OEM spare parts supply and warehousing solutions to minimize equipment downtimes.

In addition, we offer individual audit, consulting and modernization concepts, enabling our customers to increase production, expand their product range and reduce operating costs.

## Performance enhancement with digital service solutions

The upmost goal of our Smart Maintenance & Asset Optimization Solutions is to make maintenance as effective and efficient as possible and thereby maximize equipment availability. Genius CM®, Smart Alarm and DataXpert™, as well as the SMS DataFactory, form the basis to apply predictive maintenance. Alarms and thresholds are generated



based on equipment and automation data and machine learning algorithms.

The DataXpert™ and the IMMS® (Integrated Maintenance Management System) are coupled with the SMS DataFactory. Input from the DataXpert™ is used to initiate optimized maintenance tasks in the IMMS®.

Supported by the digital plant documentation eDoc, maintenance tasks are compiled and made available on mobile devices. Following maintenance staff feedback forms a practice-oriented verification of the algorithms results. In this way, algorithms are continuously improved in a closed control loop and help optimize maintenance and overall equipment efficiency.

### Partnership-based business models for mutual benefits



Traditional services and our outstanding digital solutions can also be combined to guarantee further benefits and

take over risks from customers. For example, SMS group offers to take over complete maintenance activities within the framework of long-term contracts. The range of services starts with the maintenance of components in our service centers or on customer's premises and goes as far as taking over maintenance of entire plant sections. Based on our many years of experience, we offer performance-based payment models. In this way, we share the risk of our customers and jointly generate benefits.

SMS group even goes one-step further with its equipment-as-a-service solutions. They include integrated service solution bundles comprising equipment, maintenance and intelligent digital services with performance-based payment models. This enables our customers to focus on their core competencies and processes.

SMS group is your reliable partner to offer the right solution for your individual needs from OEM spare parts supply up to integrated performance oriented service concepts for every phase of the equipment lifecycle.

# References for X-Roll® MultiFlex heat treatment lines

Customer	Country	Year of Commissioning	Max. Plate Dimensions (mm)
<b>NUCOR</b>	USA	2022	4267 x 101 (168' x 4')
<b>Ilseburger Grobblech (Salzgitter Group)</b>	Germany	2020	3,550 x 175
<b>Acroni Jecenice</b>	Slovenia	2016	2,560 x 100
<b>Acroni Jecenice</b>	Slovenia	2015	2,560 x 80
<b>Acroni Jecenice</b>	Slovenia	2013	2,560 x 130
<b>Outokumpu Degerfors</b>	Sweden	2013	3,500 x 150
<b>Xingcheng Special Steel</b>	P.R. China	2011	4,200 x 150
<b>Xingcheng Special Steel</b>	P.R. China	2010	4,200 x 150
<b>Xingcheng Special Steel</b>	P.R. China	2010	3,500 x 150
<b>YINGKOU</b>	P.R. China	2009	4,800 x 100
<b>MMK</b>	Russia	2008	4,680 x 60

References at a glance.

Type of Equipment	
Complete Heat Treatment Line with: roller hearth furnace for hardening and normalizing, X-Roll® MultiFlex-Quench, roller hearth furnace for tempering and leveler	
Complete Heat Treatment Line with: roller hearth furnace for hardening and normalizing, X-Roll® MultiFlex-Quench, roller hearth furnace for tempering and leveler	
Complete Heat Treatment Line with roller hearth furnace for hardening and normalizing, X-Roll® MultiFlex-Quench, roller hearth furnace for tempering	
Continuous Roller Quench (Revamp)	
Batch Roller Quench (Revamp)	
Complete Heat Treatment Line with: two Chamber Furnaces and Batch Roller Quench	
Continuous Roller Quench	
Roller hearth furnace for normalizing and tempering	
Roller hearth furnace for normalizing and tempering	
Continuous Roller Quench	
Complete Plate Mill with an Integrated Continuous Roller Quench	SMS group brochure: W5-305E

## **SMS group GmbH**

CoE Flat Products

Eduard-Schloemann-Strasse 4  
40237 Düsseldorf, Germany  
Phone: +49 211 881-4745  
manfred.dingenotto@sms-group.com  
www.sms-group.com

Wiesenstrasse 30  
57271 Hilchenbach-Dahlbruch, Germany  
Phone: +49 2733 29-3181  
georg.padberg@sms-group.com  
www.sms-group.com

“The information provided in this brochure contains a general description of the performance characteristics of the products concerned. The actual products may not always have these characteristics as described and, in particular, these may change as a result of further developments of the products. The provision of this information is not intended to have and will not have legal effect. An obligation to deliver products having particular characteristics shall only exist if expressly agreed in the terms of the contract.”