Next generation metals

Integrated solutions for the steel and aluminium industries

Metals Technologies

SIEMENS VAI

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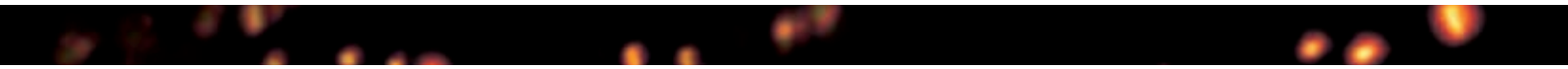


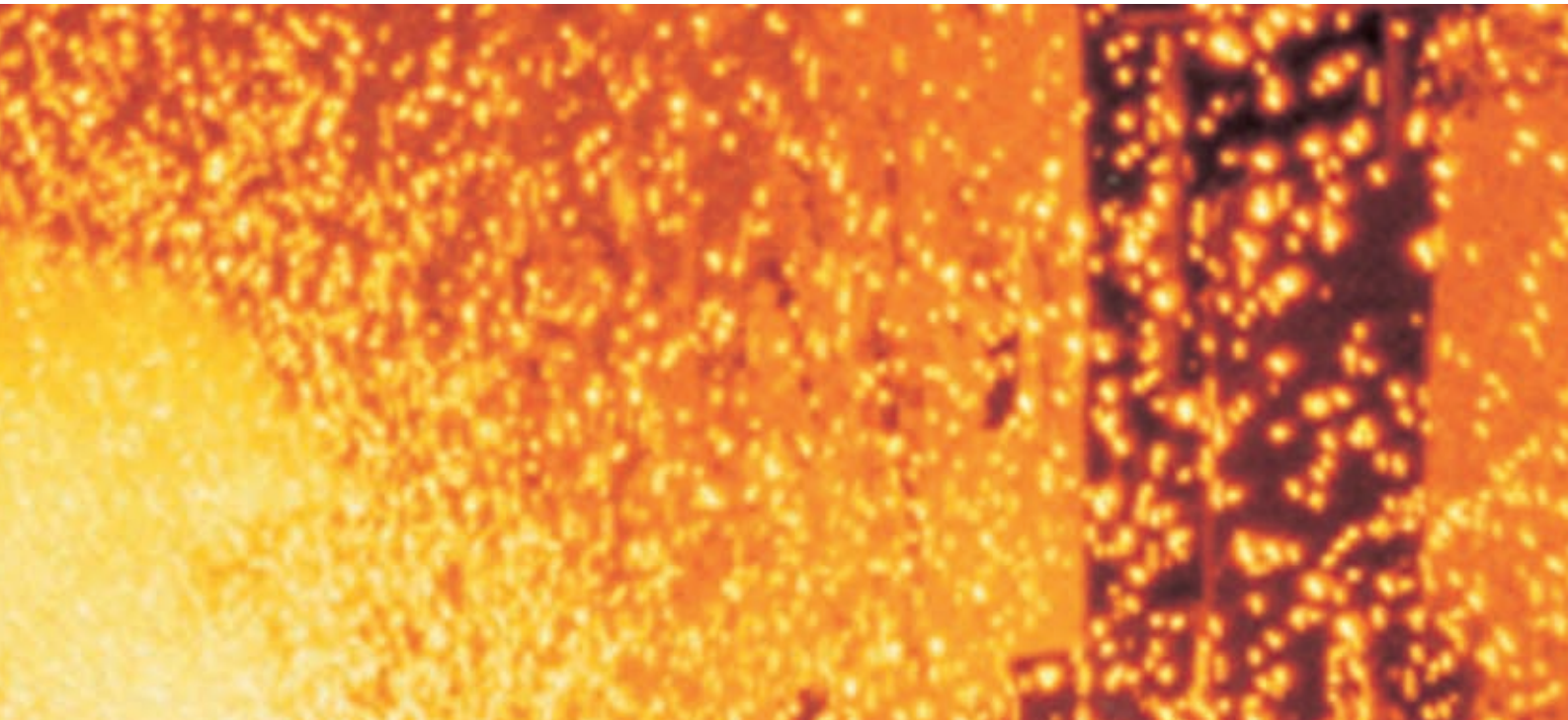
Next Generation Metals. Our strengths are your competitive advantage.

Siemens VAI. Created from the bundled strength of two leading solution providers in the metals industry.

Our comprehensive process know-how provides our customers with the highest levels of plant performance, assured achievement of market quality demands and future-proof investments.

We integrate leading solutions in technology, mechanical engineering, automation, electrical engineering and information technology to a seamless total product. Across the entire process chain – including ironmaking and steelmaking, strip-processing lines, as well as mining as an initial process step. As your partner, we ensure technological state-of-the-art and simultaneously guarantee that your continuous modernization investments pay off in the form of competitive advantages.

Together with you as the plant operator, we make Next Generation Metals a reality.

