Competence in Ironmaking

Technology, mechanics, automation and electrical engineering – leading full line competence for customized solutions

SIEMENS VAI

Metals Technologies

Global demand for iron and steel is constantly growing, while at the same time prices for raw materials, energy, and transport continue to increase.

In this dynamic environment completely new strategies are required for both ironmaking plant builders and operators.

You expect ...

- Full range of cutting-edge solutions in the iron and steelmaking sector
- Increased environmental protection and optimized processes for economical production
- Full mechatronical package solutions combining automation and mechanics
- Flexible solutions for changing local conditions and parameters
- Processes with extended raw material flexibility to encounter increasing raw material cost

Your challenge: Growth in an era of constant change.

The market is in motion.

Consolidation of the iron and steel branches manifested itself in a significant increase of mergers and takeovers. Nevertheless, the global iron and steel industry continues to expect **strong growth**. According to the latest prognosis, demand for steel will grow by up to 25% by the year 2015, mainly due to rapid economic development in the highly populated Asian countries.

In addition to **transport and logistics, above all, raw materials and energy** are the global driving forces behind the market's dynamics. The supply of coal, coke and scrap will struggle to keep pace with the growth of the steel industry and procurement costs will rise as a result. Energy costs will also continue to increase. As the first link in the product processing chain, DRI production – with its high demand for energy – will be especially affected by market pressure. The value-added chain is shifting, as many investors and plant operators are placing their plants at locations with close access to raw materials or sources of energy, such as in South America, the Middle East and the CIS countries.

Growing environmental awareness

Growing environmental consciousness also contributes to market dynamics by prompting construction of plants that meet increasingly stringent environmental standards. More and more plant operators and plant builders know that investments in environmental protection should always be viewed as long-term, since they also make a lasting contribution to building a positive image.

However, plants that produce hot metal in the U.S. and Europe must continue to optimize their consumption parameters in the future to achieve increased quality with constant or even lowered operation costs. This is the only way they will be able to strengthen their market performance over the long term.

And how dynamic are you?

You need exact analyses to keep an overview of this complex market. These include analyses of **raw material and energy**, feasibility studies and examinations of environmental performance. Today a plant for hot metal and/or DRI production is much more than just a plant. It is part of the entire value-added chain in iron and steel production.

The requirements of your customers and partners continue to be more and more challenging. They increasingly require support in decision processes, and here the magic phrase is "**Consultative Selling**."

The more comprehensive your **process expertise**, the more precisely you can meet your customer's needs with your expertise and your products, and the more you can improve your performance in the market – a market that is continuously growing in complexity and dynamics. Our invitation to you: Work together with us to meet these new challenges.

Our solution:
Think globally, act locally.
Integrated solutions for every location.

Partnership in all project phases

We put the focus on you – as a customer with your own totally unique requirements, as an operating company in a location with its own **local logistics, energy, raw materials and environmental capacities**. Profit from the experience and expertise that has made us the world leader after over 300 successful ironmaking projects. We've developed the ability to precisely meet your specific requirements. What can we do for you?

Worldwide expertise in solutions

As the only global provider of **technological solutions along the entire value-added chain** of iron and steel production, and the largest provider worldwide of metallurgical automation solutions, we can deliver in-depth support for your decision making. Siemens VAI combines plant construction experience and established process knowledge with core expertise in **mechanics, electronics and automation**, rounded out by our familiarity with both global and local market structures. And because we're part of Siemens, we have logistic and technological support to meet your particular requirements in a targeted way.

Unique portfolio

Whether you're seeking an entire solution or a stand-alone package, we offer you the **complete spectrum of all current reduction methods** for hot metal and DRI production – from the classic blast furnace approach to the new, innovative technologies for iron ore reduction/ smelting and iron ore fines processing. It's your choice: We work with you to decide on the solution that most precisely corresponds to your requirements.

Innovations that work

The name Siemens VAI stands for **leadership in innovation**. We have established a decisive competitive advantage in the area of R&D, especially thanks to our headquarters' location near a steelmaking plant. After all, we not only know which technology you need as a plant operator, but also which product qualities your customers need and expect. We invite you to work with us in applying our innovative strength to the **optimization of your process**.

Service orientation

We would be happy to tell you more about what we mean by "service". Our service expertise includes capacity analyses and feasibility studies in advance of projects and coaching of your employees, as well as spare parts supply and **continuous updating of technology**. And we don't want to forget to mention our long-term, customer-specific Siemens VAI financing models. Everything we do is with one goal in mind – to help you achieving maximum process reliability throughout the entire life-cycle of your plant.

We believe that no two customers are alike – and that applies to plants for hot metal and DRI production. That is our approach as the sole supplier of full line solutions worldwide. It's a proven strategy that has made Siemens VAI the world leader in engineering and building ironmaking and steelmaking plants.

Good reasons for Siemens VAI ironmaking technology:

- Globally unique full-line solutions for the production of hot metal and DRI
- Innovation leadership and process expertise of our employees
- High quality, availability and productivity of our plants and/or plant equipment – as proven in many reference projects
- Global and local expertise in raw materials and energy
- Proven customer and service orientation throughout the entire life-cycle of the plant

Our technology paths:

Our supplies and services:

Through decades of consistent solution orientation, Siemens VAI has attained an unique market position. Worldwide, we are the first and only complete supplier for the metallurgical industry with products and services that cover all value-added levels in the ironmaking and steelmaking process. Our customers appreciate our process and plant expertise, whether for classic blast furnaces or innovative smelting and direct reduction processes.

Technology for new plants and upgrades

More from ore

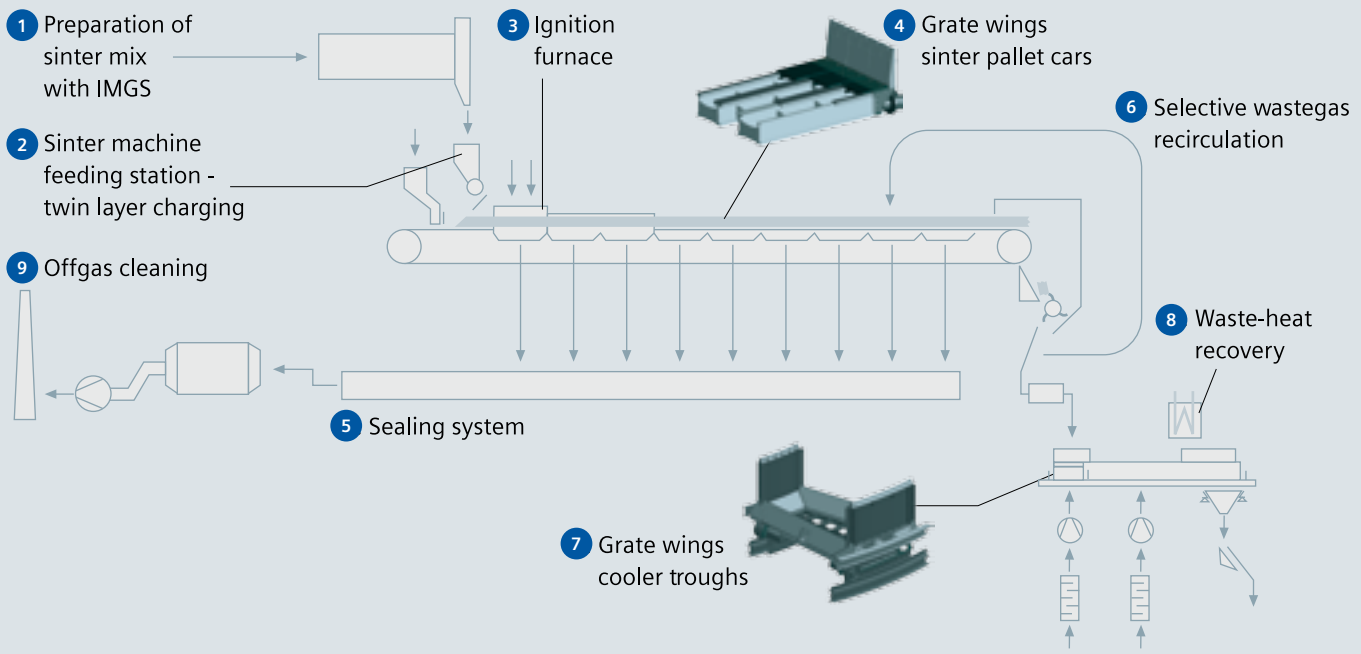
Turnkey sinter plant (4 x 400 m² sintering area), Posco, Gwangyang, Korea

Sinter plant, voestalpine Stahl, Linz, Austria:
Increase of sinter production and installation of the Selective waste gas recirculation system

Siemens VAI is one of the leading suppliers of sinter technologies. Customers value our integrated plant and process expertise in combination with automation solutions tailored to their needs.

