EXPERTISE IN STAINLESS STEEL
Cold rolling and strip processing
Expertise in stainless steel
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IF GUSTAVE EIFFEL
had only known ...

He would have used stainless steel to build the Eiffel Tower. Then all he would have needed would have been 2,000 instead of 7,000 t of steel for the Paris landmark, and above all: no paint, no rust, no repainting – ever again!

Unfortunately, Eiffel was a little too early with construction of his tower. Granted, it was already known in the 19th century that adding nickel and chromium to steel made it rust-resistant, but the know-how necessary for large-scale technical applications was not yet available.

Monsieur Eiffel’s successors appreciate the benefits of stainless steel and its almost unlimited range of applications. No wonder the market for stainless steel is getting larger and larger and larger ...

Incidentally, Eiffel was also a celebrated bridge builder and designed the steel skeleton for New York’s Statue of Liberty – here again, we at SMS Demag would have been able to join forces with him.

Why? Because, ever since the development of special steels, we rank among the leading manufacturers of equipment for the production of high-quality stainless steel strip.

Our customers throughout the world profit from this experience. Added to this is continuous improvement in technology and design to guarantee the latest plant technology. This, in turn, provides a sound basis for success on the future-oriented stainless steel market – due to low investment costs, cost-effective production and excellent products.
Steel is physical. It has mass, weight, shape; you can see and feel it. That’s because steel is no virtual product, but a solid material. And what’s easily forgotten is the fact that the steel industry is still a global heavyweight – now and in the future.

Especially stainless steel is gaining in importance. This hi-tech material offers almost limitless applications. Wherever resistance to rust, durability and aesthetics are valued, stainless steel is the first choice.

Demand is rising, often in leaps and bounds, above all in Asia. China alone reported an annual growth of more than ten percent in the past ten years. Other future markets are countries such as India and Russia.

Stainless steel adapts to any area of use, while new developments are constantly expanding its scope. Take for instance the latest innovations in vehicle construction or marine and offshore technology. Right now there are more than 120 standard grades that differ in production and composition: higher chromium contents increase chemical resistance, additions of nickel, molybdenum and aluminum improve workability and resistance to acids and heat. Included in the numerous advantages of stainless steel is the fact that it is completely recyclable.

Stainless steel is an all-purpose material. Whatever the application – whether for heavy technical plants or household appliances, precision instruments for medicine and science, components for automobile and vehicle construction or design elements in architecture and art – stainless steel meets top requirements in terms of both technology and design.

Stainless steel fascinates. Due to its versatility, its cool touch, its matt or shiny gloss, its high aesthetic attraction and elegance.

Stainless steel does the job. Due to its durability, its resistance to rust, chemical and thermal strains, its hygienic properties, its relatively low cost.

Stainless steel makes the grade. Because stainless steel is both beautiful and useful – pure and simple.

Chemicals and petrochemicals
Key requirements for the plants, tanks and containers used in the chemical industry are top rust-resistance as well as heat and acid resistance. Furthermore, the material must withstand enormous mechanical strains. Duplex stainless steels with high chromium, nickel and molybdenum contents or special steels are the cleanest and safest solution here.
TOP TECHNOLOGY
for top products

A product is only as good as the process behind it. Recognizing this fact helps determine how we handle a material as demanding as stainless steel. Significant here is top technology based on long-time know-how along with creative thinking geared toward constant improvement.

As a supplier of plant technology for manufacturing high-quality stainless steel strip, SMS Demag has long acquired a good name. Our processes have set standards time and again. Responding to our customers’ wishes, we expanded our Electrics and Automation as well as Service Divisions in recent years to evolve into a full-range supplier.

Today’s demands on production processes are higher than ever. We meet them with plant concepts for every field of use as well as custom-developed process models and technological control systems. Our plants stand out from the crowd because of their fast implementation times and run-up curves. The bottom line is: we offer our customers solutions that pay off.

So far, SMS Demag has supplied more than 100 cold rolling mills for stainless steel throughout the world, including plants with strip widths of up to 2,100 mm.

