

NEWSLETTER Information for partners and customers

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Wide strip rolling concept: First coil manufactured

Hagen-Hohenlimburg has become home to the one of the most cutting-edge pieces of machinery in the world's cold rolling industry. With the construction of the new wide 4-high reversing mill and the associated new slitting line at BILSTEIN, the BILSTEIN GROUP is setting the course for a successful future. The first wide coil customer order has been processed in autumn. This milestone represents the successful conclusion to one of the most important investments in the BILSTEIN GROUP's history. Page 2



Supermod[®], Ultramod[®] and Extramod[®]: Magnetic attraction

Supermod[®], Ultramod[®] and Extramod[®], the BILSTEIN GROUP's cold-rolled strip solutions with electromagnetic properties provide for mobility. Page 5



Innovation management system: Working systematically on our future

With its new innovation management system, the BILSTEIN GROUP has put in place structures to help it identify the megatrends of the future. Page 6



Wide strip rolling concept First coil manufactured

The critical phase is complete: the first wide coil customer order has been processed on the new four-high reversing rolling mill. This milestone represents the successful conclusion to one of the most important investments in the BILSTEIN GROUP's history.

t's up and running. With the production of the first coil, BILSTEIN's new wide rolling concept has gotten off to a great start. This offers the perfect opportunity to look back on the various steps we have taken over the last few years to carry out the project and commission what is one of the cold rolling industry's most cutting-edge plants at our Hagen-Hohenlimburg site. Commissioning of the mill marked the final step; batch annealing and the automated warehouse had already been up and running for some time.

Our new production hall

Big ideas need lots of space: to accommodate the new rolling concept, the BILSTEIN GROUP invested in the construction of new buildings at BILSTEIN Plant I. The groundbreaking ceremony for the hall that would become home to the four-high reversing mill took place on September 8, 2017. Assembly of the steel structure began in January 2018, with the beams, roof trusses, and lattices for the main hall and entrance. In March, the walls of the 2,880 m² production hall were erected, followed by the roof two months later. Then it was down to business: in June 2018, 120 concrete mixers arrived at the site, shuttling back and forth every five minutes to pour a stable concrete foundation in the seven-meter-deep basement. A total of 1,200 cubic meters of concrete and around 200 metric tons of reinforced steel ensure that the high-performance rolling mill stands on firm foundations. Approx. 5,400 cubic meters of reinforced concrete and around 790 metric tons of reinforced steel were used in the basement walls, beams, foundations, and ceiling/floor panels for the hall. By November 2018, everything was ready for the bridge crane to move in, with its 50-metric-ton main hoist and 13-metric-ton cantilever. In early January of this year, the new hall was handed over to the plant engineering company SMS Group for assembly of the rolling mill — and this began as scheduled with construction of the wide-strip mill, following an integration test.

State-of-the-art four-high reversing mill

What makes the new wide-strip mill so unique? Simple: this high-performance mill is designed for both reversing and skin pass milling (RCM/SPM) and is among the most cutting-edge plants of its kind in the world. It produces cold-rolled strip to the usual extremely high quality, with widths of up to 1,350 mm available on request, and in thicknesses of between 0.2 and 5 mm. What's more, with a rolling speed of 800 to 1,000 meters per minute, the mill can process coils with a weight of up to 31.05 metric tons. A highly specialized control system ensures outstanding flatness the entire length and breadth of the strip, while the latest measuring technology guarantees superior quality. There is highly precise strip profile measuring at the input and output of the mill, while strip tension and strip tension distribution are also captured at both points. Active rolling force measurement, laser strip speed measurement, and high-resolution cylinder position imaging also help us to ensure extremely high quality. This groundbreaking technology will help the BILSTEIN GROUP meet market demand for highstrength grades: BILSTEIN COLD ROLLED STEEL's wide-rolled strip is already used in a number of demanding applications, including axial bearings and seat rails.

High-end technology: taking digitalization to the max

The state-of-the-art reversing cold rolling mill comes with a high degree of automation, and is opening up new opportunities in terms of digitalization: a digital master computer and innovative rolling assistant enable digital management of the rollers and direct data exchange across the entire value chain. From the main control stand there's access to central control for the entire plant and auxiliary processes. It's not just the rolling process that's carried out automatically; changing rollers and handling of the coils, residual coils, and sleeves is also fully automated. The workshop is also digitally connected. It truly is high-end technology. The whole system was tested in a longterm plant simulation before it finally went live. The technology lays the foundation for a visionary future, where, for example, order data can be applied digitally in production.