Siemens VAI can look back on a long term experience in the engineering and supply of sinter plants.

To date, a total of 40 sinter plant projects have been successfully completed worldwide. It is this foundation of experience, combined with the supply of 185 blast furnaces during the course of a century, which allows us to provide sinter solutions for optimum blast furnace performance. Advanced solutions are offered for both new and existing sinter plants to meet production, quality, environmental and commercial demands.



1. Accurate proportioning and preparation of iron ore, coke and fluxes for optimizing the sinter mix with IMGS (intensive mixing and granulation system)
2. Sinter machine feeding station designed to promote segregation feeding and high permeability – twin layer charging
3. Ignition furnace for intensive ignition of sinter mix
4. Sinter machine featuring extended pallet width – grate wings sinter pallet cars
5. Minimized offgas volumes with effective sealings
6. Reduction of required offgas cleaning capacity through selective waste gas recirculation
7. Grate wings cooler troughs design for higher capacity and better utilization of cooling air
8. Installation of heat recovery system
9. Installation of dry-type offgas cleaning

Sinter plant automation

The VAiron sinter expert system optimizes both sinter plant and storage/blending yard in one integrated solution in order to obtain sinter with stable chemical and physical properties at maximum productivity and lowest fuel consumption. Simultaneously the system supports maintaining the environmental limits for sulphur.

To achieve these goals the expert system analyzes data from produced and charged material and controls critical process parameters both from sinter plant and storage/blending yard.

Main benefits:

- Stable high sinter quality
- Low quantity of offgas
- Increased productivity
- High productivity with difficult charge materials
- High productivity with high bed height
- Possibility of processing various ores
- Lower coke consumption (for sintering and blast furnaces)
- Less wear
- Lower energy consumption
- Less space requirement compared to conventional sinter plants
- Improvement of workplace conditions for employees
- Conforms to all environmental guidelines, even stricter ones in the future
- Application expert system for sinter process

Blast furnace technology

Setting the standards

Blast furnace, Corus, Teesside Works, UK

Siemens VAI has expanded to become the leading supplier of blast furnace technology in the world. Our expertise incorporates the know-how acquired from the design and supply of more than 185 blast furnaces during the course of a century.

Siemens VAI holds a complete portfolio of worldclass blast furnace technology, meeting the highest demands of performance, reliability, cost effectiveness and the environment. The entire range of solutions is provided to meet the exact requirements of the customer, for both turnkey and individual equipment supply. This, in combination with expert project management and dedication to excellence, ensures fast completion of a project, which extends over the entire life-cycle of your plant.

Blast furnace main features:

General

- Free-standing furnace shell and tower
- Optimized for access and economy
- Designed for long life

Furnace top

- Advanced burden charging equipment
- Long life replaceable throat armour
- Cast iron staves with independent cooling circuit

Cooling systems

- Robust integral linings
- Copper staves for high heat flux zones
- Cast iron staves for maximum cost-effectiveness
- Modern plate cooled solutions

Refractories

- Silicon carbide in the bosh and belly
- Erosion-resistant upper stack alumina
- Erosion-resistant carbon hearth walls with ceramic pad

Fuel injection systems

- Gases
- Coal
- Oil

Cast house

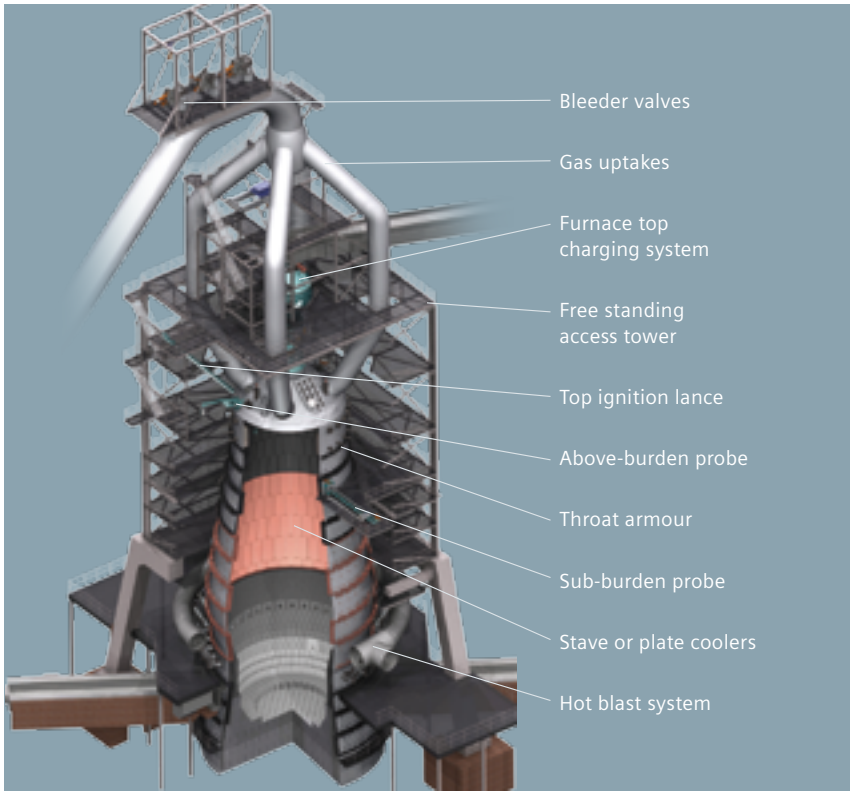
- Flat floor for safe and improved access
- High efficiency dedusting systems
- Remote operation of cast house equipment
- In-launder desiliconisation and ladle desulfurization

Ancillary equipment, including

- Taphole equipment
- Tuyere stocks
- Furnace valves
- Furnace analysis probes
- Hot-metal and slag-handling systems

Slag treatment

- Options of wet or dry slag granulation
- Production of quality product for the cement industry



Blast furnace No. 4, Posco, Gwangyang, Korea

Hot-blast stoves

- Internal and external combustion chamber designs
- High efficiency, low-emission ceramic burners
- Waste-heat recovery

Gas cleaning

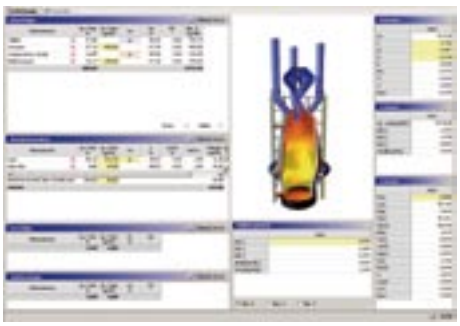
- Dust recycling
- High efficiency wet gas cleaning for secondary cleaning
- Dustcatchers and cyclones for primary cleaning
- Complete water treatment plants

Process control

- Advanced sensors for monitoring in-furnace conditions
- Various heat and mass balance models
- Stoves, burden and hearth-wear models
- Online kinetic process model
- Expert system for closed-loop control

Blast furnace automation

The unique VAiron solution package for fully automatic blast furnace control ensures high-performance blast furnace operation at the lowest possible costs – with respect to fuel consumption, productivity, raw materials and hot-metal quality, as proven in numerous blast furnaces worldwide. Comprised of modularly structured process models and a closed-loop expert system, the VAiron solution can be easily installed in all blast furnaces of any size using the existing instrumentation.



Main benefits:

- Total blast furnace supply and service
- Proven engineering for all equipment
- Fast and reliable start-up
- Consistent, reliable and low-cost production of high-quality iron
- High productivity and fuel efficiency
- World-class availability
- Ultra-long campaigns of over 20 years
- Combined technological, operational and automation expertise from a single partner
- Fully automatic blast furnace operation possible

COREX technology

Profitable and environmentally friendly ironmaking

COREX plant C-2000, Mittal Steel South Africa, Saldanha Steel Works, South Africa

COREX® is an industrially and commercially proven direct smelting reduction process that allows for cost-efficient and environmentally compatible production of hot metal directly from iron ore and non-coking coal.