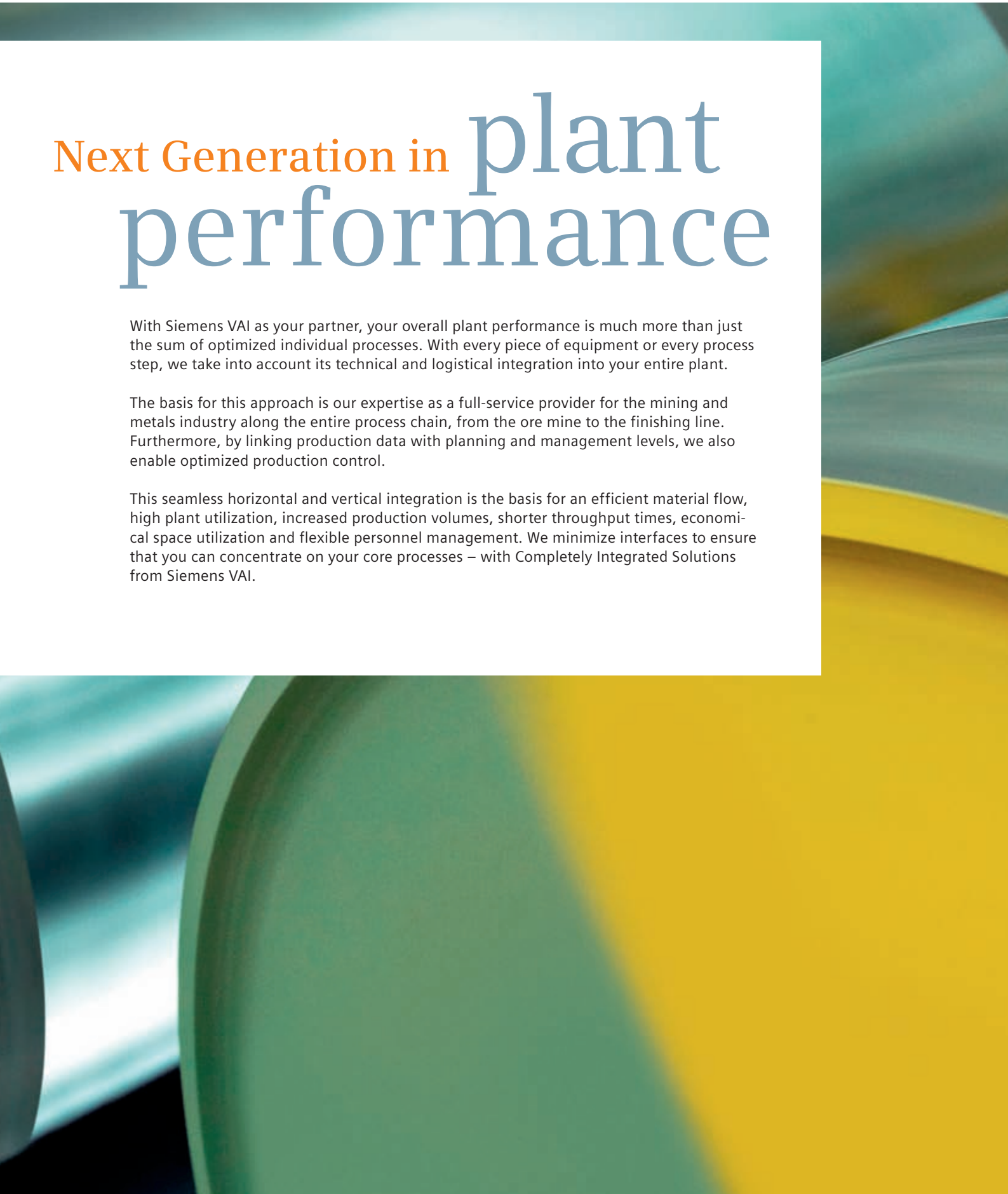


Next Generation in plant performance

With Siemens VAI as your partner, your overall plant performance is much more than just the sum of optimized individual processes. With every piece of equipment or every process step, we take into account its technical and logistical integration into your entire plant.

The basis for this approach is our expertise as a full-service provider for the mining and metals industry along the entire process chain, from the ore mine to the finishing line. Furthermore, by linking production data with planning and management levels, we also enable optimized production control.

This seamless horizontal and vertical integration is the basis for an efficient material flow, high plant utilization, increased production volumes, shorter throughput times, economical space utilization and flexible personnel management. We minimize interfaces to ensure that you can concentrate on your core processes – with Completely Integrated Solutions from Siemens VAI.



Benchmarks – yesterday and today

When the tandem cold-rolling mill was started up at Baosteel in Baoshan at the end of the 1980s, it represented the most state-of-the-art plant of its type at the time. After 15 years, a comprehensive modernization of this facility was necessary in order to meet the high quality demands of the automotive industry. In close cooperation with the customer, Siemens VAI installed, among other items, new control stands as well as a new process automation system. After a downtime of only 28 days the mill was started up again. A nominal production rate of 6,800 tons per day was regularly exceeded during the initial three months of operation – with substantially improved product quality.

Finest steel for the automotive industry: Baosteel, Baoshan, China

New standards in stainless-steel production

Siemens VAI built a complete stainless steelmaking plant for Ugine & ALZ (Arcelor Mittal Group) in Charleroi, Belgium. The large-scale order for the Carinox plant included an electric arc furnace, the AOD converter, a ladle furnace, the continuous slab caster and the accompanying environmental protection systems. Also included were the electrical engineering services and the entire process automation systems. The plant will produce one million tons of stainless slabs per year – while setting the most modern technological standards.

High tech for a million tons of steel per year: Ugine & ALZ, Belgium

Shagang – a steel works on the move

The figures themselves are impressive: 250,000 tons of plant components – from the blast furnace to the rolling mill – were dismantled in Dortmund , Germany and shipped almost 9,000 kilometers to Jiangsu Shagang Steel Corporation. There they were assembled and put into operation again. At the same time, the total plant capacity was increased by 25% to an annual production output of 4.5 million tons of steel. Siemens VAI designed the new plant configuration, upgraded the central key components and implemented a new state-of-the-art automation system. Only five months after the plant was started up again, the quality of the product had already reached that of a newly built facility.

A journey halfway across the globe: Jiangsu Shagang, China

From liquid steel directly to steel strip:
Acciaieria Arvedi, Italy

The steel strip revolution

Finished steel strip produced directly from cast thin slabs in an endless process – this technology, which is unique worldwide, is now being implemented in the Italian city of Cremona. In cooperation with the steel producer Acciaieria Arvedi, Siemens VAI is currently installing the technologically challenging Arvedi ESP plant that is designed for an annual production rate of more than two million tons of rolled steel. The founding of a joint venture company by the two partners highlights the commitment of Siemens VAI to this new technology.