Emulsion plant: processing rolling oil emulsion

A new emulsion plant is used to cool the rollers and strip and lubricate the roll gap, operating in a closed loop. The plant is housed in its own new building. Closed-loop operation and various processing steps reduce the consumption of water and other resources for the BILSTEIN GROUP. For example, with the integration of heat exchangers, the plant uses process energy to both heat and cool - significantly improving its energy footprint.

So how exactly does the system work? In the emulsion tank, all the emulsion is collected, tempered, and cleaned. The tank comprises two chambers: used (dirty) emulsion flows from the rolling mill directly into the first chamber, where it is immediately suctioned by the filter pump and where any iron particles are removed using a magnetic separator and vacuum filter, before it is transported into the other (clean emulsion) chamber. From there, the clean emulsion returns to the rolling mill; a supply pump transports it to the nozzles on the spray bar. Because the fluid must be kept constantly in motion, even during a break in rolling, any cleaned fluid simply flows back into the first chamber where it waits on standby.

A second loop ensures the emulsion is a consistent temperature: the temperature is captured by sensors in the tank chambers and controlled accordingly. During breaks in rolling, the fluid usually requires heating to ensure a consistent temperature, and during rolling it usually requires cooling. This is controlled via two plate heat exchangers. One is powered by waste heat from surrounding plants, while the other is supplied by a separate gas/hot water system.

Complete automation and sustainability: batch annealing with a built-in ORC system

Environmental considerations were also taken into account during the expansion and modernization of the world's first fully automatic batch annealing plant, which took place in three

Technical details: rolling mill

Strip width Strip thickness Reversing Strip thickness Skin passing Coil weight

Rolling speed

min. 600 mm / max. 1,350 mm max. input: 7.50 mm min. input: 0.51 mm max. output: 5.00 mm min. output: 0.20 mm max. input: 7.50 mm min. input: 0.21 mm max. output: 5.00 mm min. output: 0.20 mm max. 31.05 metric tons 800 - 1,000 m/min

Technical details: measuring devices

Thickness/profile measuring device (X-ray system) Number of measurement zones: 80 Measurement range: 0.2 - 7.5 mm Measurement accuracy: 0.15 % Linearity: +/-0.1 % Analog time constants: \leq 10 ms Strip width measurement with hole and edge cracking detection (LED) Camera clusters: 2 Cameras/cluster: 16 LED clusters: 4 Strip width: +/- 0.3 mm Hole size: 1 x 1 mm Edge cracking: 1 x 1 mm Strip speed measurement (laser) Measurement range: 1 – 1,050 m/min Measurement accuracy: +/- 0.05% Digital increment: 1 mm/s Clearance: 1,500 mm Strip tension measurement Measurement range: 4 - 250 kN Measurement accuracy: +/- 0.55 % Deviation allowed: < +/-5%

Technical details: ORC system

Power generated from process energy: 764,400 kWh per year Process heat used: 9,690,000 kWh per year Reduction in CO₂ emissions: 2,365 metric tons per year Increase in energy efficiency of annealing plant: 39%

Technical details: shears

Strip width Strip width Coil diameter

Speed

Rotary shears for slitting, cutting, trimming, and coiling min. 15 mm / max. 1,350 mm min. 0.5 mm / max. 5.0 mm external: 700 - 2,025 mm internal: 400 mm, 500 mm, 600 mm Level 1: max. 200 m/min Level 2: max. 400 m/min



phases (2012, 2015, and 2018). Thanks to Organic Rankine Cycle (ORC) technology, any waste heat produced during batch annealing is reintroduced and reused in the process. The energy is used to generate electricity, as well as to heat the production hall, leading, for example, to a significant reduction in total CO_2 emissions. This autonomous system for energy recovery and electricity generation was developed in house because there was no reference solution to work from. One key aspect was the process control system, which enables both the batch annealing and ORC system to operate fully automatically. Last but not least, the automated batch annealing technology adheres to all international standards in terms of process safety and product quality – and the aim is to keep it that way, of course.