The process was developed to industrial maturity by Siemens VAI and is the only alternative to the conventional blast furnace route consisting of sinter plant, coke oven and blast furnace.
It distinguishes itself from the blast furnace route by:

- Direct use of non-coking coal as reducing agent and energy source and
- Iron ore can be directly and feasibly charged to the process in form of lump ore, pellets and sinter

COREX process

In the COREX process all metallurgical work is carried out in two separate process reactors – the reduction shaft and the melter gasifier.

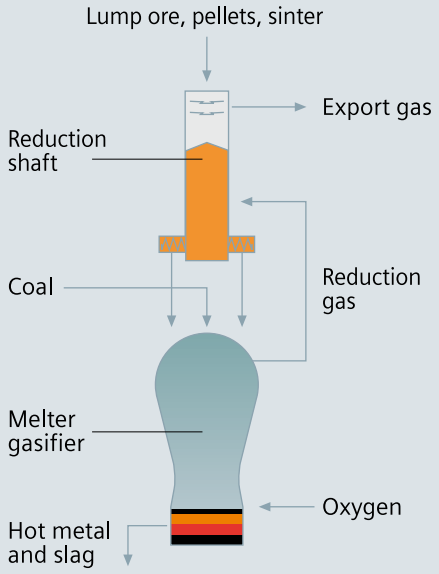
Iron ore (lump ore, pellets, sinter or a mixture thereof) are charged into a reduction shaft where they are reduced to direct reduced iron (DRI) by a reduction gas moving in counter flow. Discharge screws convey the DRI from the reduction shaft into the melter gasifier, where final reduction and melting takes place in addition to all other metallurgical reactions. Hot metal and slag tapping are done as in conventional blast furnace practice.

Viewing the process from the coal route perspective, coal is directly charged into the melter gasifier. Coal combustion by oxygen injected into the melter gasifier results in the generation of a highly efficient reduction gas. This gas exits the melter, is cooled and is then blown into the reduction shaft, reducing the iron ores in counter flow to DRI as described above.

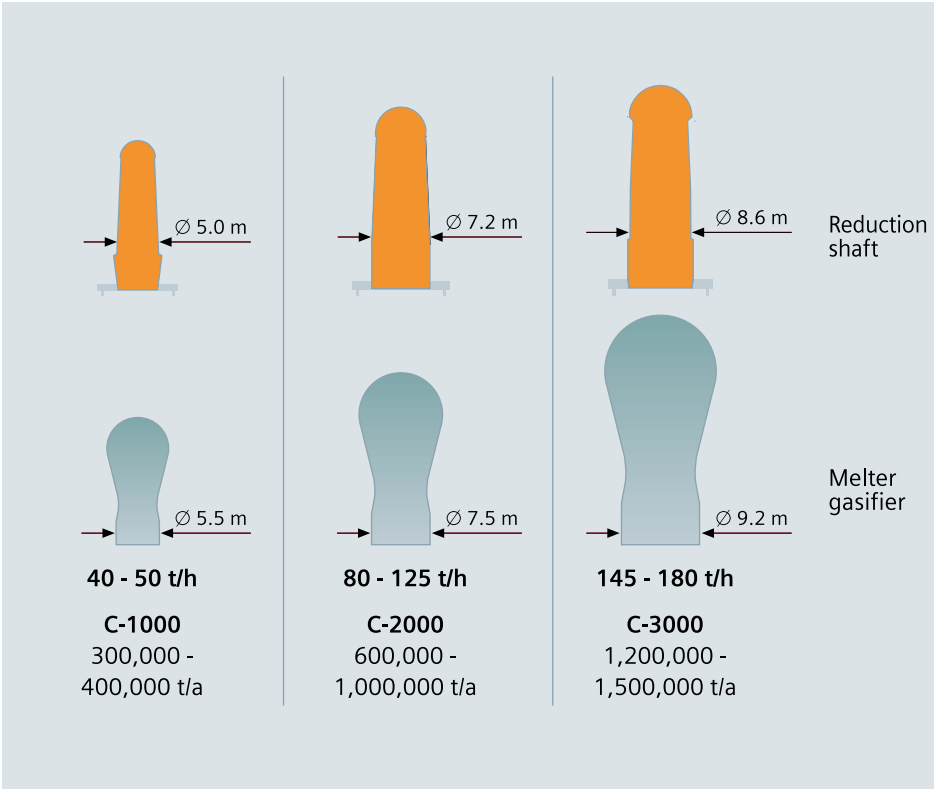
The gas leaving the reduction shaft is cooled and cleaned and is suitable for a wide range of applications (e.g., power generation, DRI production or use in reheating furnaces)

COREX automation

A state-of-the-art automation system is an integral part of the COREX plant facility.



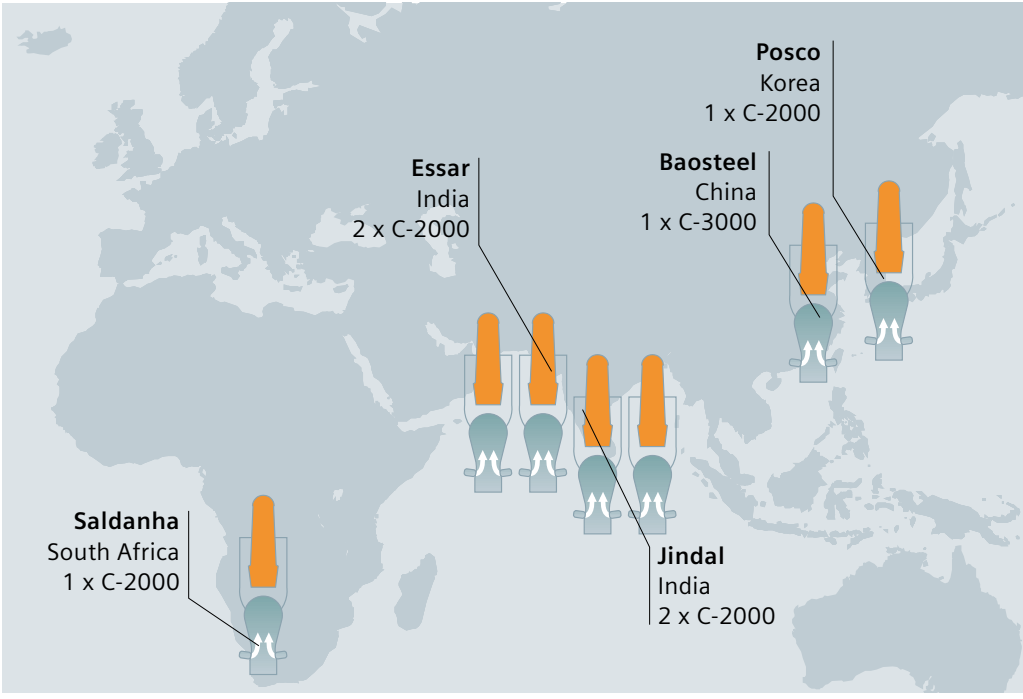
Simplified flow sheet of the COREX process



Upscaling of COREX plants

Main benefits:

- Substantially reduced specific investment costs and operation costs compared with conventional blast furnace route
- Outstanding overall environmental compatibility
- Use of COREX export gas for a wide range of applications
- Use of a wide variety of iron ores and coals
- Elimination of coking plants
- Highest operational flexibility (e.g., production output, production stops and raw-material changes)
- Hot-metal quality suitable for all steel applications
- Convincing production results of COREX plants in operation



COREX plants in operation and under construction

FINEX technology

Environmentally safe ironmaking

The FINEX® smelting-reduction process based on the direct use of non-coking coal and fine ore is perhaps the most exciting ironmaking technology on the market today.

Since 1992, Siemens VAI and the Korean steel producer Posco have been jointly developing the FINEX process – a process with great potential with regard to productivity and the low cost production of hot metal.

