

Issue 03 Feb 2018

LET'S ROLL

News and reports on technology from the people at Union Electric Åkers

VICTURA™

TwinAlloy™ Steel Rolls

NEW ROLL GRADE AND TECHNOLOGY CONCEPT IS BORN

UNION ELECTRIC ÅKERS INTRODUCES VICTURA™ TwinAlloy™ STEEL ROLLS

*Major steps have been taken throughout the industry
to meet the ever-changing needs of hot rolling mills.*

SSAB RAAHE - ONE STEP AHEAD OF THE FUTURE

A new and important milestone has been reached.

CAST PRODUCTION NETWORK – UNMATCHED CAPABILITIES

ROLLS GET YOU DRESSED FOR SUCCESS

ABM WEEK 2017

AISTECH 2017

LETTER FROM THE PRESIDENT

Dear Valued Customer,

2017 was a significant and challenging year for Union Electric Åkers. Global steel demand began to make a comeback in the fourth quarter of 2016. There was some recovery in the North American oil and gas markets. And throughout 2017, we continued to see ongoing but moderate growth in global steel demand.

Mr. T.V. Narendran, Chairman of the worldsteel Economics Committee, reported "encouraging" progress in the global steel market in 2017. "We have seen the cyclical upturn broadening and firming throughout the year leading to better than expected performance for both developed and developing economies," he stated.

In fact, according to worldsteel's global steel production statistics for 2017, global crude steel production, increased by 5.3% over 2016. The EU saw an increase of 4.1% over the prior year, and in North America, production was 4.8% higher than in 2016. Despite these positive movements, we also experienced challenging headwinds.



As to be expected, our manufacturing costs increased due to growing product demand. Upward pricing pressures on the cost of key raw materials, combined with the shortages of other steelmaking consumables such as electrodes and refractories, also contributed to increased operating costs. The most surprising shortage was the lack of capable machinists and other skilled craftsmen which slowed our ability to ramp production. The need to outsource additional labor to support this growing volume of business, further negatively impacted the company's performance.

Although we experienced difficulties, we also saw success:

1. Union Electric Åkers added a significant new accredited aluminum mill to our customer list, demonstrating our growing presence among major aluminum rolling mills around the world.
2. In December, we introduced TwinAlloy™ Steel, a new generation of breakthrough performance-grade rolls, with the release of VICTURA™, the first product in the series.
3. Union Electric Åkers was strongly represented at AISTech in Nashville in May with the presentation of two papers.
4. Our R&D team presented at ABM Week 2017 in Brazil in October. Both conferences gave us an opportunity to showcase our advances in research and development.
5. INVICTA continued to gain acceptance in cold mills meeting the ever-increasing demands on cold rolled products like rolling Advanced High Strength Steel (AHSS) materials.

There's more to come from Union Electric Åkers in 2018. We will continue to invest in quality and manufacturing processes to deliver superior value to our customers, and introduce product and service advancements that secure our position as the preferred brand. I won't be satisfied until we are able to outperform our customer's expectations. And I know that you, our valued customer, will not be satisfied until we get there.

Thank you for giving us the opportunity to serve you
Ladies and Gentlemen, Let's Roll!

Rodney Scagline
President, Union Electric Steel Corporation



VICTURA™

TwinAlloy™ Steel Rolls

NEW ROLL GRADE AND TECHNOLOGY CONCEPT IS BORN

The chronological milestones for late finishing stand roll grade families at Union Electric Åkers are the ICDP, Enhanced ICDP, and the newest, TwinAlloy™ Steel.

The IC rolls in the early stages of research and development were based on the former design of Ni-hardened material, where a high volume of cementite was generated within the matrix to reach greater hardness and increased wear resistance when compared with white iron.

The MC-type of carbide was first introduced into Enhanced ICDP rolls to improve performance. With the most recent development of VICTURA™ TwinAlloy™ Steel, Union Electric Åkers introduced additional MC-type of carbide as well as other carbides to achieve an optimized balance of cementite, MC-type carbides, and graphite which resulted in a homogeneous distribution of all phases. By incorporating this concept, a large number of elements that promote the formation of MC-type of carbides are used.