New cold strip slitting line

As part of the new wide rolling concept, BILSTEIN also invested in a state-of-the-art cutting and packaging line, with fully automated coil storage upstream of the process. The high-performance slitting line processes high-strength grades in any rolling width up to a thickness of 5 mm and with a tensile strength of up to 1,400 N/mm². Just like in the US, the BILSTEIN GROUP again turned to plant and machine engineers GEORG, based in the Siegerland region of Germany.

To quickly adapt the plant machinery to the relevant strip specifications, the intelligent system changes a range of line settings fully automatically. Thanks to the high degree of automation, a huge increase in plant productivity is achieved. Lots of tasks that were previously carried out manually are now completely automated, for example the strapping around the coils being fed into the mill are now removed robotically. This is also a real advantage when it comes to workplace safety. The high-precision rotary shears, with pre-prepared attachments switched in and out with the help of a robot, are another highlight. Fully automated mandrel exchange on the plant's recoiler is having a similarly positive impact on the line. There has also been a huge decrease in auxiliary process time thanks to the deployment of patented technologies.



Supermod[®], Ultramod[®], and Extramod[®] cold-rolled strip solutions

Magnetic attraction

The BILSTEIN GROUP's innovative cold-rolled grades with soft magnetic properties offer an ideal, economical alternative or addition to conventional electrical steel. They are especially suitable for use in car actuator systems, or in any control systems that are electromagnetically operated.

The auto industry's entire value chain is being impacted by the electric vehicle megatrend. The sector is looking at a variety of solutions that can help it achieve the goal of significantly reducing CO_2 emissions of vehicles around the world. Right now, this includes developing diverse hybrid technologies that can be brought to market quickly and cost-effectively, without losing sight of their emissions reduction target. This is why OEMs are demanding new components and applications with electromagnetic properties. And for components with electromagnetic characteristics, high-alloy electrical steel straight off the shelf is not always the solution.

Electrical steel is not always the answer

The BILSTEIN GROUP's cold-rolled strip grades Supermod[®], Ultramod[®], and Extramod[®] already possess excellent electromagnetic properties when delivered, enabling direct parts manufacturing without additional annealing. The grades are identical to DCO4 grade steel in all key areas, in line with the requirements of DIN EN 10139 and DIN EN 10140. This means Supermod[®], Ultramod[®], and Extramod[®] fill the gap between cold-rolled strip and aluminum-silicon-alloyed electrical steel in terms of quality, cost, and flexibility in dimensions and volume. The material is ideal for a range of electrical engineering applications, including electric vehicles.

Supermod[®], Ultramod[®], and Extramod[®] – cost-effective alternatives

The material with low magnetic coercivity can be used directly in manufacturing. This removes the need for the usual costly annealing process at the customer end – because this step is already incorporated in the product's properties. The Supermod[®] and Ultramod[®] grades were developed by the BILSTEIN GROUP together with a customer, and have already been successfully deployed in a number of different fields. Renowned customers are now relying on the material to produce electromagnetic actuators such as pressure control valves and multi-port valves for automatic transmissions. Mercedes-Benz, for example, has completely switched its automatic transmissions over to Supermod[®]. The grades are also being used for magnetic relays in electric trains.

Compared to other steel solutions, these products offer excellent formability and also permit variable dimensions and tolerances, independent of well-known industry standards. Supermod[®] and Ultramod[®] can be produced in all thicknesses and lot sizes and are an attractive option for any application where conventional steel strip is currently being used but special electromagnetic properties would bring additional benefits.