Exemplary emission levels:
Posco, Korea

Innovation saves emissions

Siemens VAI developed FINEX® technology jointly with the Korean steel producer Posco – one of the largest steelmakers in the world producing over 30 million tons of steel per year. FINEX is a further development of the COREX® process and allows hot metal to be produced with excellent environmental values based on fine ore. With the completion of a plant with an annual hot metal capacity of 1.5 million tons at the Pohang site in the Republic of Korea, Posco underlined its strong confidence in FINEX as a future-oriented technology. The plant was successfully started up in April 2007.

World-leading solutions in quality control: MSM packages

Controlling quality – optimizing quality

The online monitoring of microstructure and material properties plays a decisive role in the quality of rolled steel strip. The MSM microstructure monitor packages, which can be integrated into cooling-line process models, are outstanding examples of technological leadership by Siemens VAI. The company's expertise in this field will be further cemented with additional solutions for heavy-plate mills and compact hot-rolling mills. The new solutions are now ready for the pilot-plant stage.

Next Generation in technology

Siemens VAI helps you meet the ever-increasing quality requirements of your customers – reliably, reproducibly and economically. With an almost unparalleled capability we convert advances in materials technology into the process technology of your plant.

This innovative strength has a long tradition in our company. Many of the technological firsts in the metals industry originated with Siemens, with VAI, and with their integrated subsidiaries.

Integration into Siemens AG further increased the wealth of resources driving our innovation – through a systematic exchange of knowledge extending from plant construction to information technology. In the area of research and development alone, Siemens has a staff of 470,000 employees worldwide and invests 5.7 billion euros each year. As a result, our innovation work is constantly enriched by a stream of interdisciplinary knowledge that decisively promotes progress in the metals industry.

Next Generation in life-cycle partnership

With Siemens VAI, your plant production will stay competitive throughout its entire life cycle.

This sustained competitive edge is the product of a unique partnership – one that synchronizes durable mechanical systems with the fast innovation cycles of the automation world. It enables the fast and efficient upgrading of your plant to produce new products, using new input materials and utilizing new forms of energy. It analyzes and exploits cost reduction potentials in production and auxiliary processes. It ensures that your operating and maintenance personnel master new technologies quickly and efficiently. And it makes sure that original replacement parts are promptly available at your locations over many years.

For you, this means maximum returns and long-term protection of your investment. Guaranteed by Siemens VAI – your partner for the entire life cycle of your plant.

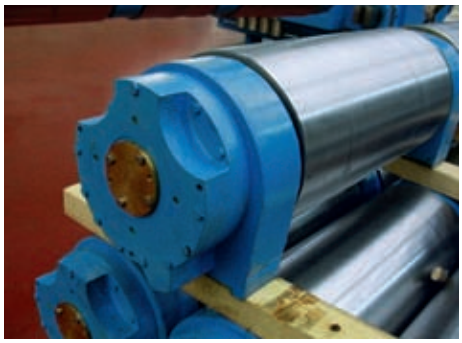
Partnership for prolonged service life

For over 24 years Siemens VAI has been a reliable maintenance service partner to its customers in North America. This partnership has lead to a significant increase in equipment service life and cost savings by consistently focusing on component improvements. The result of this partnership is continual development and implementation of technologies, reduced maintenance costs and enhanced product quality.

An eye for detail: Siemens VAI specialists on site

Worldwide spare-parts management

Reliable spare-parts supply has a major impact on operating costs and the availability of steel and rolling mills. Siemens VAI ensures the worldwide delivery of spare-parts – both for mechanical as well as electrical and automation technology. Continual improvement of our components contributes to a reduction in operational and maintenance costs as well as to compliance with safety standards.



Optimum spare-parts supply thanks to comprehensive service programs

Global service on site

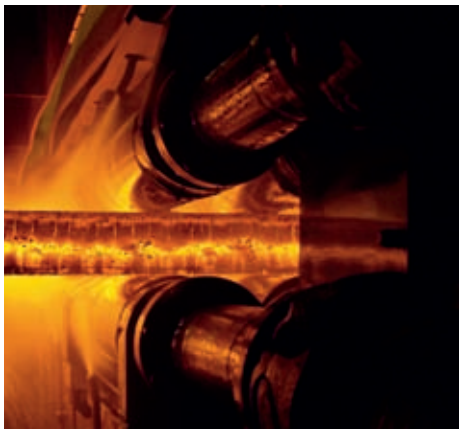
Our service staff of 3,000 local employees – of which approx. 2,000 work in mechanical workshops – are supported by the Metals / Mining Service & Support Center (MSC). This center serves our customers as a central point of contact for questions and problems that may arise. Service managers address every issue presented to them and immediately request the help of specialists when required. The MSC offers fast help around the clock, 365 days a year, to ensure efficient plant operation and the highest levels of plant availability. Worldwide.

Available whenever required: MSC staff members

Availability on call

Siemens VAI Remote Service provides customers with direct online assistance. Problems are analyzed by specialists online, by e-mail or on the telephone – and frequently solved in this way. For example, at the time the contract for the electrical engineering and automation of a tandem mill was signed, our customer SSAB in Sweden opted for a 24-hour remote-service contract to run over two years. This contract provides SSAB access to Siemens VAI specialists around the clock and guarantees the processing of a problem within four hours.

Quick solutions to urgent questions: Siemens VAI remote service



Complete success in half
the time – with Siemens VAI

Short commissioning time ensures fast ramp-up of the plant

Connect & Cast® is a Siemens VAI solution for the particularly fast and smooth start-up of continuous casters. High-quality components and systems in combination with intensive testing create the basis for fully automatic operation from the very beginning. Our customers acknowledge this reliability. In the short period from the beginning of 2005 until the end of 2006, Siemens VAI was entrusted with the installation or modernization of more than 50 casters in 17 countries. In the same time period, a total of 54 Siemens VAI plants went into operation, i.e. in average, a caster start-up every 14 days.