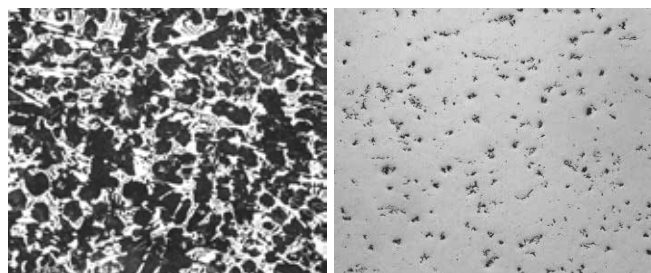
“Our key objective in the project was to develop a new R&D approach that would result in a major performance step change when compared to our existing grades used in late finishing stands. Throughout the prototype phase we have been able to show a consistent 50-100% performance improvement over Enhanced ICDP type of rolls,” says Jason Sychterz, Vice President of Technology at Union Electric Steel.

“TwinAlloy™ material characteristics are primarily the combination of cast and forged alloy design philosophies, coupled with refined and modified process technologies. Looking ahead, we are further developing TwinAlloy™ technology and are in fact testing prototypes in a new TwinAlloy™ HSS grade with exciting results.”

“The TwinAlloy™ technology concept represents a series of forged and cast roll materials developed by Union Electric Åkers that aims to bring breakthrough improvements in performance and Total Cost of Ownership in both hot and cold rolling applications,” commented Stefan Wahlund, Director of Product Management and Marketing. “A critical aspect of our development and design of new TwinAlloy™ technology products is the ease of implementation for the customer. With our VICTURA™ grade, we have a true plug and play product.”

VICTURA™ TwinAlloy™ Steel is designed for hot rolling, late finishing stand application and combines the High Speed Steel SPECRA™ and enhanced ICDP MICRA™ / APEX™ technologies introducing even more MC-type of carbide. By adapting high alloy tool steel based carbides to an iron-based graphite morphology, the campaign lengths of early (HSS) and late finishing stands can be closely matched. The combination of MC carbides and the microstructure develops excellent oxidation characteristics which promote extended rolling campaigns.

Figures show the microstructural comparison between the Enhanced ICDP and the VICTURA™ TwinAlloy™ Steel material.

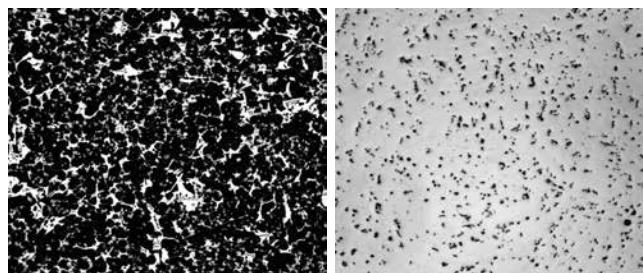


x100

x25

MICRA™/APEX™ - ENHANCED ICDP

Bainitic/martensitic matrix with Fe₃C carbides, free graphite particles and a small amount of homogeneously distributed MC-carbides.