The benefits of BILSTEIN grades with electromagnetic properties

- No additional annealing needed
- Excellent formability (high n-value)
- Variable dimensions and tolerances possible, independent of well-known standards
- Small lots throughout the production process (batch annealing)
- Part substitution, efficiency through increased material output via cold working
- No more "off the shelf" material: custom material properties possible thanks to a flexible manufacturing process
- Can be electroplated (galvanized, copper-plated or nickel-plated)
- Can be welded using all joint technologies

Innovation management system

Working systematically on our future

With its new innovation management system, the BILSTEIN GROUP has put in place structures to help it identify the megatrends of the future and align the company's strategy accordingly. The New Applications and Markets (NAM) team is at the heart of all this work.

he global automotive industry is undergoing a huge transformation: the vehicles of the future are characterized by connectivity, autonomous driving, shared mobility, and electrification. These four megatrends are combined in the acronym C.A.S.E. - derived from the initials of its constituents Connectivity, Autonomous Driving, Shared Mobility, and Electrification. Whether it's battery technology, renewable energies, e-bikes, or other forms of micro-mobility, there are a number of fields and an enormous momentum in play. And this, in turn, poses a number of big challenges for OEMs. To remain innovative in this environment and help shape the trends of the future is a very ambitious goal that can only be achieved by channeling and advancing our ideas in a more strategic way. To achieve this, the BILSTEIN GROUP's new innovation management system aims to systematically develop products and processes that don't yet exist but that will become key trends in the future.

Capitalizing on internal know-how

How much potential does a new idea have? To answer this question effectively, the new innovation management system features an analysis process, opportunity and risk assessment tools, and – importantly – criteria for terminating ideas that do not offer any real benefits. The BILSTEIN GROUP already has a huge volume of internal methodological know-how, and many of the tools were already in use. We're now building on this experience. What's new is that everything is now integrated in a single place, in New Applications and Markets, the NAM team.



The team started by collating ideas in workshops with colleagues, at trade shows and conferences, in discussions with external experts, and in talks with customers, other specialists, and suppliers.

Team NAM



Four steps to thumbs up or down

A variety of process-related tools are incorporated in the decision-making process to ensure decisions are made effectively. Level 2 includes the creation of a budget and potential timeline. Assessments of market/idea potential, investment estimates, and the technology appraisal are also used in Level 2 to help decide whether an idea is worth pursuing. The NAM team relies on its colleagues' expertise here: To get a solid evaluation of the technology, the team relies on the technical knowledge and practical experience of their colleagues across the various departments. Intensive and cross-departmental cooperation is the critical success factor here. Questions on prototypes and potential patent applications are also clarified in Levels 2 and 3 of the decision-making process. Level 4 is where the detailed work really begins, with the generation of market surveys, sales plans, investment and budget plans, and business cases, as well as infrastructure and plant technology plans. Customer feedback campaigns also provide valuable external input.

And to ensure there is consensus not only on an idea, but on the associated resources and investment required, all Level 4 decisions also involve senior management and shareholders. This ensures that everyone is on board with an idea by the end of the process. On the whole, these new structures have made the BILSTEIN GROUP much more efficient. Only the very best projects are actually implemented, with all the necessary documentation and with the involvement of all key decision makers.



A digital world

#BILSTEIN GROUP @social media

The BILSTEIN GROUP is undergoing a digital makeover and extending its presence beyond Facebook to the social media channels Instagram and LinkedIn. As part of the update, the corporate website is also getting a major facelift – ensuring the company has a consistent look and feel across the digital world.

To help the BILSTEIN GROUP appeal to all generations, including future employees and customers, it has refreshed and expanded its social media presence online. Just a few weeks ago, the BILSTEIN GROUP could only be found on Facebook, where it wasn't even that active. But that's about to change. From now on, news and updates will be posted regularly across multiple platforms.

But which are the best channels for speaking to our target groups? Prior research and analysis can help us determine the most effective and efficient platforms for our purposes. Because at the end of the day, the BILSTEIN GROUP aims to reach as many people as possible.

Three platforms with exceptional potential

A benefit analysis showed that Instagram, Facebook, and LinkedIn offer particularly good opportunities. These platforms are international and known by everyone, and most people use them every day. The channels can also help with hiring, allowing us to reach highly skilled, potential employees.



bilstein_group



By leveraging all three of these platforms, the BILSTEIN GROUP can now provide authentic inspiration as well as serious information.

New BILSTEIN GROUP website

in

Additionally, in October, the BILSTEIN GROUP has launched a fresh, more modern version of its website, with updated facts and figures. Take a look for yourself: www.bilstein-gruppe.de

BILSTEIN GROUP - Kaltband



Our work with the BUK

A strategic approach to family services

Since early 2019, the BILSTEIN GROUP has been working with "BUK Familienbewusstes Personalmanagement GmbH" for all things related to family services. Let's take a look at our collaboration so far.

rying to balance a family and a career day in, day out, is no small feat: say your kid is sick, grandma and grandpa are on vacation, and you need to get to work – it's not an easy situation to deal with. You need help, and fast.