Turnkey package solutions:
Large-scale projects for Hadeed

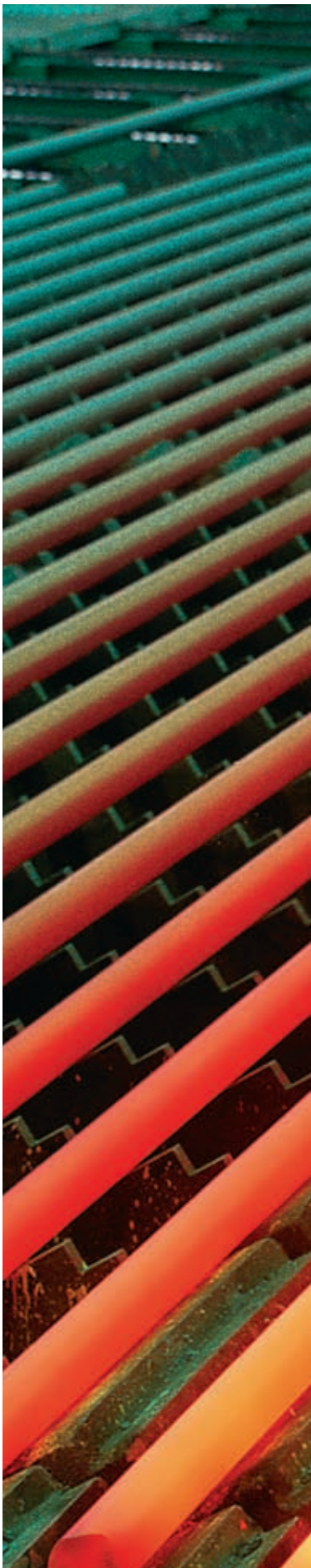
Complete steel works from a single source

"Think big" is the motto of Saudi Iron & Steel Company (Hadeed) on its continued expansion course. In the short time since 2004 alone, four large-scale projects are being implemented under the leadership of Siemens VAI. The world's largest MIDREX™ direct-reduction plant is being built at Al Jubail as a turnkey solution to produce 1.76 million tons of hot DRI per year. In a second step, a complete turnkey steelmaking plant, which will operate on the basis of directly charged hot DRI, was engineered, built and handed over to the customer. The third project involves the doubling of the capacity of the existing hot-rolling mill to two million tons per year. In a fourth project we are modernizing the existing hot-dip galvanizing line – which will enable Hadeed to produce additional steel grades.

Lengths ahead in technology: Corus
rolling mill in Scunthorpe, England

World premiere implemented in the shortest time

120-meter-long rails are rolled in one piece in Scunthorpe, a British location of TATA Steel. This innovative process was made possible as part of a complete solution from Siemens VAI. Seven new "Red Ring" universal stands were installed parallel to the existing line, including a station for automatic roll change as well as integrated machinery for descaling, stamping, hot sawing and pre-cambering the rails. With a downtime of only 14 days, the customer demands for the shortest possible operational interruption of the existing line were met quickly, safely and cost-efficiently.



Next Generation in reliability

With Siemens VAI, you profit from our comprehensive experience. Along the entire process chain, from mining to ironmaking and steelmaking, to rolling and finishing. We are your No. 1 partner in the industry worldwide – and we have a reputation for reliability and financial strength.

Every day we continue to strengthen this leading role by offering solutions that are precisely tailored to our customers' needs and with on-time project completions. We have a proven reputation for meeting – and often exceeding – the agreed scheduling, cost and performance targets, as demonstrated in numerous project examples worldwide.

This combination of experience and dependability is at your service in 50 countries. At all of these locations, Siemens VAI is firmly established as a part of the economy and society, and is a welcome partner to the local industry.