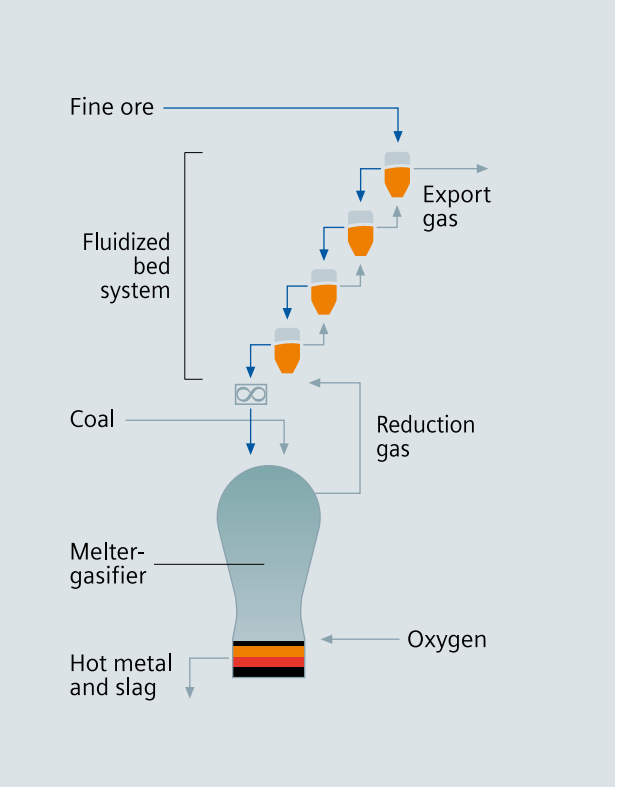
In the FINEX process fine iron ore is preheated and reduced to fine direct reduced iron (DRI) in a three or four stage fluidized bed reactor system. The upper reactor stage serves primarily as a preheating stage. In the succeeding stages the iron ore is progressively reduced to fine DRI. The fine DRI will be compacted and then charged in the form of hot compacted iron (HCI) into the melter gasifier. The charged HCI is subsequently reduced to metallic iron and melted. The heat needed for the metallurgical reduction work and the melting is supplied by coal gasification with oxygen. The reduction gas, also produced by the coal gasification, is passed through the fluidized bed reactors.

The generated FINEX export gas is a highly valuable product and can be further used for DRI/HBI production, electric energy generation or heating purposes. The hot metal and slag produced in the melter gasifier is frequently tapped from the hearth as in blast furnace or COREX® operation.

Further steps for commercial application of FINEX

The FINEX process will provide hot metal production based on the direct use of coal and fine ore. Currently the COREX plant of Posco is part of the FINEX demonstration plant with an annual hot metal capacity of 900,000 t/a. Because of the excellent results achieved with the FINEX demonstration plant, the decision was made by Posco in August 2004 to construct a 1.5 million t/a industrial FINEX 1.5M plant at Posco Pohang Works, Korea.

FINEX F-1.5M plant, Posco, Pohang Works, Korea



Simplified flow sheet of the FINEX process

Plant start-up is scheduled for April 2007. The FINEX process will be available on the market shortly after successful start-up and the initial operation phase of the FINEX 1.5M plant of Posco.

The wide availability of all iron ores mined today – and non-coking coal – projects a highly promising future for the FINEX technology.

FINEX automation

The state-of-the-art COREX automation system combined with Siemens VAI's fine ore reduction experience is the solid platform for this plant.

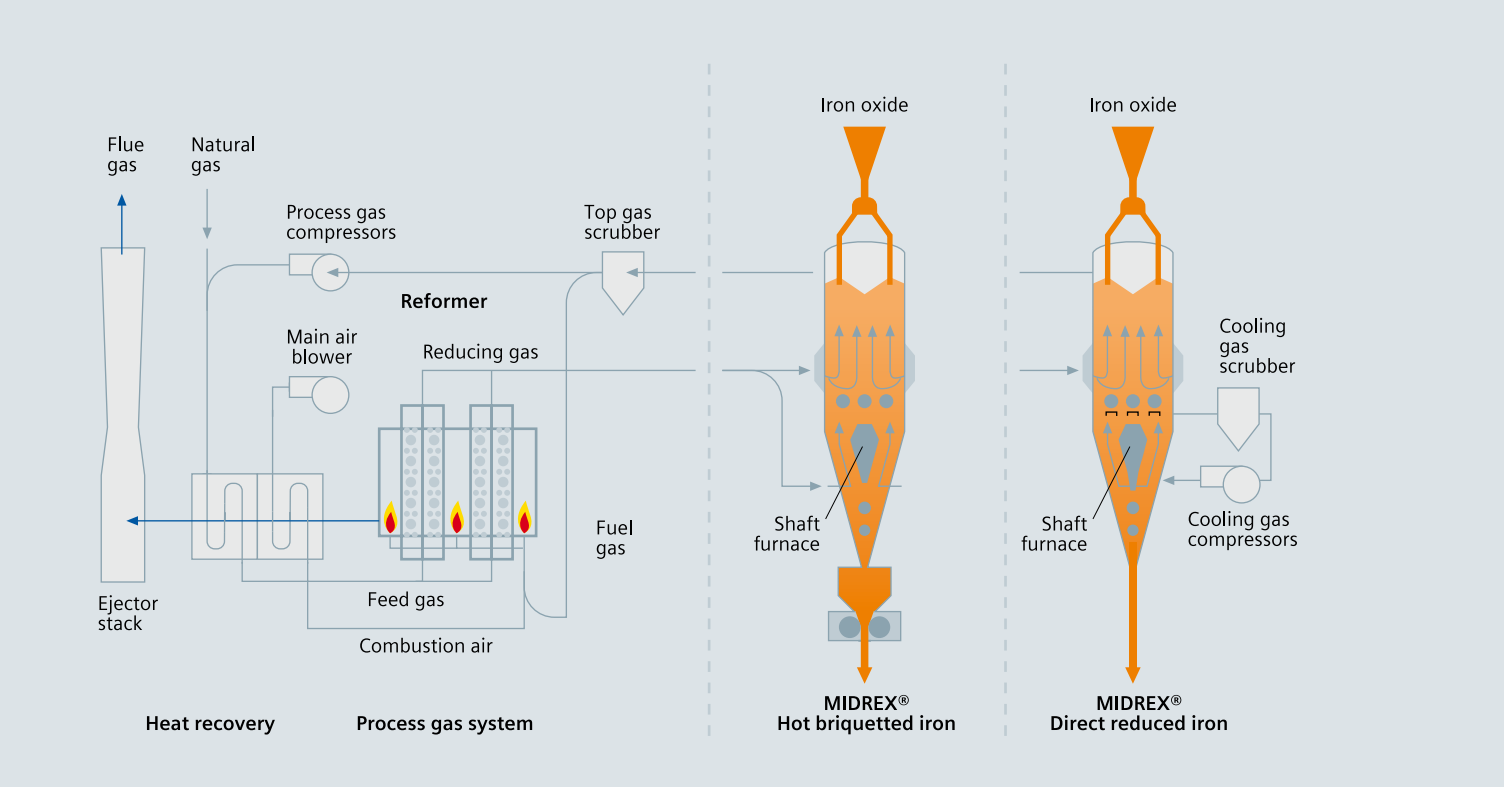
Main benefits:

As the FINEX and the COREX process principles are similar, similar advantages compared to the blast furnace route can be shown. The major difference between COREX and the FINEX process is that FINEX can directly use sinter feed iron ore (up to 12 mm). Further:

- Favorable economics in comparison to the blast furnace route
- Environmental benefits due to savings in resources and energy, as well as lower emissions
- Direct utilization of non-coking coal
- High valuable export gas for a wide range of applications in metallurgical processes and energy production
- Production of hot metal with similar quality to the blast furnace
- Flexibility in operation
- Reduction of process steps

MIDREX technology

Direct reduction at its best



Simplified flow sheet of the MIDREX process

Siemens VAI as a licensee of the MIDREX technology is building MIDREX® direct reduction plants with great success and can supply each size of packages up to turn key solutions.