x100

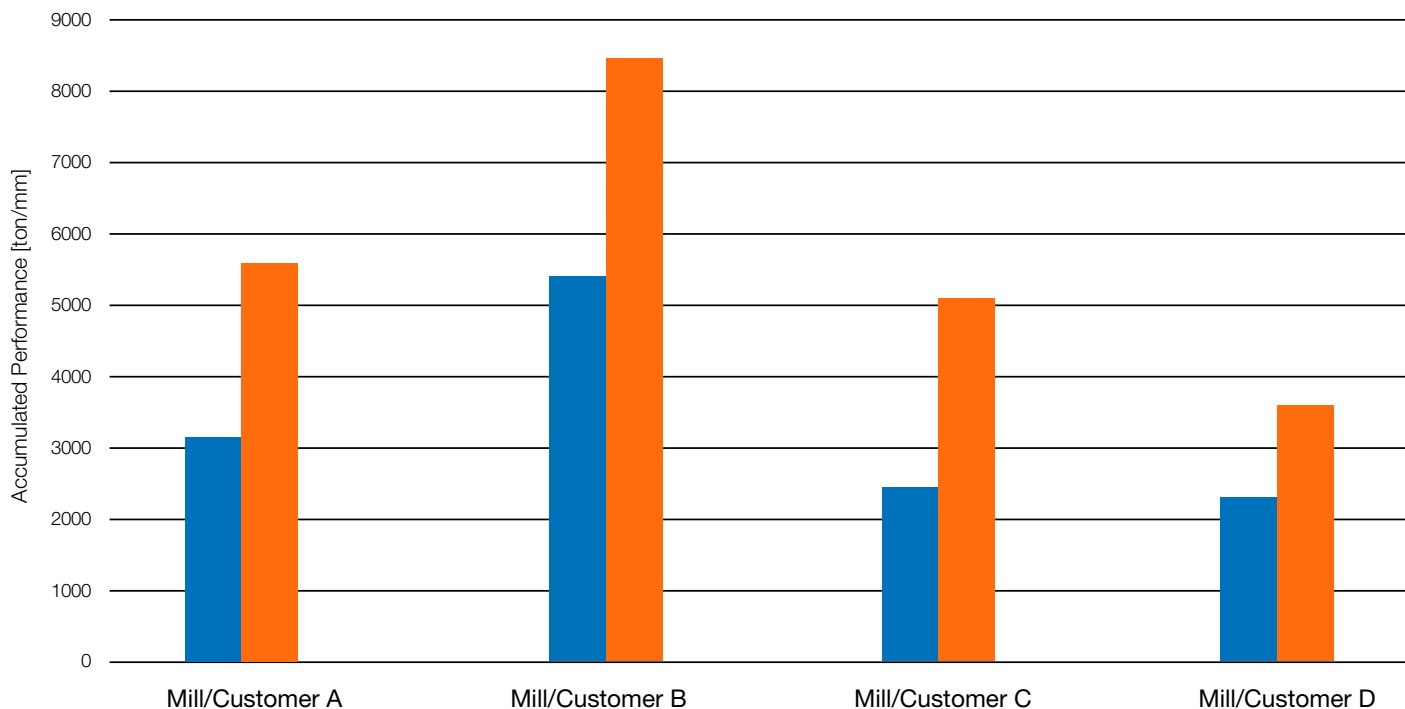
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VICTURA™/TwinAlloy™ STEEL

Tempered bainitic/martensitic matrix with large amount of homogeneously distributed MC-type carbides and cementite and free graphite nodules.

Roll Performance at Selected Customers, Enhanced ICDP (MICRA™/APEX™) vs VICTURA™

MICRA™/APEX™ VICTURA™



Breakthrough 50-100% performance improvement compared to enhanced ICDP grades such as MICRA™ / APEX™

VICTURA™

TwinAlloy™ Steel Rolls

UNION ELECTRIC ÅKERS INTRODUCES VICTURA™ TwinAlloy™ STEEL ROLLS

Since the introduction in the mid 90's of enhanced carbide ICDP type of work rolls for hot rolling finishing stand applications, major steps have been taken throughout the industry to meet the ever-changing needs of hot rolling mills. Mill applications that require newly advanced and highly demanding materials are setting a new standard for roll requirements.

In December 2017, Union Electric Åkers officially launched TwinAlloy™ Steel, a new generation of high-performance grade rolls, with the release of VICTURA™, the first product in the series. Union Electric Åkers' long tradition in forged and cast roll making, combined with a commitment to research and development, have resulted in the TwinAlloy™ concept. This innovative technology brings together superior wear resistance, good operation safety and excellent surface quality – properties that no other manufacturer has been able to successfully combine.

Substantial research and development, coupled with prototype testing, resulted in the new roll grade VICTURA, which brings breakthrough performance in hot strip mill applications. For the customer, this means exceptional increases in productivity and optimization of Total Cost of Ownership (TCO).