Products and services

SMS Demag plans and builds turnkey plants and performs revamps. Included in our complete service range are consortium leadership, technical services, consulting and viability studies.

We supply:
- annealing and pickling lines for cold and hot strip
- cold rolling mills
- bright annealing lines
- skin-pass mills
- electrics and automation

= preparing and finishing lines, including:
  - coil preparation lines
  - polishing and grinding lines
  - cleaning lines
  - shear and packing lines
Vehicle construction

Strong, yet easily workable. Light but safe. Durable and rust-free, but recyclable. That’s the kind of material today’s automotive industry demands. Mission impossible? No way. The stuff auto dreams are made of is called stainless steel.

Chassis parts, exhaust systems, tanks – whatever they require, vehicle constructors rely on hi-tech stainless steel as a driving force for success.
Stainless steel is an uncomplicated material – once it is finished. But producing and refining it requires complex processes. Paramount here are the annealing and pickling production stages designed to achieve good strip quality and surface properties.

SMS Demag has been producing all kinds of pickling lines since the early 1950’s, so we can draw on vast experience in both the mechanical and the process technology areas. Today’s plants must meet high standards of quality, efficiency, flexibility and eco-friendliness. This is where SMS Demag has consistently ranked among the pioneers of innovative technologies. Take for instance our new concepts for integrated lines designed for producing stainless steel strip.

High quantity, quality and speed ...

That, in a nutshell, was the challenge AK Steel (USA) presented to SMS Demag. The company’s Rockport, Indiana works has operated a top-of-the-range combined hot/cold strip annealing and pickling line since 1999. It processes all common stainless steel grades with strip widths from 660 mm to 1,575 mm and thicknesses of 0.46 to 5.08 mm. The chemical section of the plant works according to the SMS Demag-developed turbulence pickling principle. Achieving an annual throughput of 573,000 t, it ranks among the world’s most productive plants. Moreover, it is exceptionally fast. Its maximum speed of 152 m/min for cold strip puts it way ahead of other annealing and pickling lines.

Product line

Our range of plant concepts is geared to market and customer wishes. It covers:

- hot strip annealing and pickling lines – to anneal and descale black hot strip and to homogenize the strip properties
- cold strip annealing and pickling lines – to re-crystallize the metal structure and exactly adjust the strip properties
- combined hot/cold strip annealing and pickling lines – for cost-effective production of cold and hot strip in one plant
- integrated rolling, annealing and pickling lines (IRAPL) – with integrated cold rolling mills for cost-effective production of stainless steel strip in a single line

Combined hot/cold annealing and pickling line
Household and trade

A university canteen. Here, each day, hundreds of meals are prepared and served. Ensuring hygiene and durability is a top priority for both the machines and the equipment. That makes stainless steel the first choice for everything from the XXL-size pans to the smallest dessert spoons.
Pickling with state-of-the-art methods

Pickling removes the oxide layer (scale) that forms on the strip surface during the annealing process. It is a complex process managed reliably, efficiently and with cutting-edge technology by SMS Demag annealing and pickling systems. Scale breakers and shot blasters perform the mechanical preparation work. Next in line is the electrolytic pickling section where layers of scale are loosened that are difficult or impossible to remove in the subsequent chemical pickling section. Final descaling takes place in the turbulence pickling section’s acid bath.

Separation for speed

SMS Demag has developed a patented process for electrolytic pickling: galvanic separation of the electrodes. It is based on a complete separation between the anode and cathode areas in the galvanic bath. Compared to conventional processes, the current loss is lower and the pickling process is accelerated. That increases the efficiency of the entire work stage by some 30 percent.