MIDREX is a natural gas based shaft furnace process that converts iron oxides in the form of pellets or lump ore into direct reduced iron (DRI). The MIDREX direct reduction technology has evolved dramatically during the past four decades from plant capacities of just 150,000 t/a to capacities now approaching 2 million t/a. New projects recently contracted in the Middle East, Russia, Malaysia and Pakistan have shown a dominant trend in the use of Hot DRI for maximizing steelmaking benefits. Worldwide about one third of all MIDREX plants built were done so with significant involvement (e.g. consortium leadership) of Siemens VAI.

The MIDREX process is highly adaptive to our customers' needs, which is reflected in a broad variety of applications. The performance of MIDREX plants typically exceeds nominal capacity ratings. This trend will continue with the implementation of new technologies such as oxide coating, oxygen injection, OXY+, centrifugal process gas compressors, and SIMPAX. The most recent development is the hot discharge and hot transport of DRI with direct feeding into the EAF (Electric Arc Furnace) thus utilizing the sensible heat of the freshly reduced product.

Plant data layout:

- Oxide material handling, including day bins and oxide screening
- MIDREX shaft furnace, including inserts and refractory
- Discharge systems for either DRI, HDRI or HBI
- Process gas compressors
- MIDREX reformer with recuperator
- Power stack system
- Product handling
- Electric, instrumentation and automation
- Utilities

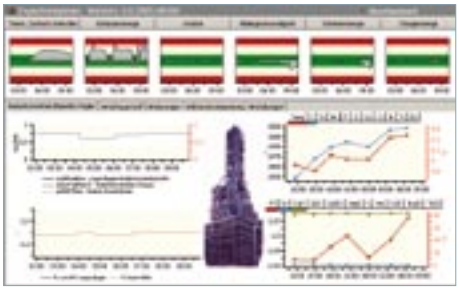
MIDREX plant, Misurata, Libya

Products:

- HBI (hot briquetted iron) plants
- DRI (direct reduced iron) plants
- HDRI (hot direct reduced iron) with hot transport and hot charging into EAF's

MIDREX automation

The proven DR process control system is supplemented by an optimization solution called SIMPAX. A core part of this powerful package is a model predicting the product quality (metallization and carbon). The plant status derived from online process data and model calculations can be used as an input for an expert system, providing setpoints for key process parameters. Stable process conditions and high productivity are gained benefits.



Main benefits:

- Fastest start-up
- Simple operation
- High availability
- Low pressure shaft furnace
- Balanced H_2/CO ratio
- Flexibility for hot transport/charging:
  - Green field solutions considering the hot transport and hot charging right from the beginning of planning
  - Possibilities for existing captive plants to convert to HDRI discharge considering the limitations of existing steel shops
  - Existing steel mills considering backward integration

Ironmaking automation

Experience makes the difference

In addition to engineering and technological expertise, Siemens VAI provides a complete range of automation solutions, from process automation to sophisticated optimization packages and expert systems.

To ensure high-performance plant operation at low costs, the closed-loop optimization system VAiron was developed by the Automation Division of Siemens VAI in cooperation with the Ironmaking Division of voestalpine Stahl, both of Linz, Austria.

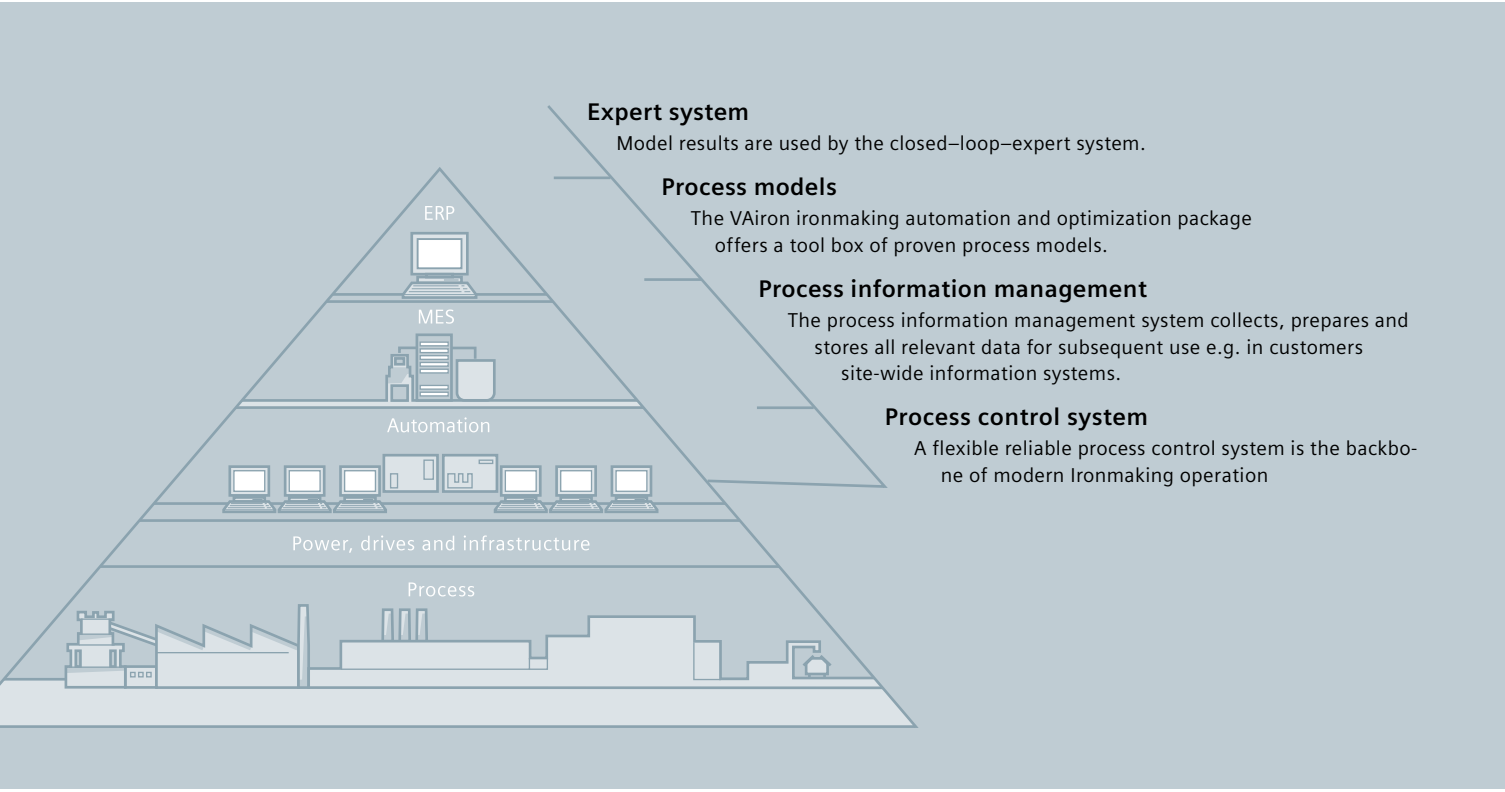
VAiron functions based on advanced process models, artificial intelligence, enhanced software applications, graphical user interfaces and operational know-how. Excellent process performance and significantly lower production costs are the proven results.

Features:

- Combined technological, operational and automation expertise from a single partner
- Fully automatic operation of key processes
- Comprehensive metallurgical insight into the process
- Easy system integration into existing automation environment
- Highly configurable process information management system

Main benefits:

- Reduced overall production costs
- Higher productivity-optimized performance
- Significantly decreased standard deviation of quality parameters
- Stable process conditions and high plant availability
- Amortization period typically less than one year



Leading automation solutions on all plant levels from the field up to the management level

A milestone in process control

Siemens VAI has a long history of successful control and automation projects in the Iron & Steel industry from turnkey equipment supply to unit packaged plant. Based on a unique blend of manufacturing and engineering excellence, Siemens VAI can provide:

- Consultancy for new projects or upgrades, feasibility studies or cost assessments
- Automation software from concept to factory (final acceptance) test designed by highly qualified and process familiar engineers in worldwide locations
- Full electric, instrumentation & computer turnkey capability, from design, procurement to commissioning and services
- Maintenance, training and on-going technical support

Process information management

A multithreaded, three-tier client-server real-time application is the basis for the configuration of VAiron. The process information management system supplies an extremely flexible and powerful database for the continuous improvement of process knowledge.

VAiron interprets process data, performs model calculations and visualizes the results in MS Windows or web-based graphical user interfaces. With optional linking of MS Excel and MS Access applications to the VAiron system, data analysis, interpretation and visualization are greatly facilitated.

