

DIRECT FROM MIDREX

1ST QUARTER 2007

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MIDREX TECHNOLOGIES, INC.



Commentary

Solutions for Steelmakers

The world steel industry is undergoing a transformation. Those of us who lived through the downturn of 1997-2003 welcome the tremendous profitability and enthusiasm of the last three years. This and other factors have spurred many changes, including strong growth in production worldwide, the emergence of China as the major global player, consolidation, and new technology developments.

Electric arc furnace (EAF) steelmaking continues to grow worldwide because of its capital and operating cost advantages, flexibility, and environmental benefits. Until recently, most EAFs used a 100 percent scrap feed, but with the growth in production, scrap availability has become an issue. More and more EAF steelmakers are charging virgin iron materials, including DRI and HBI. These materials provide much-needed iron units and also enable the mills to produce "clean" steels with low levels of metallic residuals.

As an example, an analysis of DRI production economics in the low natural gas cost areas shows a conversion cost from iron oxide to DRI of only about \$20/t. The conversion cost from DRI/scrap-to-liquid steel is about \$30-40/t. These result in a cash cost for liquid steel on the order of \$170-240/t, which is lower than the cost from blast furnace/BOF complexes in most areas. The use of hot charged DRI contributes to these economics, providing a savings in operating costs plus a substantial increase in melt shop productivity.

To deal with this rapidly changing landscape, Midrex has undertaken a comprehensive look at the needs of the industry and refocused our technology development efforts to meet these needs. Our vision is to expand direct reduction applications and provide a range of solutions for the steel industry. Our marketing theme for the next few years will be "Solutions for Steelmakers," reflecting this vision. The "Solutions" theme will be prominent in our marketing efforts, including advertising, trade show exhibits, technical papers, and our website.

Since start-up of the first MIDREX® Plant at Oregon Steel Mills in 1969, Midrex has continually developed the technology, and the results speak for themselves: 60 percent or more of the world's DRI has been produced in MIDREX Plants each year since 1987. We have enhanced our technology development efforts and that is a major thrust of our business plan for the future. The solutions we are offering and developing in the areas of plant

capacity, productivity, energy consumption, raw materials and reductant flexibility, and product form provide value to steelmakers incorporating reduced iron products in their production facilities. A description of Midrex's technology development efforts is in the article "MIDREX Technology Development: A Firm Foundation Plus Continuous Improvement," in this issue of *Direct from Midrex*.

A major focus of our work is hot discharge of product, transport to the meltshop, and hot charging to the EAF. This provides significant benefits in EAF productivity and operating cost. In today's competitive steelmaking world, producers realize that hot charging DRI to the EAF means higher profits and lower operating costs. Midrex has developed and is currently installing three methods for hot transport: HOTLINK® using predominately gravity feed to the EAF, a hot transport conveyor, and hot transport vessels. These options give steel producers the flexibility to select the optimal system for their site.

Environmental issues are also becoming increasingly important, and Midrex offers technologies to reduce the impact of iron and steelmaking on the environment. The MIDREX Process using natural gas plus an EAF emits about one-half the CO₂ as a blast furnace/BOF complex. The FASTMET® and FASTMELT® Processes can be used to recycle steel mill wastes to produce a valuable iron product and reclaim zinc and other by-products.

The MIDREX Process has played an important role in the growth of EAF production worldwide, with approximately 36 million tons of DRI/HBI produced in 2006 and a projection of 50 million tons by 2009. As the steel industry grows, we will continue to enhance our shaft furnace and rotary hearth furnace processes and develop new applications to meet the needs of steelmakers worldwide. Look for Midrex to continue providing *Solutions for Steelmakers*.



Stephen Montague
Vice President –
Commercial & Technology



MIDREX

Technology Development:

A FIRM FOUNDATION + CONTINUOUS IMPROVEMENT

By John Kopfle
 Director - Corporate Development
 Midrex Technologies, Inc.

"Nothing is permanent but change"
 Heraclitus

A FIRM FOUNDATION

Since 1969, Midrex and its partners have built (or are constructing) 63 MIDREX® Modules (shaft furnaces plus reformers and associated systems) in 21 countries. To date, these facilities have produced over 500 million tons (Mt) of DRI and HBI, with a market value exceeding \$70 billion. This record of plant sales, successful start-ups, and continued outstanding performance has resulted in a market share for MIDREX® Technology of 60 percent or more each year since 1987.



Donald Beggs

The success of the MIDREX® Direct Reduction Process is based on the firm foundation of the work done by Donald Beggs and his colleagues in the Surface Combustion Division of the Midland-Ross Corporation in the 1960s. Beggs' concept of pairing a stoichiometric CO₂ reformer with a shaft furnace to reduce iron oxide was brilliant, a once-in-a-lifetime achievement. The MIDREX Process concept has stood the test of time due to this solid foundation with continual technology development and now produces over 36 million tons of iron per year, trailing only the blast furnace.