Personalized, straightforward support

In the BUK, the BILSTEIN GROUP has found a partner that can provide this kind of emergency help and support for employees in Germany, if they choose to use it.

There is a number of easy ways to reach the assistants at BUK: customer service hotlines, video chats, email, and even face-to-face consultations. Response times to queries are quick and the services are completely free of charge for all BILSTEIN GROUP colleagues. The BUK is 100 percent dedicated to ensuring the confidentiality of your data and information.

Summer camp for kids

The BUK's portfolio of services includes the BILSTEIN GROUP's summer camp, which was used by a number of employees this year. Between July 22 and 26 and/or August 19 and 23, 14 children aged six to 12 had the opportunity to spend one or two fun weeks in Hagen-Hohenlimburg and the surrounding areas.

The extensive program of activities included trips to Dortmund Zoo, the Phänomenta Lüdenscheid science museum, and Westfalenpark. The BILSTEIN GROUP kids also had the chance to learn how to unicycle, relax on the blue:beach at Kemnader Lake, and experience an outdoors adventure with bushcraft and survival training.

Parents simply had to drop their kids off and pick them up each day at the canteen on Weinhof, before and after their shifts. The process really couldn't have been easier – a huge relief for parents, and a ton of fun for the kids.

BUK's services

1. Childcare

Personalized advice about types and cost of childcare, parental allowances and leave, and support for any contractual queries, etc.

 Summer vacation support
Searching for qualified childcare options, au-pairs and babysitters, homework assistance, emergency childcare, BUK summer camp, etc.

3. Caring for relatives

Personalized advice on care options and costs, care assessments, and organizing care. Sourcing care services across Germany, communication with local organizations, etc.

4. External employee support Confidential advice on health, work, career, personal matters, mental health, addiction, and dependency

Further information on the BUK's family services is available at: www.buk-familienservice.de

400 years of strip steel production in the region The home of cold rolling

When the BILSTEIN GROUP was founded in 1911 in the area between Hagen and Hohenlimburg, the region had already made a name for itself: just a stone's throw away, in the Wesselbach valley, the foundations for today's cold rolling industry were laid back in 1619. Let's take a journey through time.

1619

Judge Wessel Lappenberg started running his own wire factory in the county of Limburg in 1619. He was first mentioned in records because he had to pay an annual fee of four gold guilders to the local count for use of water from the Wesselbach river. His small factory represented the early origins of the cold rolling industry in the Lenne valley.



A descendant of Lappenberg sold the factory 86 years later, but the new owner did not continue operations.



Gottfried Böing, the son of a wire manufacturer, purchases the old factory. He pays the count the fees for the river water for the last 97 years and moves the factory from the Wesselbach to Langenkamp.





Thanks to the expert knowledge of a foreman, Gottfried Böing transitioned from wire drawing to the increasingly modern wire rolling procedure, making a huge technological leap ahead of his competitors in the industry.

1855

The main motivation for developing coldrolled strip came from the fashion industry. The birth of the hoop skirt challenged the innovative spirit of several Hohenlimburg wire drawers. Johann Peter Hüsecken, among others, succeeded in replacing the wire with light, flexible steep strips: the beginning of cold-rolled strip.

1846

Edmund Böing, Gottfried Böing's son, plans to diversify his father's business and founds the company "Böing, Röhr und Sefsky" with Carl Röhr and Robert Sefsky. Together, the three men add a large wire factory in Oeger Hardt to their portfolio and convert it into a puddling factory where crude iron can be made into malleable wrought iron. Gradually, they add puddling furnaces, a foundry, a machine shop, a hammer mill, and a rolling mill. Today, the company's founding stone can be seen on the lawn outside the Hoesch Hohenlimburg WerksMuseum, bearing the initials of the founders.



Did you know? Around 70 percent of all German coldrolled products are still made in the Hohenlimburg region. Moreover, German production makes up more than half of all European manufacturing in this sector.

Did you know?