Online process models

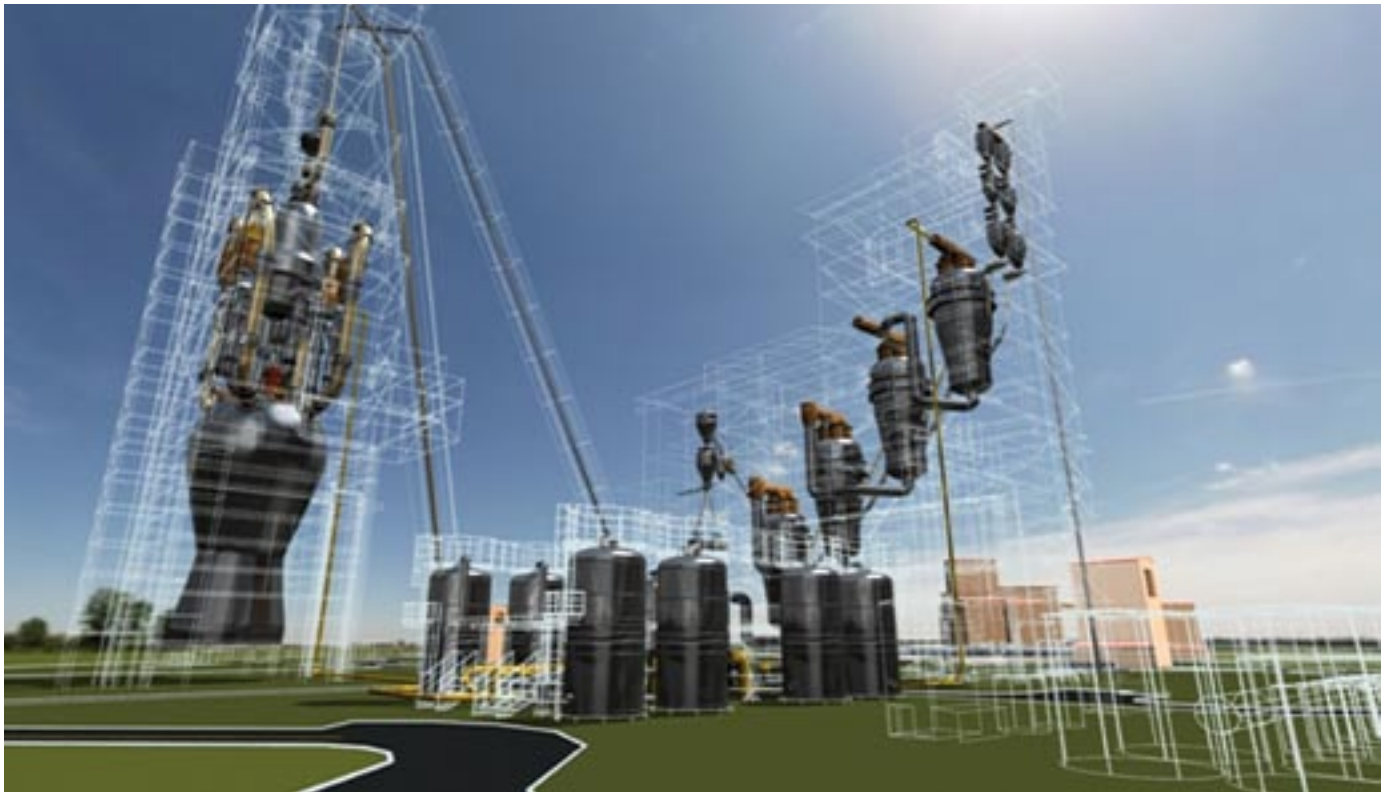
The VAiron ironmaking automation and optimization packages offer a toolbox of proven process models. These models were developed together with operating companies and validated by practical experience.

Closed-loop expert system

VAiron is the world's first expert system which allows the control of main parameters of blast furnaces, sinter plants, direct reduction plants and smelting reduction plants without the need for operator interaction. Major process parameters of ironmaking plants are automatically controlled in closed-loop mode to ensure stable and consistent process operations at low production costs.

R&D at Siemens VAI

Innovative ironmaking solutions



The FINEX smelting-reduction process, a new ironmaking technology based on the direct use of coal and fine ore

Siemens VAI's distinct willingness to pursue new and innovative paths is a main reason why it's the market leader.

In addition to our full-line expertise, what really sets us apart is our tremendous innovative strength. That's because innovation doesn't just happen in our heads or in theoretical concepts at Siemens VAI. We see innovation as a continuing process of further development. And we have the courage to transform our ideas and conceptual designs into practical solutions – as clearly reflected in over 4,000 relevant patents with a renewal rate of 10 percent.

Cooperation with universities and research centers, such as Johannes Kepler University in Linz, Leoben University of Mining and Metallurgy, and the Christian Doppler Laboratories, supports the rapid incorporation of the latest scientific findings into our solutions. With these efforts, our goal is always to continually improve technologies for the production of hot metal and DRI. Our intense commitment to innovation can be seen, for example, in the MEROS® technology for reducing sintering emissions, and in Siemens VAI's advances in fine ores processing with the newly developed FINEX® process.

FINEX

As part of the FINEX development, Posco is currently erecting an industrial FINEX 1.5M plant. Developments for FINEX are ongoing for enhancing the competitiveness of the technology by further reduction of the consumption figures and increasing the overall availability by stabilization of operation and development of maintenance methods. Investigations for FINEX plants of the 2nd generation are under preparation with the focus to reduce investment costs and to implement the latest development results.

Hot DRI transport system

"Gimbal" distributor

MEROS plant, voestalpine Stahl, Linz, Austria

Hot DRI transport system

A special hot conveyor system was developed for the transport of hot (i.e., un-cooled) direct reduced iron (HDRI) from a DR-plant to a melting facility (e.g., EAF). Following the DR-Process, HDRI is directly discharged onto an enclosed, gas-shrouded, bucket-type conveyor belt. The material is elevated to a bunker system located above the melting unit from where it is dosed into the furnace at a temperature of approximately 650 °C. By using the calorific heat of the DRI, highly valuable electrical energy can be saved. A first of its kind installation is already in operation at the FINEX demonstration plant at Posco's Pohang Works, Korea. Here, hot-compacted iron is transferred by the Hot Conveyor System from the compacting unit of the FINEX reactors to the top of a melter gasifier, followed by melting to hot metal. Presently a hot transport system is under installment at HADEED, Saudi Arabia linking the world largest DR plant to an adjacent steel mill.

Gimbal Top® charging system

The purpose of the Gimbal Top distribution system is to facilitate controlled distribution of charge material into the blast furnace via a gimbal type oscillating chute. Compared to conventional solutions, its innovative design allows infinite charging possibilities and improved burden distribution to the blast furnace. The rugged simplicity of the drive provides an elegant low-maintenance solution at minimal investment cost. The Gimbal distributor, as part of the overall furnace top charging system, offers a fully-integrated charging solution, generating significant improvement in blast furnace operation and maintenance cost.

Successfully proven in the arduous high-temperature and high-pressure environment of the COREX melter gasifier, Siemens VAI now adds this equipment to its portfolio of world-class blast furnace technology.

MEROS

MEROS (= Maximized Emission Reduction Of Sintering) is an innovative technology developed by Siemens VAI which effectively reduces the polluting emissions of sinter plants. Through the use of specific additives, the polluting components in the gas flow are combined and separated in a connected fiber filter. The process is "semi-dry" and therefore 100% effluent free.

The normal official limits can be reached with the installation of MEROS technology.
In 2005 a MEROS demonstration plant for a gas flow of approx. 100,000 m^3/h was successfully put into operation at voestalpine Stahl Linz, Austria.
Based on the knowledge from this operation, up scaling of the technology was carried out recently.

Our ironmaking services

How a market leader supports projects

Ironmaking projects are often complex, and require proven project management to implement them cost-effectively. We work in close collaboration with you to develop the best possible solution based on your specific requirements.