We are excited to introduce VICTURA, the newest addition of high-performance work rolls for hot rolling finishing stand applications. With the latest in research and innovation from Union Electric Åkers, we continue to offer an enhanced product portfolio that provides solutions for every customer need and any future challenge.

Union Electric Åkers' solutions for late finishing stands work rolls include:

- ICRA/AIC ICDP
- MICRA/APEX Enhanced ICDP
- VICTURA™ TwinAlloy™ Steel

For more information on VICTURA™ TwinAlloy™ Steel Rolls, please contact your local Area Sales Manager or visit the Union Electric Åkers Product page at www.uniones.com.



Peter Hedqvist (UEÅ), Zhi Zang (UEÅ) and Jaakko Kortenieniemi (SSAB Rahe).

SSAB RAAHE - ONE STEP AHEAD OF THE FUTURE

A new and important milestone has been reached with the successful implementation of VICTURA™ TwinAlloy™ Steel Rolls in the SSAB Hot Strip Mill at Raahe Works.

Through a collaborative effort to reach maximum roll performance and utilization through cutting edge roll technology and roll shop management, Union Electric Åkers and SSAB Raahe used prototype testing and the validation phase to prove that the TwinAlloy™ Steel concept is here to stay.

“The transparent dialogue and mutual technical exchange with Union Electric Åkers Sales and R&D team has been critical to reach sufficient results. SSAB has set an ambitious target to be a fossil-free steel manufacturer by the year 2045, and better performing rolls will reduce our carbon footprint.

I am confident we will continue to be one step ahead of the future in driving productivity, quality and CO2 efficiency improvements through the development projects we are running together with Union Electric Åkers (UEÅ) and other partners,” says Jaakko Kortenieniemi, Development Engineer at SSAB Raahe.

CAST PRODUCTION NETWORK – UNMATCHED CAPABILITIES

One of Union Electric Åkers' unique strengths is the ability of our global manufacturing network to meet the vast array of customer demands and expectations.

Our cast products are manufactured in a total of four facilities, located in four different countries, each contributing their specialties to the product portfolio. By conducting benchmark and best practice projects, we continuously strive to provide a complete product offering for Hot Strip Mill Work Rolls, which can be manufactured in all four of the plants.

When new roll grades are in development, such as the high-performance roll, VICTURA™ TwinAlloy™ Steel, the ability to produce a specific grade at multiple manufacturing facilities is addressed early in the R&D project. This approach is truly unique to the industry and is a strength of Union Electric Åkers manufacturing.

From the date of launching a breakthrough product, Union Electric Åkers can produce and distribute reliable, high-technology rolls from a manufacturing network that spans the globe.



AVONMORE PLANT – USA

The plant in Avonmore was founded in 1894 and supplies to both the domestic and international markets. Åkers National Roll Company is located approximately 35 miles (56 kilometers) northeast of Pittsburgh, Pennsylvania, USA.

Products

- Work Rolls for Hot Strip Finishing Mills
- Work Rolls for Hot Strip Roughing Mills
- Plate Mill Rolls
- Cold Strip Mill Rolls



GATESHEAD PLANT – UNITED KINGDOM

Located in Gateshead, England, this facility was originally the Davy Roll Company, supplying cast roll products for more than 150 years. In 1999, Union Electric Steel purchased the company and changed the name to Union Electric Steel UK Limited (UES UK). Today, UES UK continues the legacy of producing high-quality cast rolls for hot and cold strip mills, medium-to-heavy section mills, and plate mills.

Products

- Work Rolls for Hot Strip Finishing Mills
- Work Rolls for Hot Strip Roughing Mills
- Work Rolls for Plate Mills
- Rolls and Sleeves for Section Mills
- Back-up Rolls
- Rolls for Cold Strip Mills



ÅKERS STYCKEBRUK PLANT – SWEDEN

Operations at the plant in Åkers Styckebruk dates back to 1580, when the business was established. The first pair of rolls were delivered in 1806. Today's plant, Åkers Sweden AB, is located approximately 47 miles (75 kilometers) west of Stockholm, Sweden.