Highlights of turbulence technology

What makes turbulence pickling special is the moving acid bath that removes scale faster and at lower temperatures than conventional methods. Immersion covers seal off the top of the pickling channel and reduce evaporation losses during the pickling process. A special bottom profile that reduces sludge deposits has been developed for pickling tanks made of plastic. Turbulence technology drastically cuts overheads and maintenance costs and lets producers react flexibly to different process conditions. There is nothing to beat this method, developed and patented by SMS Demag, that represents state-of-the-art technology and is used worldwide.
A regulation model precisely controls all the main parameters of the annealing and pickling process, such as turbulence, temperature and concentration of the pickling medium, electric current intensity and furnace temperature.

**IRAPL: rolling, annealing and pickling in one**

Integrated rolling, annealing and pickling lines (IRAPL) bring together these processing stages in a single line.

The know-how for this technology was developed by SMS Demag in close cooperation with our customers Ugine (France) and Avesta (Sweden). The IRAPL concept is ideal for certain material and surface grades, and its benefits are obvious: higher production, lower processing costs, and cheaper products. IRAPL supplements the conventional process route and comes with huge potential, because it might be used in the future to produce some 50 percent of strip grades on the market.
Perfect quality from start to finish – that is what today’s industry demands from stainless steel producers. Only state-of-the-art stainless steel rolling mills like those from SMS Demag are able to meet these standards. They roll the input material – hot-rolled stainless steel strip up to 1,600 mm wide and 10 mm thick – down to the required final thickness. This results in stainless steel strip of top surface quality with excellent strip thickness and flatness tolerances, on request down to a thickness of just 0.1 mm.

Yet even broader and thinner strip is possible. Custom rolling mills produce extra-broad widths of up to 2,100 mm and ultrathin strip with almost inconceivable thicknesses of a few thousandths of a millimeter, e.g. for catalytic converter foils.

Stainless steel strip production using monoblock at SKS

Boontown Shanghai, Pudong peninsula, the headquarters of Shanghai Krupp Stainless Co. Ltd. (SKS). Founded as a joint venture to tap the expanding Chinese market. Here, since 2001, top quality stainless steel strip has been produced on a 20-roll cold rolling mill from SMS Demag. The plant processes austenitic and ferritic strip 800 to 1,340 mm wide and 5 mm thick, achieving minimum final thicknesses after rolling of 0.1 mm. Built in compact monoblock design, the facility features all the technological equipment necessary for efficient, close tolerances and eco-friendly production of top strip grades.

... and using splitblock at YUSCO

Leading-edge technology is also available at Yieh United Steel Corporation (YUSCO), Taiwan’s largest stainless steel producer. It is integrated in a new-generation stainless steel rolling mill located in the port and industrial center of Kaohsiung. The 20-roll cold rolling facility from SMS Demag rolls 800 to 1,300 mm wide stainless steel strip with a maximum thickness of 6 mm down to final thicknesses of 0.15 mm. Central to the plant is the mill stand in splitblock design. Its advantages are: improved cooling and/or heat removal, direct rolling force measurement, a larger roll gap for better introduction of the strip end, optimum accessibility and the use of variable work rolls. Or, to put it another way: more flexibility at much shorter idle periods.
20-roll rolling mills:  
Power packs bursting with hi-tech

Cold-rolled stainless steel strip is usually rolled on 20-roll mills. These power packs feature high shaping forces, but at the same time they are chock-full of ingenious technological details. They are designed as stand-alone machines and operate in reversing mode. SMS Demag supplies 20-roll rolling mills in two versions: the closed, sturdy monoblock type or the next-generation splitblock option with a split roll block for more flexible roll pairs and simpler roll and strip handling. Mill stands of both designs are used to achieve the required final thicknesses at rolling speeds of up to 1,000 m a minute and an absolute thickness reduction of up to 90 percent in just a few passes.
Multi-talents for special purposes

6-High-12 or 18-HS reducing stands, the preferred option in integrated rolling, annealing and pickling lines (IRAPL), complete our product range. They were developed for this special rolling task on the basis of the practice-proven SMS Demag technology for cold rolling mills and supplemented by work roll supports. Our patented HS system (horizontal stabilization) minimizes the horizontal forces that act on the side support elements, in this way guaranteeing a stable rolling process. The 6-High-18-HS stand is equally suitable for use as a reversing rolling mill, as a stand for an SMS Demag Compact Cold Mill (CCM), tandem mills or as a supplementary system for rolling mill revamps.