Siemens VAI offers you our experience from over 1,800 successfully completed projects around the world. In our customer relationships, we identify with each customer project a way that is unsurpassed worldwide. Our on-site project teams work perfectly together, and are strongly rooted in the respective markets. They're familiar with local market conditions, as well as with the language and culture of each region. With their knowledge and expertise, they ensure that as a plant operator you can always quickly and flexibly respond to changing market conditions.

Quality standards

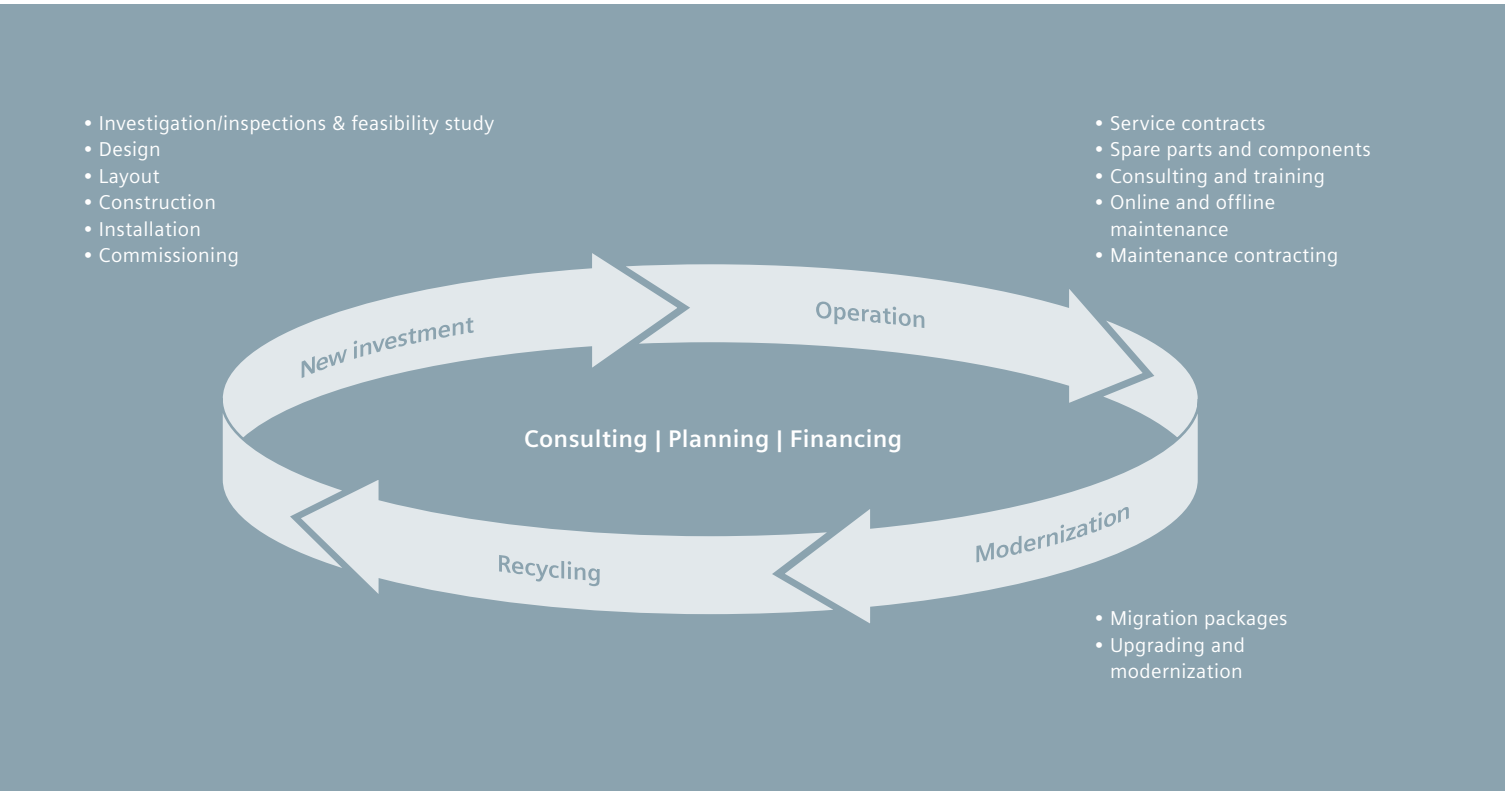
Our project management is certified to ISO 9001:2000. Our employees are supported by an integrated apprenticeship and training program right from the start, and years of experience sharpen their abilities to manage projects. Naturally, we have standardized tools available to handle all levels of project management with a transparent and organized approach. So we can work with you to ensure on-schedule implementation and the shortest possible start-up times for your project. An online data management enables a fast, worldwide exchange of knowledge and experience. And our project manager forum makes sure that experience and results from individual projects are forwarded and shared. In everything we do, our goal is always to bundle our knowledge and experience to optimize your plant throughout its entire lifetime.

Siemens VAI – Extensive project management experience:

- Extensive experience in project management over more than 40 years
- Successful execution of 1,800 projects worldwide
- Our clients represent a 70% share of the world steel production

Life-cycle management

Partnership never ends



Siemens VAI Life-cycle services

As a plant operator, you have conflicting needs. On the one hand, your performance is measured each quarter against short-term profitability expectations. On the other hand, you have to think on a totally different timescale compared with the capital market. Depending on the lifetime of your plant, you have to take 15 years or more into account. At the very least, that's 60 full quarters.

But thanks to our comprehensive expertise and integrated approach to solutions, you benefit both short-term and long-term from our life-cycle services.

In the short term: Backed by our extensive experience with many reference plants, we provide you with the certainty of fast, dependable production start-up and shorter amortization periods.

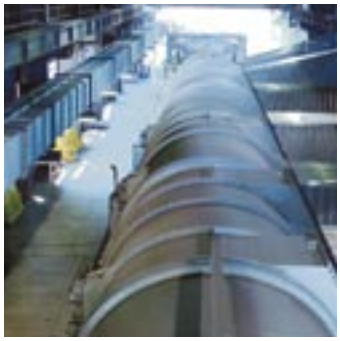
In the long term: Our master plan guarantees competitive performance for your plant in every phase of its life-cycle. Whether we're providing 24/7 technical support, optimizing maintenance, or making permanent plant improvements, we're always working to ensure the cost-effective operation of your plant.

Expertise from experience – Selected success stories in ironmaking technologies

Competence in figures. Especially in the field of ironmaking, where increased productivity, higher capacity, lowered operating costs and reducing emissions count more than anything. These are results with which our customers can measure their success – and ours as well. Have a closer look, and you can judge us by following examples.

Sinter technology – More from ore

Customer:	Corus, Port Talbot Works, UK
Type of system:	Sinter plant 390 m²
Our solution:	Modernization of sinter plant by enlarging the sinter area (pallet width extension) and revamping of the sinter cooler (engineering and supply, advisory services)
The result:	Increased production by 20% with lower specific coke, electrical energy and natural gas consumption



Sinter technology – More from ore

Customer:	voestalpine Stahl, Linz, Austria
Type of system:	Sinter plant 250 m²
Our solution:	Enlargement of the sinter area through lengthening of the sinter strand and installation of selective waste gas recirculation
The result:	Increase of sinter performance by 30% with the same offgas quantity

Blast furnace technology – Setting the standards

Customer:	CST, Vitoria, Brazil
Type of system:	Blast furnace No. 3 Furnace size: 3,617 m³ with hearth diameter of 12.5 m
Our solution:	Turnkey plant on greenfield site
The result:	Completion date – end of 2006

Blast furnace technology – Setting the standards

Customer: Corus, Port Talbot Works, UK

Type of system: Blast furnace No. 5
Furnace size: 2,560 m^3 with hearth diameter of 10.8 m

Our solution: Modular construction to minimize erection program

The result: Successful blow in, less than a year after contract award, the world's best time for a new blast furnace on existing foundations

COREX Saldanha – Profitable and environmental friendly ironmaking

Customer: Mittal Steel South Africa, Saldanha Steel Works, South Africa

Type of system: 1 x COREX C-2000 plant and a COREX gas-based DR plant

Our solution: Combination of a COREX plant with a COREX gas-based DR plant to produce hot metal and DRI for the downstream EAF operations, additionally complying with strictest environmental regulations.