Products

- Work Rolls for Hot Strip Finishing Mills
- Work Rolls for Hot Strip Roughing Mills
- Work Rolls for Plate Mills
- Rolls for Heavy Section Mills
- Rolls for Medium Section Mills



TAIYUAN PLANT - CHINA

The facility was founded in 1975, which was originally a wholly-owned subsidiary of TISCO. In 1979, production of spun cast ICDP Rolls began. In May 2007, the joint venture agreement between TISCO and Åkers AB was signed. Shanxi Åkers TISCO Roll Co. Ltd. is located in Taiyuan, Shanxi Province, southwest of Beijing, China.

Products

- Hot Strip Mill Work Rolls



ABM WEEK 2017

The annual conference of Brazilian Metallurgy, Materials and Mining Association, ABM Week 2017, was held at the Pro Magno Events Center in São Paulo, Brazil, at the beginning of October.

As the largest steel conference in Latin America, this event is primarily attended by delegates from industry and academia from across the region. The topics covered ranged from mining to the latest in product innovation and technology. Over 750 technical papers were presented, and Union Electric Åkers was well represented.

Zhi Zhang, R&D Senior Engineer, presented a paper on Union Electric Åkers TwinAlloy™ Steel series, a new generation of high-performance rolls. The paper, which is co-authored by Zhi Zhang, Mats Söder, R&D Manager, and Ron Webber, Technical Services Manager, discusses the development VICTURA™ steel grade rolls. These breakthrough rolls are engineered for use in hot rolling, late finishing stand applications (see articles titled “A New Roll Grade and Technology Concept is Born” and “Union Electric Åkers Introduces VICTURA™ TwinAlloy™ Steel Rolls”). The presentation also included a discussion of the research and customer trial results that went into the development of VICTURA.

A second paper, “Total Cost of Ownership Models,” by Ron Webber, presented various aspects of analyzing the true cost of using rolls. Apparent variables, such as T/mm and roll price, do not always give a complete picture of what customers can spend on rolls. Union Electric Åkers’ personnel can assist our valued customers in evaluating and reducing their overall roll costs. Both papers are available upon request.



**UNION ELECTRIC ÅKERS WELCOMES
YOU TO MEET WITH US IN SÃO PAULO!**

ABM Week 2018, São Paulo / Sp / Brazil, October 2-4



AISTECH 2017

Music City Center, in Nashville, Tennessee, played host to the 14th annual AISTech 2017, the Iron & Steel Technology Conference and Exposition. The event attracted more than 6,200 attendees far and wide to the music capital, which is home to the Grand Ole Opry House and The Country Music Hall of Fame.

The conference featured innovations and technologies from all over the world that help steel producers to compete more effectively in today's global market. The venue also provided participants with the opportunity to meet face-to-face with key individuals involved in the manufacturing and processing of iron and steel. Over 535 companies exhibited, 504 presentations given, and 113 technical sessions were held, making this AISTech's second best turnout.

Union Electric Åkers kicked off the week by treating customers to a night of music, libations, and southern-style cuisine at the world-famous Wildhorse Saloon, located in the heart of Music City's downtown district.

In addition to exhibiting at the expo, representatives from Union Electric Åkers presented two technical papers. “Total Cost of Ownership Models,” by Ron Webber, laid out various aspects of analyzing the actual cost of using rolls. Mats Söder, R&D Manager, discussed TwinAlloy™ Steel grades for Hot Strip Mill Late Finishing Stands. Both papers can be made available upon request.

“The turnout at our booth was better than in past years,” said Lou Woistman, Area Sales Manager. “I think the recovery we've seen in the industry, since the fourth quarter of 2016, has people excited again about steel and optimistic for the future.”

Chris Morgan, Area Sales Manager, added, “I spoke with visitors to the booth about our business, about the impact of the tariffs, and about whether we thought the pickup in the industry is going to last. People are hopeful of the new leadership, and sustainable turnaround for the industry.” There's more to come from Union Electric Åkers! Be sure to look for us at AISTech 2018, which will be held May 7th through the 10th at the Pennsylvania Convention Center, in Philadelphia, Pennsylvania.