Perfect mill management

Excellent strip qualities are no accident, but the result of production processes optimized down to the last detail. This requires advanced high technology to control the rolling process of the stainless steel strip. Reliably and fully automatically, it monitors reduction, flatness and thickness in the roll gap. All stands are equipped with hydraulic actuators that regulate the strip thickness and flatness. We use our innovative mathematic process model, Troll, to control these actuators. Speed and thickness measuring devices installed at the feed and exit ends supply the data necessary for process regulation.

Skin-passing for an optimal result

Cold rolling and re-crystallization of the stainless steel strip are followed by skin-passing. The aim of this “gentle” rolling process is to create high-gloss surfaces and to perfect the mechanical strip qualities, for instance the deep drawing formability. Skin-passing of stainless steel is mainly performed on duo-reversing mill stands.

There are two versions to suit the various plant concepts: “inline” describes a skin-pass rolling mill integrated in the annealing and pickling line and/or the bright annealing line, while “offline” means it is arranged downstream.

Brilliant finish

Strip processing at Shanghai Krupp Stainless (SKS). Brilliant finish for the strip surface in the skin-pass rolling mill from SMS Demag.

The 2-High rolling stand at a glance:
- Roll diameter: max. 800 mm
- Roll barrel length: 1,500 mm
- Rolling speed: max. 600 m/min

Special highlights:
- Roll bending for better roll gap adjustment to the material to be rolled
- Low-friction Morgoil bearing
- Automatic quick-roll-change device
- Automatically controlled strip and roll cleaning devices
Also available: inline skin-pass rolling mills in four-high design. They enable producers to influence the strip flatness even more accurately and to skin-pass ferritic stainless steel strip in one pass.

Solutions with a future

Cold rolling mills from SMS Demag make the most of all the options offered by modern rolling technology for precision rolling of thin and ultrathin stainless steel strip. They work fully automatically, are easy to operate and require little maintenance. Equally impressive are their fast process times, high emission protection and the fact that they achieve excellent results: flat strip with perfect surfaces. So, alongside conventional process routes with their great benefits, there will eventually be an increase in integrated plant concepts for the cost-effective mass production of stainless steel cold strip. SMS Demag also supplies future-oriented solutions for these new market demands.

Art

A sculpture in remembrance of D-Day. To mark the 60th anniversary of the Allied landing in Normandy, French sculptress Anilore Banon at the beginning of 2004 created a monumental sculpture for the famous Omaha Beach. She used stainless steel because of the beauty and rust-resistance of the material.
Sometimes we want stainless steel not to merely shine, but to reflect like a mirror. This is required for instance for the material used to make reflectors in car headlamps or washing machine and dryer drums. And that’s a clear case for the bright annealing line.

Plants designed according to the SMS Demag concept ensure optimum mechanical strip properties, flatness and the cleanest possible, undamaged surfaces. The annealing process in a protective gas atmosphere, i.e. without oxygen, is reliable and saves energy.

It is the norm today that mechanical finishing is integrated in the bright annealing line. Available here are inline variations such as: skin-pass rolling mills for Perfecting the strip surface and mechanical properties, tension levelers to improve strip flatness, and trimming shears for precisely setting the strip width.

There is a special emphasis on protecting the sensitive strip surface, which also applies to bright annealing lines. Coated rolls guide the strip gently through the plant, while no rolls are necessary in vertical furnaces.