The result: The technologies employed at Saldanha Steel Works show a successful performance since start-up and are fulfilling the stringent environmental regulations

COREX Jindal – Profitable and environmental friendly ironmaking

Customer: Jindal South West Steel, Toranagallu Works, India

Type of system: 2 x COREX C-2000 plants

Our solution: Design and supply of 2 COREX C-2000 plants charged with pellets, lump ore, non-coking coal, steel mill residues and fine ore. The COREX export gas is used for the generation of electrical energy and production of pellets.

The result: Location advantages and high levels of automation enable JSW Steel to produce hot metal with one of the lowest costs in India

FINEX – Environmental safe ironmaking

Customer: Posco, Pohang Works, Korea

Type of system: 1 x FINEX 1.5M plant

Our solution: The FINEX 1.5M plant aims at the production of hot metal based on the direct use on non-metallurgical coal and sinter feed fine ore.

The result: This plant is the first industrial FINEX plant world-wide demonstrating an alternative to the traditional blast furnace route for the environmental friendly production of high quality, low cost hot metal

MIDREX technology – Direct reduction at its best

Customer: Saudi Iron and Steel Company Ltd. (HADEED), Al-Jubail, Saudi Arabia

Type of system: MIDREX, HDRI discharge, Capacity: 1,760,000 t/a

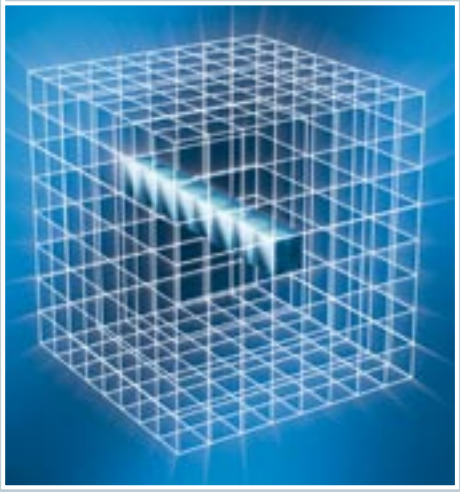
Our solution: The world largest DR plant as a turnkey project together with MIDREX as consortium partner

The result: Commissioning and start-up first half 2007

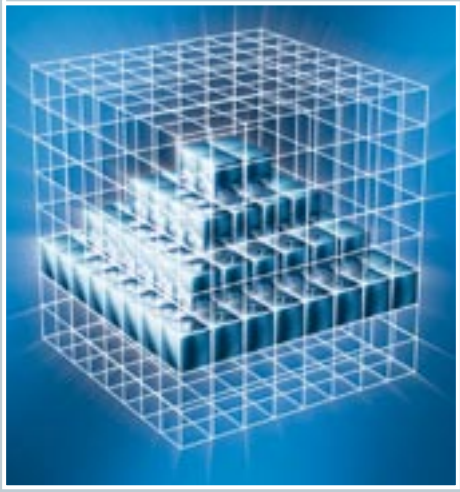
Completely Integrated Solutions with Siemens VAI

Integrated offerings for higher plant performance

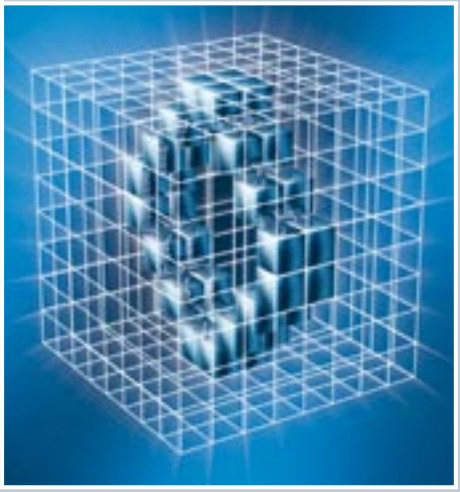
Higher availability
Measurable process improvement



Greater productivity
Integrated information technology



Reduced life-cycle costs
Maximum protection of your investment



Optimized processes

We lay the foundation for optimized processes with proven, leading products worldwide, including mechanical and technological engineering for metal production, rolling and strip processing as well as process control engineering, drive engineering and power supply. Integrated online and offline process models reflect decades of practical experience and help to ensure reliable, reproducible quality.

Our process engineering expertise fuses these products into complete plant solutions that also accommodate the upstream and downstream processes. These solutions are the basis for optimal resource use, minimized waiting times and reduced maintenance and spare parts costs, as well as wide flexibility with respect to raw materials and the resulting products.

Efficient production control

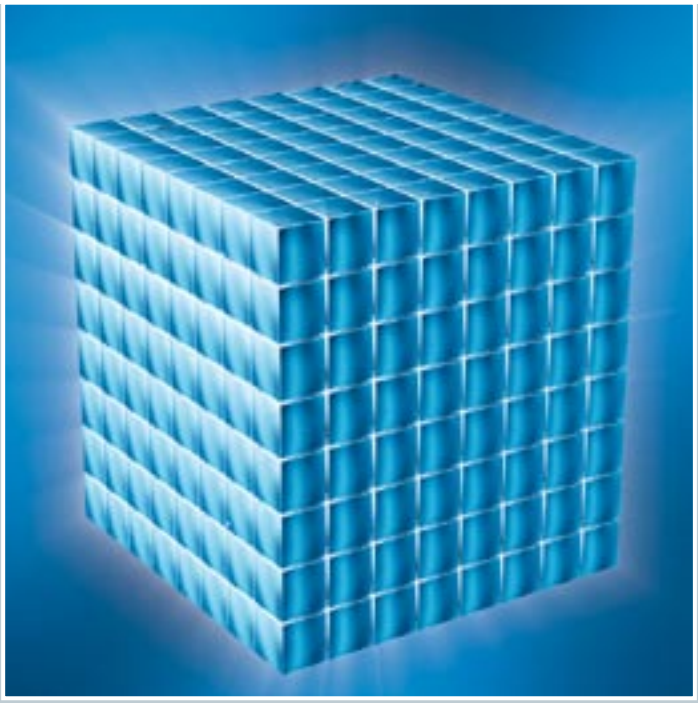
A further factor for competitive production is the quality of information processing. Production data must be consolidated and compared with planning data to ensure optimal production flow.

As a leading supplier for the metals industry Siemens VAI offers integrated information technology across all automation levels – from the sensor to the Enterprise Resource Planning system. Patented solutions, such as for smelting reduction plants, electric arc furnaces, hot strip mills, profile rolling or processing lines, enable systematic quality assurance, efficient logistics, flexible production planning and scheduling, end-to-end tracking and tracing from raw materials to the end product and back, and much more.

Maximized life-cycle returns

Services from Siemens VAI help to ensure high profitability for your plant throughout the entire life-cycle. Reliable project implementation by our specialists sets the course for quick start-up and repayment of funds as scheduled.

During the operating phase, preventive maintenance, standardized components and component design that meets the requirements of steel plants help keep maintenance costs low. A reliable spare parts supply – with in-house workshops for key components – ensures high availability. And modernization at the right time guarantees a high level of competitiveness and compliance with environmental regulations in the future.



Perfect integration of every aspect

Completely Integrated Solutions offer a comprehensive range of products and services, tailored and refined to the specific requirements of your plant. The key to this approach is the close interlinking of plant construction, process engineering, electrical and automation engineering, sensors and actuators, as well as information technology and life-cycle services, seamlessly integrated by Siemens VAI.

Completely Integrated Solutions from Siemens VAI – your benefits from an integrated concept:

- High process quality, lower energy costs and increased throughput – by taking all process steps into account
- Reproducible high product quality and efficient use of charging materials – thanks to integrated process models
- High enterprise quality, low life-cycle costs and unique investment protection – through flexible production based on metal-specific MES systems, intelligent plant design and integrated planning.

For further information,
please contact:

Siemens VAI
Metals Technologies GmbH & Co
P.O. Box 4, Turmstr. 44
4031 Linz, Austria
Phone: +43 (0)732 65 92 2851
E-mail: ironmaking.metals@siemens.com

The information provided in this brochure contains merely general descriptions or characteristics of performance which in actual case of use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract.

Order No.: E10001-M3-A5-V3-7600
Printed in Austria
Dispo No.: 21661 K-No.: 28103
SPS SVAI-07-00304 WS 03071.5
Subject to change without prior notice

www.siemens-vai.com