**UNION ELECTRIC ÅKERS WELCOMES
YOU TO MEET WITH US IN PENNSYLVANIA!**

AISTech 2018, Philadelphia, Pennsylvania, USA, May 7-10, Booth: 1834



Film star actress Bahar Pars wearing the steel dress at the Oscar Gala.

ROLLS GET YOU DRESSED FOR SUCCESS

Every day we are in constant contact with products made of rolled steel and metal, in various forms and shapes.

- Cars have numerous components comprised of rolled steel and aluminum.
- Packaging products, such as beverage cans and aluminum foil, and even the aluminum foil safety seal that keeps medicine in their package, are made of rolled metal.
- In our homes, essential appliances such as refrigerators, water heaters, and dishwashers, can only be made using rolled steel and alloy.

We could go on and on, listing all the items that we touch, that we use and that we rely on in our daily life that are produced using high-precision rotating tools in the form of high-quality forged and cast rolls. In fact, you are likely using a product today where a cast or forged roll from Union Electric Åkers has played a vital part in its production.

Modern advances in metallurgy and steel rolling innovation have given us the ability to manufacture metal to ultra-thin measurements. Ultra-thin materials are used in aerospace and military applications, high-efficiency motors, sensing applications, and high-temperature strip products. Now we can even use rolled steel products in clothing!

One of our long-term customer; Voestalpine Precision Strip AB, also known in Sweden as Munkfors, for short. Although best known for their valve steels, razor & scalpel blades and blades for the paper industry, Cold-rolled steel from Munkfors has recently gained a new field of application in haute couture featured on the fashion runway and the red carpet.

By combining the know-how of rolling extremely thin strip products, with the advanced rolls technology provided by Union Electric Åkers, steel was used to create a designer dress for a rising actress at a recent awards gala.

It all started in 2015, when Swedish fashion designer, Naim Josefi, began his collaboration with the steel industry. With the assistance of a Swedish producer of metal cutting tools. Josefi 3D printed a pair of shoes that he had designed for the music recording artist, Lady Gaga.

The 3D shoe project left Josefi wanting more. He next got the idea of creating a dress made entirely of very thin steel. An idea that eventually brought him in contact with Munkfors, a manufacturer that once upon a time produced steel used in corsets and crinolines.

“I asked them to colour steel for me, and then they sent me some samples that were amazing, and well, off we went,” says Josefi. Through a series of controlled oxidation experiments, researchers were able to colour the thin steel strip in different shades of blue.

Josefi's haute couture creation consists of 6,000 steel pieces, hand sewn and designed exclusively for the film star actress, Bahar Pars, who wore the dress at the Academy Awards ceremony in February 2017.

“There are very few steelmakers, who can manufacture as ultra-thin, rolled steel strips as we do. The pieces of strip for the dress are twenty-two thousandths of a millimeter, i.e., 0.022 mm thick, which may be compared to one-sixth of a human hair,” says Ian Jones, Head of Sales and Vice Managing Director of Voestalpine Precision Strip AB.



Each of the 6,000 razor-thin steel pieces was sewn on by hand.