The bright annealing line at a glance:

- Entry area with double pay off reel group and welding machine for coil preparation and endless joining of the cold coils to be processed
- Strip cleaning section with degreasing, rinsing section and strip dryer
- Vertical annealing furnace (muffle furnace, electric furnace or combination) with protective gas atmosphere and strip cooling zone for oxidation-free re-crystallization of the cold strip
- Vertical looper to bridge the coil-changing sequences in the entry and exit areas
- Post-treatment section for passivating the strip surface and downstream mechanical finishing
- Exit area with coiling group including dividing shear and strapping machine to bind the finished cold coils
Architecture

Ever since 1929, the Chrysler Building has dominated the Manhattan skyline. Yet few people know that the spike on top of its tower is made of stainless steel. Right up to the present day, this material is increasingly popular with architects. A current example is Frank O. Gehry, the world-famous specialist in sloping walls and dizzy perspectives, who used the fascinating design scope and excellent technical properties of stainless steel for office blocks in Düsseldorf, Germany.
As regular as clockwork, only on a larger scale is how the production process in a modern cold rolling mill takes place. It all begins and ends with coil preparation and finishing devices. What happens in between is cleaning and stretching the strip. The production lines used here are sometimes called “auxiliary equipment”, but that is of course an understatement. Supplied by SMS Demag, they are also packed full of technical ingenuity. And they also ensure the customer gets what he expects: perfect strip in top quality.

The coil preparation section makes the hot strip ready for subsequent processing. The cleaning lines are integrated in the process route and work either with alkalis, electrolysis, high pressure or ultrasound, depending on the starting material.

Plus, whenever extreme flatness is demanded, the cold strip is treated in tension levelers. That eliminates the tensions inherent in the strip. This is performed either in a separate line or inline during the annealing process.

The finishing section is where the finished stainless steel strip is inspected, cut to size and packed. Then, if required, grinding lines add a grinding finish. Slitting lines divide the coils into narrow strip, cross-cutting lines cut it into sheets. Finally, automatic strapping and packing devices pack the sensitive finished products for safe transport.

All SMS Demag plants are renowned for precision, reliability and flexibility. Significant here are largely automated sequences that ensure high process speeds, while low preparation times and short idle periods increase productivity. High rates of throughput and fast changeovers to different strip dimensions enable operators to produce just in time.

Product line
- Coil preparation lines
- Polishing and grinding machines
- Cleaning lines
- Slitting lines
- Cross-cutting lines
- Tension leveling lines
- Packing lines
Food
There are certain things the Germans take very seriously, for instance their beer. It is only allowed to contain hops, malt, water and yeast – nothing else. No additives, and definitely no germs or other impurities. To make sure everything goes strictly according to the traditional German “Purity Law”, breweries prefer fermentation tanks and bottling systems made of stainless steel.
Best-technology stainless steel production also means state-of-the-art automation and backup service from one source. As a system supplier, SMS Demag assumes responsibility for all functions over the entire service life of the plants we build.

We offer our customers advanced automation systems for top plant efficiency and product quality. They are created in interdisciplinary cooperation between our Engineering, Media, Technology, Electrics and Automation Divisions as well as in cooperation with world-class producers. Included in our product range are integrated systems for drives, controls, process models and production planning (Level 0 to 3). “X-Pact” is the name that sums up our services in the electrics and automation segments.

And, because we take our commitment to service very seriously, SMS Demag is present (almost) everywhere. Take for instance our joint venture Millcraft SMS Services LLC, which puts us on the spot at ten locations in the U.S. alone. We are also extending our independent repair service in China.

“Plug and work”

Simply switch on and go – that’s the ideal. To attain it, we test our systems exhaustively before commissioning. This starts with extensive plant functioning and operation simulations. Then we connect the entire automation system up to a simulation model that depicts the plant with its process stages. That’s how we carefully test and optimize sequences and technical functions even before delivery. It ensures fast run-up curves, especially after revamps.

Productive right from the start

Let’s take a look at automation, using the example of the 20-roll cold rolling mill for stainless steel at VDM Werdohl (Germany) for the manufacture of ultrathin strip down to a final thickness of 0.02 mm. SMS Demag supplied the plant technology along with the entire electrical systems and the automation, consisting of thickness control, flatness control, sequence control, drives and drive controls as well as HMI system. The cold rolling mill stayed significantly below the guaranteed thickness tolerances in all phases. During commissioning, it far exceeded the planned run-up curve and achieved the annual capacity of up to 5,000 t within a few weeks.