What are the features of the basic process that enabled this success to occur? Here are three:

Simplicity – the MIDREX Process is inherently simple to operate, involving only three major unit operations: gas preheating, natural gas reforming, and iron ore reduction. Over the years, many other direct reduction process concepts have been devised with theoretically lower energy or iron ore consumptions and reduced operating and capital costs, but they proved too complex or expensive in practice, or just did not work. The simplicity of the MIDREX Process is possible because it uses natural gas, a very clean fuel, and agglomerated iron ore, which makes the processing relatively easy.

Efficiency – a packed bed reactor with counter-current reactant flows is generally the most efficient means to process materials. There are three primary reasons: 1) since the reactor (shaft furnace) is filled completely with iron oxide, the volumetric productivity is very high, 2) a moving packed bed ensures that each particle of iron oxide experiences the same temperature profile, gas composition, and residence time as every other particle, and 3) counter-current flow provides the largest "driving force" for reaction and fast reaction times. It is no surprise that the other major means of producing iron, the blast furnace, is also a shaft with counter-current solids and gas flows.

Flexibility – MIDREX Plants have proven flexibility regarding iron ores and reducing gas sources. A number of unique design features, including the MIDREX® Reformer, burdenfeeders and easy flow devices, provide for excellent gas-solids contact and

the successful use of high percentages of lump ores. The MIDREX Process can utilize almost any ratio of hydrogen to carbon monoxide. Plants are operating successfully with H₂/CO ratios from 0.5 to 3.5.

CONTINUOUS IMPROVEMENT

In addition to the soundness of the basic flowsheet, the other factor that has enabled the MIDREX Process to remain the dominant direct reduction process for almost 30 years has been the process improvements developed and commercialized by Midrex, MIDREX Licensees, and project partners. Since installation of the first commercial-scale plant in Portland, Oregon, USA, Midrex has continued to advance the state-of-the-art in gas-based direct reduction.

Improvements have been made in plant capacity, productivity, energy consumption, raw materials and reductant flexibility, and product form.

Perhaps the best evidence of this ongoing technology development is the increased production of our existing plants over time. There are 21 MIDREX Modules that have been in production for more than 20 years. The total rated capacity of these plants when installed was 9.5 Mtpy. These plants produced a total of 13.3 Mt in 2005. This same trend continues with the new generation of MIDREX Plants and the overall capacity utilization for all MIDREX Plants in recent years has been about 130 percent.

Midrex has an active technology development effort and that process expertise is reflected in our 40 plus patents. The company has unique experience in pyro-processing as well as substantial capabilities in high temperature refractory and equipment design, super-alloy selection and application, combustion systems, reforming, waste heat recovery systems, and high temperature furnace applications.

Midrex's technology development program is overseen by a Technology Steering Committee. This committee consists of senior management from all areas of the company, as well as members from Kobe Steel, Midrex's parent company. Midrex's Technology Development Department carries out much of the detailed technical analysis and assessment required.

In the company's business plan, there are several three year goals for technology development. Perhaps the most important is to bring two technological improvements to commercialization each year.

A crucial part of Midrex's technology development activities is the company's state-of-the-art Technical Center, which is



Figure 1 - Midrex Technical Center

the focus of research and development activities. The facility, shown in Figure 1, is located near Charlotte, NC USA, and has been an essential part of our business strategy for more than 30 years.

During the last few years, Midrex has made a significant investment in the Technical Center facilities, including a major upgrade of its mineral processing capabilities. The Tech Center contains the following equipment:

- Sample preparation, including drying, crushing, splitting, and pulverizing
- Wet chemistry laboratory for analyzing iron ores and other iron-bearing materials
- Physical analysis equipment, including size distribution, crush strength, and tumble test
- Numerous analyzers, including gas chromatographs, surface area analyzers, optical spectrometers for elemental analysis, and LECO carbon/sulfur analyzer
- Furnaces for conducting iron ore characterization (Linder and Hot Load)
- Various bench-scale furnaces for characterizing raw materials
- Equipment for pelletizing and briquetting iron ores, coals, and other solids
- A 150 kg/h FASTMET Process Simulator and an Electric Ironmaking Furnace for pilot testing of the FASTMET®, FASTMELT®, and ITmk3® Processes
- A variety of equipment for beneficiating solids

Midrex maintains an ongoing technology transfer program to share knowledge with plant operators and project partners. This effort includes a Technical Services program, frequent

travel to plant sites, the annual Operations Seminar, and numerous bulletins regarding new technology developments.

DON'T REST ON YOUR LAURELS

From 1970-2006, DRI output from MIDREX Plants grew to 36 Mtpy, as shown in Figure 2.

Even though the world steel industry experienced two severe multi-year downturns during that period, MIDREX Plant production increased nearly every year. A major factor in this record of outstanding performance was technology development. Improvements were developed and commercialized during that period in the areas of plant capacity, productivity, energy consumption, raw materials and reductant flexibility, and product form.