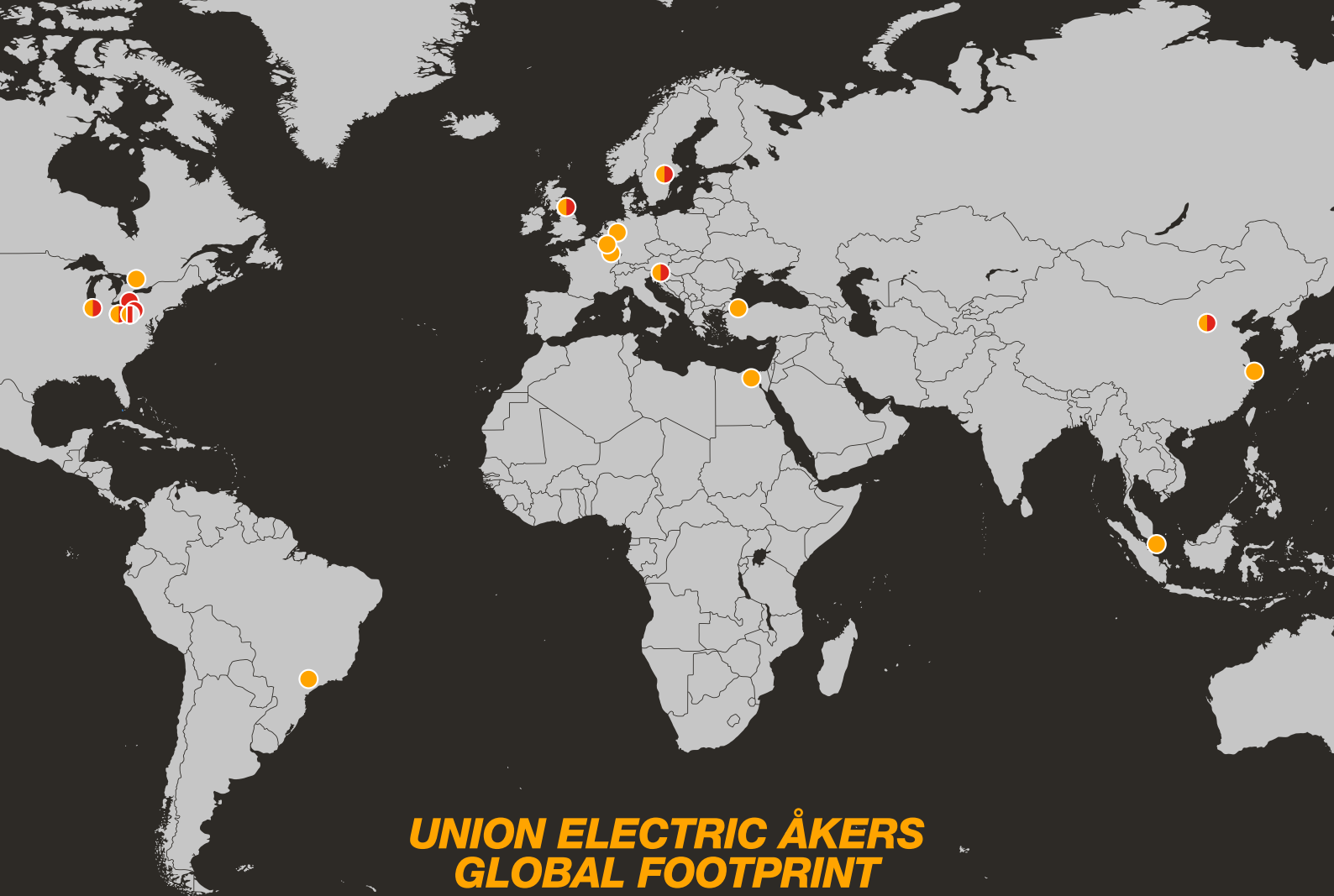
The Union Electric Åkers rolls that are used in the rolling mill of Munkfors are Work Rolls with the following specifications:

Dimensions: Ø80mm x 280mm x 620mm

Grade: INDRA Series

Barrel Hardness: 860-910 HV

To conclude, Union Electric Åkers and Naim Josefi have one thing in common...our products are tailor-made.



UNION ELECTRIC ÅKERS GLOBAL FOOTPRINT

● Corporate Headquarters

USA, Carnegie

● Sales & Service offices

Brazil, Piracicaba
China, Shanghai
Canada, Ancaster
Egypt, Cairo
France, Thionville

Germany, Duisburg
Singapore, Singapore
Slovenia, Ravne
Sweden, Åkers Styckebruk
Turkey, Istanbul

UK, Gateshead
USA, Avonmore
USA, Carnegie
USA, Valparaiso

● Manufacturing sites

China, Taiyuan
Slovenia, Ravne
Sweden, Åkers Styckebruk
UK, Gateshead
USA, Avonmore

USA, Burgettstown
USA, Carnegie
USA, Erie
USA, Valparaiso

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