Our low-cost service packages make sure SMS Demag plants stay operational – day in, day out, year after year. Tailor-made service agreements free our customers from many individual activities.
Our products and services

- Electrics and automation
  - Production planning
  - Setup systems
  - Regulation of the actuators
  - Regulation of the furnace and pickling parameters
  - Thickness, flatness and skin-passing degree controls
  - Drive controls

- HMI system (human-machine interface)
- Drives, measuring devices, sensors

- Services
  - Assembly, commissioning
  - Maintenance management
  - Inspections, repairs, spare parts
  - Advice, optimization
  - 24-hour hotline and tele-service
  - Updates and upgrades for software and hardware

Energy and the environment

Now, turning to the key area of renewable energies, including nuclear fusion by means of sunlight. Heat and a high-energy neutron flow are created inside the fusion power station. So special steel encases the ring-shaped plasma chamber where the fusion processes take place. This is yet another future technology that would not be possible without the innovative material stainless steel.
The stainless steel industry is going through a period of change. Why? Because on the one hand the market is clamoring for more cost efficiency, on the other hand demands on the quality and eco-friendliness of all production processes are increasing. Only intensive research and development secures our technological edge – and gives our customers competitive advantages.

Our activities focus on CSP hot strip production, semi-endless rolling of hot strip, alternative pickling methods, new surface coating and cleaning systems as well as methods of flatness measurement and control.

As a corporation we are committed to the principle of sustainable growth and protection of the natural resources that provide the basis for life. Our plants meet all the required environment standards, and equipment for recycling the media used is a major part of our product line.

T-roll sets standards

The T-roll technology package developed by SMS Demag opens up a whole new understanding of the processes that take place in the roll gap. Working on the basis of physical process models, this system calculates the elastic roll deformation as well as the elastic and plastic material shaping. Furthermore it determines the strip temperature and its impact on the shaping conditions depending on the process parameters. Yet the highlight of T-roll is its lubrication model that simulates the formation of the lubricating film, the contact surfaces and the friction conditions in the roll gap. Now, for the first time, rolling mill operators can precisely forecast the final strip surface texture and/or strip roughness. Using T-roll also leads to productivity increases of up to 30 percent.

A tradition of innovation

Here are some examples of innovative processes developed by SMS Demag:

- CONARC (Converter and Arcing) – producing stainless steel in one metallurgical vessel
- CSP (Compact Strip Production) – thin slab casting and direct final rolling of hot strip
- CVC (Continuous Variable Crown) – influencing the roll gap geometry by shifting specially ground rolls
- Turbulence pickling – using the kinetic energy of the acid during the pickling process
Quality without compromise

There are only short paths in our company leading from the virtual model to the real product, because our design departments and production shop are closely interlinked. All components that determine functions in our product line come from our own production shops. They are manufactured, pre-assembled and checked by our own, qualified staff.

SMS Demag runs extremely efficient production shops. Mechanical processing, welding and assembly take place with the help of a machine park that is constantly updated. All production processes are supported by data processing systems, special production planning and control software, software for CNC programming and for recording production data.

The bottom line for our customers is: top quality standards and short assembly times due to hydraulically, mechanically and electrically pre-tested units.

3D models in production

Top quality and cost-consciousness determine the work process during production. This is where 3D models support our engineering team, supplying exact isometric data for the pre-fabrication of plant parts. That shortens the final assembly time and avoids problems in adjusting to the actual plant surroundings.

Drilling technology

An oil platform in the North Sea. Extreme conditions for man and material. Salt water, storms, enormous sea swell. Yet the platform stands as solid as the proverbial rock: on legs made of stainless steel.
People rise to the challenges they face – our challenge is the production of rolling mill system solutions at the highest level. Observing the market and responding to our customers’ wishes are second nature to us. This is the basis on which we work to develop new technical processes for the next plant generation.