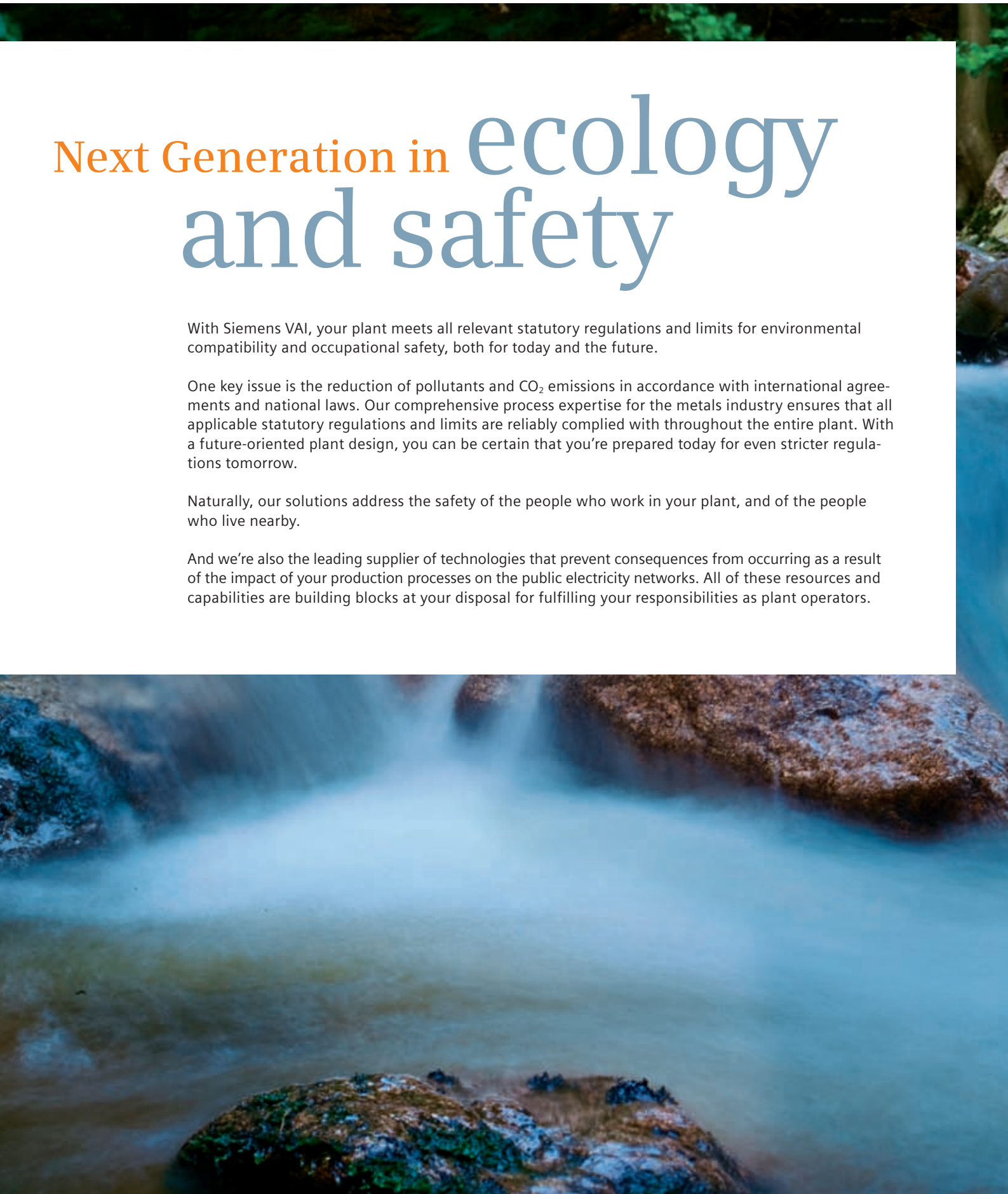
Next Generation in ecology and safety

With Siemens VAI, your plant meets all relevant statutory regulations and limits for environmental compatibility and occupational safety, both for today and the future.

One key issue is the reduction of pollutants and CO_2 emissions in accordance with international agreements and national laws. Our comprehensive process expertise for the metals industry ensures that all applicable statutory regulations and limits are reliably complied with throughout the entire plant. With a future-oriented plant design, you can be certain that you're prepared today for even stricter regulations tomorrow.

Naturally, our solutions address the safety of the people who work in your plant, and of the people who live nearby.

And we're also the leading supplier of technologies that prevent consequences from occurring as a result of the impact of your production processes on the public electricity networks. All of these resources and capabilities are building blocks at your disposal for fulfilling your responsibilities as plant operators.



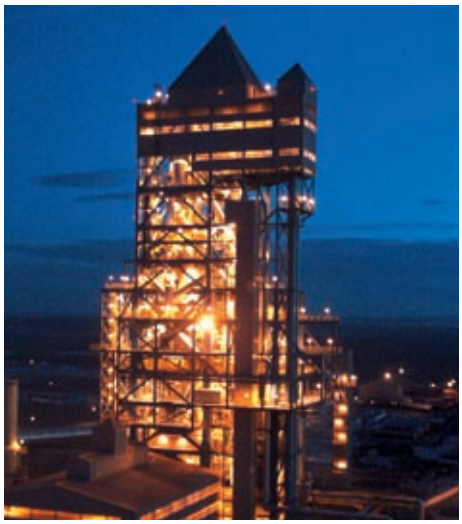
MEROS – record-low sintering emissions

A new technological development in the field of sintering is MEROS® – "Maximized Emission Reduction of Sintering." The process leads to a substantial reduction in fine-dust emissions and is completely wastewater-free. An industrial-scale MEROS plant is currently under construction at voestalpine Stahl in Linz, Austria.

Benefits for everyone – innovative solutions to protect our environment

COREX – direct environmental protection

In 1989, Siemens VAI built the first industrial COREX plant in Pretoria, South Africa. Since that time, this smelting-reduction process has proven to be an environmentally friendly and cost-effective alternative to the traditional blast-furnace route. Gaseous emissions (NO_x, SO_2) and dust are reduced by roughly 90% with this process. Liquid emissions are reduced by as much as 98%.



Cleaner air – reduced gas emissions with the COREX ironmaking process

LiquiRob – safety first in the liquid-metal phase

LiquiRob® technology from Siemens VAI substantially increases work safety and efficiency through completely automated operations in the extremely dangerous liquid steel area of continuous casting plants. The possibility to install the LiquiRob step-wise in existing plants makes this technology a highly interesting investment.

Safe workplace – remote control of dangerous processes

Water – complete solutions for production and the environment

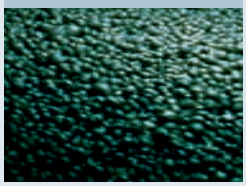
No water, no steel: in the metals production industry, water is the prime element for cooling and descaling. It is also used for the generation of steam and energy. Siemens VAI offers complete solutions for all process water systems, including make-up water treatment, waste-water treatment, sludge treatment, recooling and recycling. The goal is to provide an adequate water supply for the booming industry, while simultaneously minimizing costs and protecting the environment.

Valuable water – sustainable solutions for an optimum protection of our natural resources

Environmental Technologies

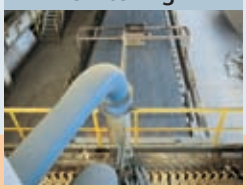
Raw Material Mining and Preparation

SIMINE^{CIS} Pellet

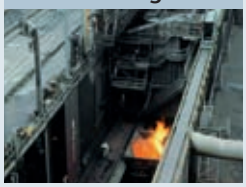


Pelletizing plant

Sintering



Coking



Fluxes

Ironmaking

Blast furnace

COREX®

FINEX®

Direct reduction

Steelmaking

Converter technologies

Basic oxygen converter (LD)

AOD converter

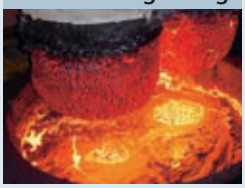
Electric arc furnace

Steel scrap

Secondary Metallurgy

Ladle furnace

Vacuum degassing



Continuous Casting

Slab caster

Bloom caster

Billet caster

Beam-blank caster


Hot Rolling
Cold Rolling
Strip Processing
Finished Products
Plate mill
SIROLL CIS PM
Heavy plates and strip
Processing line
Finishing line
Surface-refined sheet
– Aluminized sheet
– Galvanized sheet
– Polymer-coated strip
– Tin plate
Cold-rolling mill
SIROLL CIS PL
SIROLL CIS FL
SIROLL CIS CM
Hot-strip mill
SIROLL CIS HM
Thin sheet,
Ultrathin sheet,
Hot-rolled strip
Formed steel,
heavy sections,
I beams, rails,
sheet pile sections
Long-product rolling
Cold-drawn steel
Light-weight sections,
Merchant bars
Rod wire
SIROLL CIS ALU
SIROLL CIS ALU
SIROLL CIS ALU
Hot mills
Cold mills
Foil mills