In the 18th century, a fine, flat-rolled wire was used to provide structure to the round hooped skirts that were fashionable at the time. However, these steel crinolines, which were invented in 1856, had one huge drawback: after initial treatment, the steel buckled extremely easily, causing the skirts to lose their shape. Using the cold-rolling procedure, developed by wire drawers from Hohenlimburg, a skirt that kept the required shape could be made out of flexible spring steel strip for the first time.



In 1856, "Böing, Röhr und Sefsky" changes its name to "Limburger Fabrik und Hüttenverein" and adds more production sites in the Hohenlimburg area over the next few years. The company increasingly focuses on rolling as it heads toward the turn of the century. There is a merger, acquisitions, and restructuring, which lead to the construction of a new medium-width strip mill.





In the years leading up to 1900, the lower Nahmerbach valley near Hohenlimburg becomes very densely populated with wire drawers and cold rolling mills. The Bergisches Land region, with its many rivers and streams and being a prime location for textile production since the 17th century, makes the area particularly attractive to factories. In 1900, the Hohenlimburg railway is opened – a narrow-gauge railway for goods transportation – providing around 40 rail connections to the local steelworks.

1907

In 1907, Limburger Fabrik und Hüttenverein AG merges with the iron and steelworks Hoesch AG in Dortmund, marking the start of a new chapter in the industrial story of Hohenlimburg. The phrase "Hoesch Hohenlimburg" becomes a wellknown term in the region - and remains so today.



The company "Platenius, Jung & Meier" is founded in the Nahmer valley, south of Hohenlimburg. The cold-rolled strip manufacturer is purchased by its future namesake Hugo Vogelsang 32 years later.



1911

In 1911, Friedrich Bilstein launches a small cold rolling mill out of the ballroom of his parents' restaurant in Hohenlimburg. He sources the raw material locally: in the early years, the hot-rolled strip is transported by horse and cart from Hoesch AG to the BILSTEIN plant.





Together with his brother Heinrich, Friedrich Bilstein builds a factory on Weinhof, right on the banks of the Lenne river. The new plant is also connected to the railway line.

Did you know?

Hohenlimburg first got its name in 1879. Until then, the area was known as "Limburg." The name was changed to avoid any confusion with the town of the same name on the river Lahn.



After the construction of a medium-width strip mill in the Hoesch factory, in August 1955 the company starts rolling its first medium-width strip in Hohenlimburg, which goes on to gain recognition far beyond the region.



After Hoesch AG donated a large monument to hot rolling to Hohenlimburg in 1959, the cold rolling mills felt they should do the same and on a similar scale. So the local cold rolling companies joined forces and, in 1961, unveiled a monument on the right bank of the Lenne, opposite the monument to hot rolling.



Hoesch makes the biggest investment in the company's history: for around 115 million Deutschmark, it acquires a new medium-width trip mill with a new furnace, a reversing mill with integrated edger, two additional mills, process automation, and a new coiler. BILSTEIN also continues to grow, and in 1985 expands its production halls, annealing capacity, and production plants.



BILSTEIN purchases HUGO VOGELSANG.

1992-1999

Hoesch AG merges with Fried. Krupp GmbH and, following a merger between Krupp and Thyssen, becomes part of the Thyssenkrupp family several years later.





BILSTEIN goes international: between 2003 and 2010, the group acquires C. VOGELSANG and SHEARLINE STEEL STRIP LTD. (UK), KWW a.s. (now BILSTEIN CEE, Czech Republic), purchases a holding in ARMCO DO BRASIL S.A. (Brazil), and founds BILSTEIN NORTH AMERICA, INC. (USA) and BILSTEIN TRADING (SHANGHAI) (China).



The BILSTEIN GROUP opens a new production plant, BILSTEIN COLD ROLLED STEEL, in Bowling Green, Kentucky (USA). Thyssenkrupp changes the brand name of the hot-rolled strip made in Hohenlimburg to precidur® and in 2019 celebrates its 400-year history, which spans from the production of the first wire coil all the way through to today's precidur®.

With the first coil manufactured on the wide strip rolling plant at its headquarters near BILSTEIN, the BILSTEIN GROUP is setting another milestone in the cold strip market.



LEGAL INFORMATION

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