Two key developments will influence the production of stainless steel flat products in the coming years: first, low-cost hot strip in thin dimensions will be available in larger quantities in the future. This will above all be due to the CSP technology (compact strip production) developed by SMS Demag. And second, the process chain for manufacturing cold strip will change. Here again, SMS Demag is contributing extensive development work.

**CSP – new market for a successful principle**

CSP has long been established in the world of steel production. Meanwhile, the huge advantages of this groundbreaking technology can also be applied for producing stainless steel hot strip. That’s because CSP not only offers better mechanical properties, but also more exact geometric dimensions of the hot strip. Moreover, this method enables producers to achieve hot strip thicknesses of under 2 mm. Compared to conventional production, a CSP plant requires 40 percent lower investment costs, 20 percent lower production costs and up to 70 percent less total energy. Just as drastic are the reductions in overheads and maintenance costs.

The first CSP plant for stainless steel was commissioned in 2001. Today SMS Demag builds CSP plants for capacities from 500,000 to more than two million t a year.

Depending on customer specifications, SMS Demag offers single or multiple-stand Steckel rolling mill concepts for the production of stainless steel hot strip.
**Medicine**

Routine in the operating theater: treating complex fractures. Wires, screws and plates are used to stabilize fractures. The material? Stainless steel of course, just like the instruments the surgeon uses. Stainless steel is the standard in the operating theater and on the ward. Its properties make it predestined for all conceivable applications in medicine.
Shorter processes and optimized plants

Likewise, the process chain for manufacturing stainless steel cold strip is undergoing changes. Previously separate work stages are increasingly being integrated in single plants. Today the latest cold strip annealing and pickling lines as well as bright annealing lines are already being equipped with finishing devices such as skin-pass rolling mills, tension levelers and trimming shears. A further step in this direction is represented by the IRAPL technology (integrated rolling, annealing and pickling lines) developed by SMS Demag. Applying this method enables plant operators to produce finished 2B cold strip from “black” hot strip in just a few minutes. IRAPL plants consist of multiple-stand inline rolling mills, pickling sections, annealing furnaces and finishing devices. All the elements are integrated in one continuous plant. The cost advantage for the final product is up to 20 percent compared to conventional production.

It is likely that in the future there will be a further concentration of stainless steel producers and specialization of individual works. That means the market will evolve specialized, highly productive plants for certain stainless steel grades. Variations of these plant configurations are continuous tandem lines for stainless steel products or combined plants for stainless and carbon steel production in a single facility.

Yet also conventional process routes will continue to be improved. Included here is not only the development of eco-friendly acid-free pickling methods but also further optimization of bright annealing as well as the achievement of better shine grades in conventional plants.
PRODUCT LINE

Processing lines
(Strip widths 500 - 2,100 mm / strip thicknesses 0.2 - 13.0 mm)
- Annealing and pickling lines for hot strip
- Annealing and pickling lines for cold strip
- Combined annealing and pickling lines for hot and cold strip
- Integrated rolling, annealing and pickling lines (IRAPL)
- Bright annealing lines

Cold rolling mills
(strip widths 500 - 2,100 mm / strip thicknesses 0.10 - 13.0 mm)
- 20-Roll mills in monoblock and splitblock design
- 20-High foil mills (minimum thickness 0.02 mm)
- CVC 4-HS mills
- CVC 6-HS mills
- 6-High-18-HS mills
- Continuous tandem mills
- 2-High skin-pass mills (offline and inline)
- 4-High skin-pass mills (offline and inline)
- Combined 2/4-High skin-pass mills

Preparation and finishing lines
(strip widths 500 - 2,100 mm / strip thicknesses 0.10 - 13.0 mm)
- Coil preparation lines
- Cleaning lines
- Polishing and grinding lines
- Tension leveling lines
- Inspection lines
- Slitting lines
- Trimming and cross-cutting lines
- Packing lines

Auxiliary equipment
- Rolling oil systems for cold rolling mills
- Emulsion systems for cold rolling mills

Electrics, automation and service
MEETING your EXPECTATIONS

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