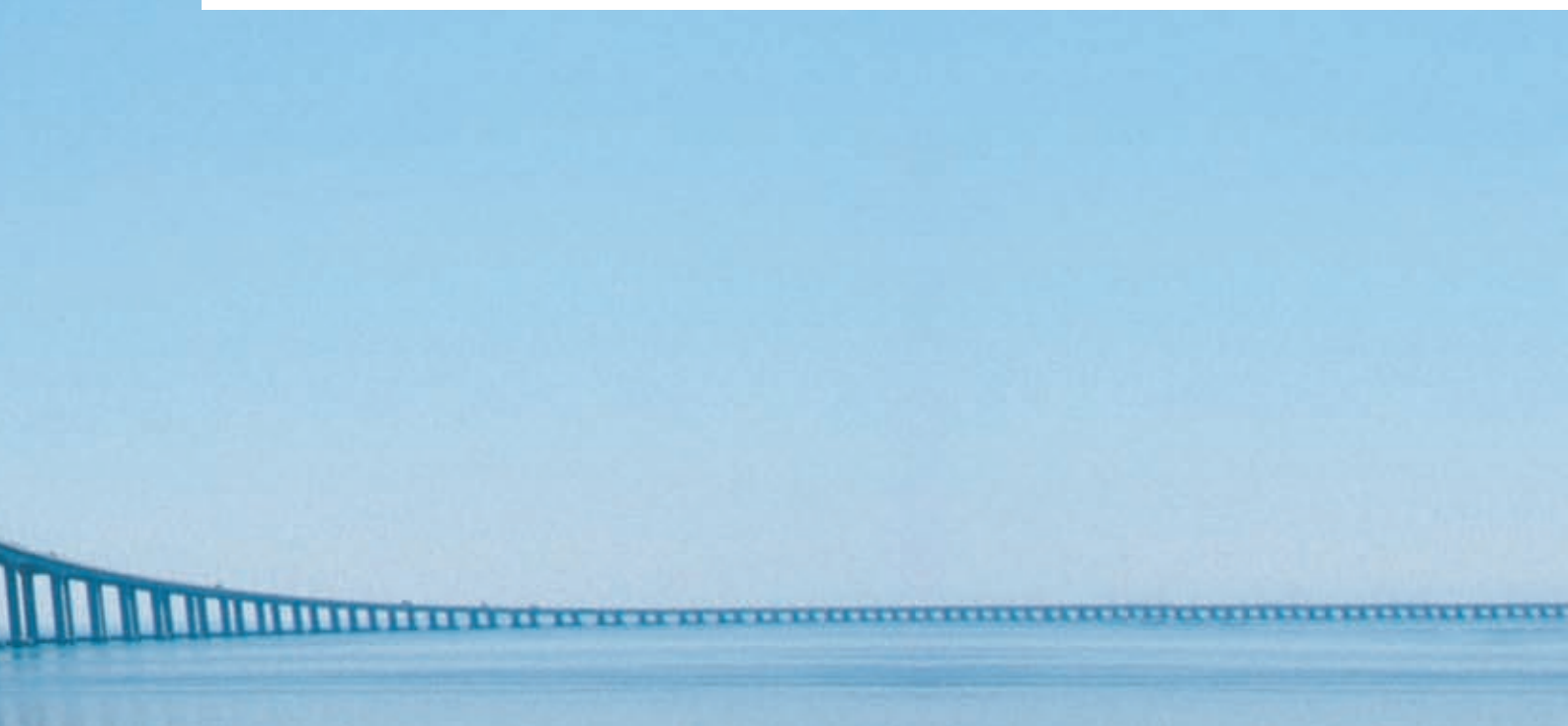
Spanning the bridge across your entire production process:

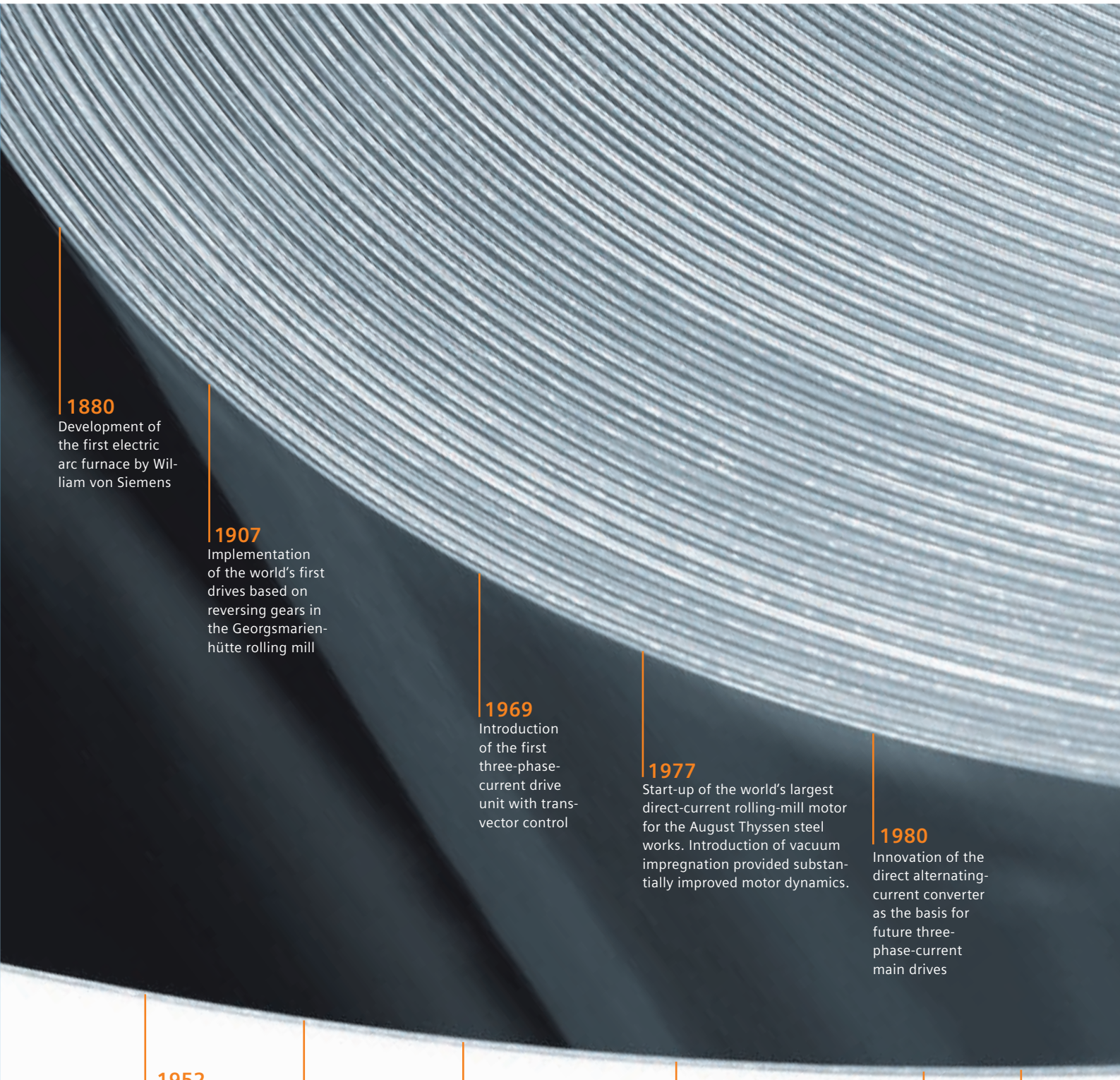
Next Generation Metals.

The key to higher productivity and throughput rates is a plant-wide process optimization. This is the specialty of Siemens Industrial Solutions and Services.

We offer integrated and coordinated solutions for all of your process routes and for all end products while taking into consideration the related upstream and downstream production steps. These are all combined into a single process, as, for example, the world's first Endless Strip Production (ESP) facility.

The result: totally integrated and optimized production processes along the entire production route. Productivity is more than just the sum of its parts. Is there a better bridge into a successful future?





1880
Development of the first electric arc furnace by William von Siemens

1907
Implementation of the world's first drives based on reversing gears in the Georgsmarienhütte rolling mill

1952
First LD steelmaking plant in Linz

1956
First international plant-building order for LD steelmaking plant in India

1968
Revolutionary developments in the field of continuous casting technology for the first continuous slab caster (CC1) in Linz

1969
Introduction of the first three-phase-current drive unit with transvector control

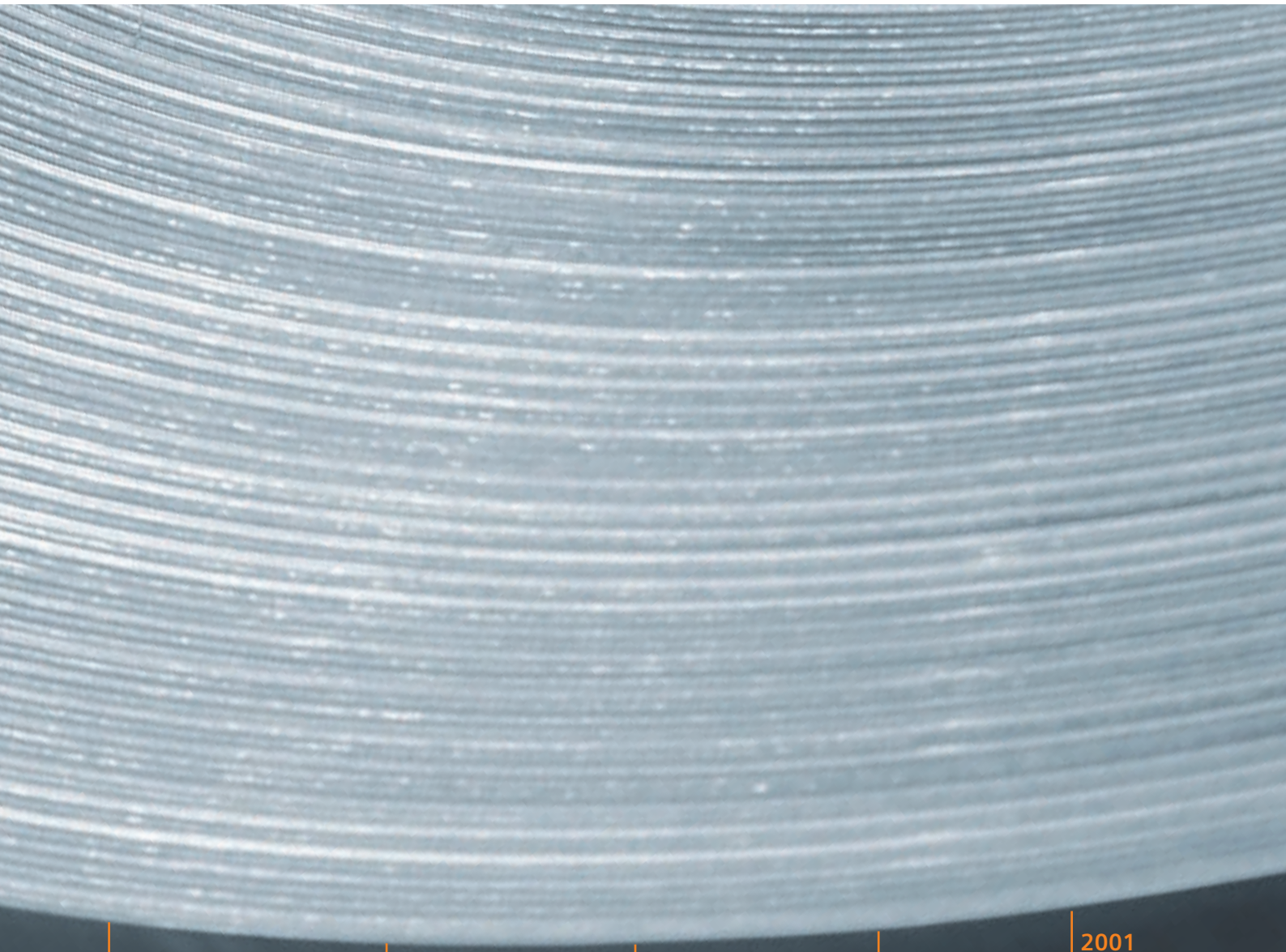
1977
Start-up of the world's largest direct-current rolling-mill motor for the August Thyssen steel works. Introduction of vacuum impregnation provided substantially improved motor dynamics.

1979
Online process model (Level 2) in continuous casting

1980
Innovation of the direct alternating-current converter as the basis for future three-phase-current main drives

1985
First CAQC (computer-aided quality control) casting system

1986
World's first combined pickling-tandem line



1989
Start-up of the first COREX plant which directly uses coal for the reduction and melting of ore to hot metal

1991
Initial implementation of neural networks for efficient adaptation of process models

1991
DSR® – Dynamic Shape Roll for aluminium and steel cold rolling

1994
Initial implementation of the DYNACS® secondary-cooling model

1995
Wire rod rolling speed operating at 130 m/s, design speed 150 m/s

1996
Development of electric shaft furnace technology

1997
DynaGap – dynamic gap adjustment for continuous slab casters

VAI-Q Strip for the prediction of the mechanical properties of hot-rolled strip

1999
Comprehensive expansion of blast furnace technology

2001
New cooling-line model allows controlled cooling along the entire strip length

2001
New actuator for profile and flatness control in the rolling process (SmartCrown®)

2002
AOD converter process model

2003
World's first implementation of a FINEX plant for the production of hot metal at Posco, South Korea

New system generation of VAI SIAS surface inspection for flat products

2003
Development of a local positioning system for precise localization of materials and products

2004
Microstructure calculation and hardness prediction/quality prediction for hot-rolled strip

2007
Online calculation and control of temperature and phases in the cooling line (microstructure target cooling)

MEROS (Maximized Emission Reduction of Sintering) technology reduces harmful emissions, particularly fine dusts

LiquiRob for health and safety improvement in the liquid metal area

Ultimate EAF: Revolutionary electric production technology and design features ensure extremely short cycle times and tap-to-tap times down to 30 minutes. Maximum furnace performance in terms of quantity and quality.

2008
Endless Strip Production (ESP) line for continuous production of conventional and ultrathin hot-rolled strip

2009
Process improvement in the sintering plant: technology packages (twin-layer charging), IMGS (intensive mixing and granulation system) and optimized selective waste-gas recycling as an integral part of greenfield sintering plants

2010

Innovation is our guiding principle.

Innovation has enjoyed a very long tradition at both Siemens Metals and VAI. More than 80% of the technological firsts originated with Siemens or with VAI. The invention of the LD steelmaking process by VAI in 1952 revolutionized the steelmaking world. Three-phase-current main drives, now the standard for many years in the metals industry, were first implemented by Siemens.

And we are consistently moving forward with our development and innovation activities. More than 1,000 patents with an innovation rate of 10% are substantial proof of our innovative power. 25% of our sales comes from new products we offer. Our integration will promote our innovation strength even more.

A close-up view.

As the market leader in metals technologies, Siemens VAI is represented in more than 50 countries of the world.

That is merely a number, but there are a lot of successful partnerships that tell a much more important story. We are located near you. We are dedicated to the success of our customers, and we are deeply rooted in the countries where we are located.

Many enterprises in the metals industry have been partners of Siemens, VAI or one of their subsidiaries for many years, even decades – companies which are now centers of competence in today's world of Siemens VAI.

We're everywhere you need us to be: The most important locations of Siemens VAI

Linz (Headquarters) | Austria
Sinter, smelting reduction, direct reduction, converter steelmaking, stainless steelmaking, slab casting, bloom casting, beam-blank casting, billet casting

Turnkey-MiniMills

Hot-strip mills, Endless Strip Production (ESP), compact hot-strip mills, tandem cold mills, pickling-tandem cold mills, reversing cold mills, skin-pass mills, reversing cold mills/ stainless

Electrical and automation solutions for Iron & Steelmaking

Environmental technologies

Erlangen | Germany
Metals/Mining Service & Support Center (MSC)

Electrical and automation solutions for Rolling & Processing

Coking, pelletizing, mining

Christchurch, Sheffield, Stockton | UK
Blast furnace

Hot-strip mills/aluminium, cold-strip mills/aluminium, foil mills/aluminium, plate mills, Steckel mills, plate-Steckel mills

Legelshurst, Duisburg | Germany
Electric arc furnace, ladle furnace, vacuum technology, oxygen injection technology

Meltshop-MiniMills

Marnate | Italy
Long-product technologies – wire rod mills, bar mills, section mills

Environmental technologies for long products

Saint-Chamond, Montbrison, Montigny-le-Bretonneux | France
Continuous pickling lines, push-pull pickling lines, continuous annealing lines, continuous coating lines, hot-dip/electrolytical galvanizing lines, electrolytical tinning lines, stainless-steel lines, special equipment for processing lines

Worcester | USA
Long-product technologies,high-speed wire rod/bar mills, merchant bar and section mills, long rolling guides, spares and services

For further information contact:

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Order No.: E10001-M1-A3-V3-7600
Printed in Germany
Dispo No.: 21661 K No.: 28105
GB 090706 WS 12091.
Subject to change without prior notice

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