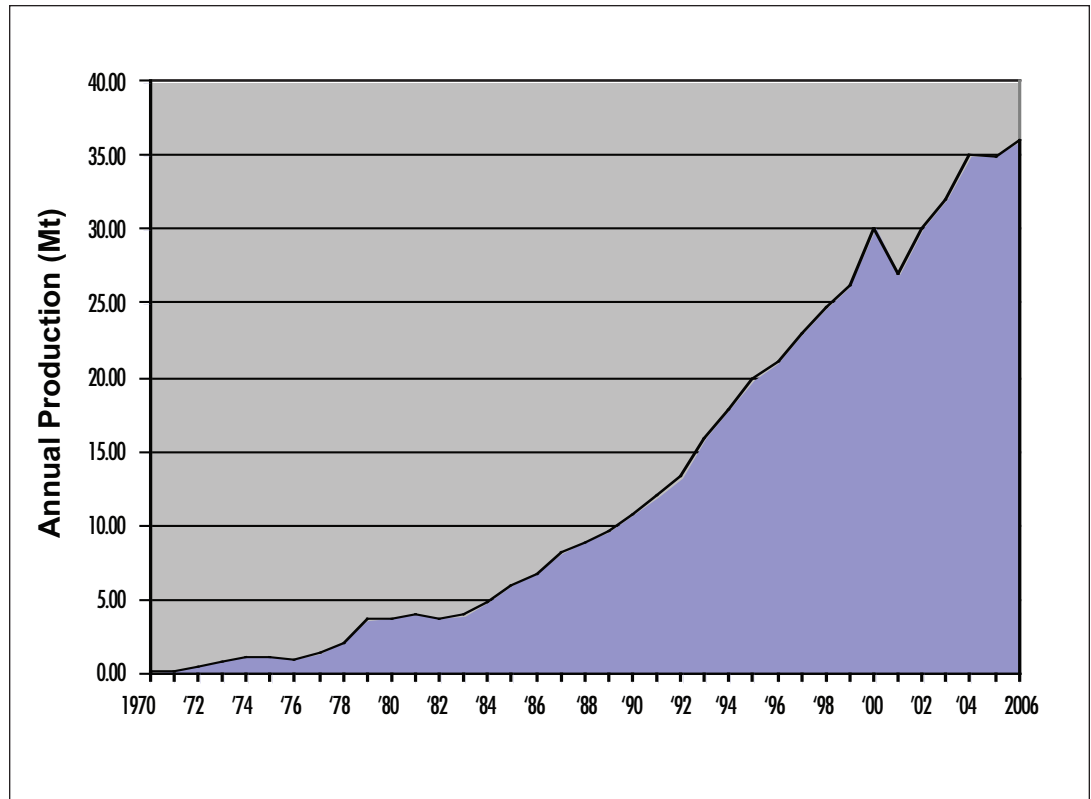


Figure 2 - MIDREX Plant Production

Plant Capacity

The first MIDREX Plant had two shaft furnaces of 3.7 meter diameter, with annual capacity of 150,000 t/y each. Over the years, Midrex built larger and larger modules and the standard MEGAMOD® now has a 6.65 meter diameter furnace and an annual capacity of over 1.5 Mt. Thus, the capacity of a single module (shaft furnace, reformer, and associated equipment) increased by a factor of more than ten. Because of the major economy-of-scale of the technology, these larger plants have significantly enhanced economics.

Productivity

The volumetric productivity of the shaft furnace is a convenient benchmark for relative comparison to other MIDREX Shaft Furnaces and is very important for profitable operation. The shaft furnace specific production rate is expressed in tons per day per cubic meter of reduction volume (t/d-m³). The specific production rate is most efficiently increased through the use of higher operating temperatures, which increases reaction kinetics, and internal devices, which facilitate good gas-solids contact. Several MIDREX Plants have achieved annual productivities of 14 t/d-m³, the highest in the direct reduction industry. MIDREX Plants routinely exceed rated capacity, and in recent years the overall capacity utilization has been 120-130 percent. Some MIDREX Plants have achieved as high as 210 percent of capacity on an annual basis using improved operating techniques and equipment modifications.

Energy Consumption

The first MIDREX Plants had a natural gas consumption above 3 Gcal per ton of DRI. Due to more efficient heat recovery systems, modern plants can now achieve levels of under 2.3 Gcal/t. State-of-the-art MIDREX Plants can incorporate up to four stages of heat recovery.

Raw Materials and Reductant Flexibility

Over the years, MIDREX Plants have operated on over 50 iron oxide sources, including pellets and lump ores, from around the world. Several plants have operated on 50 percent or more lump ore for extended periods of time, and plants have been designed for continual use of 70 percent lump ore. Most MIDREX Plants use standard natural gas processed in a MIDREX® Reformer to create a syngas with a hydrogen/carbon monoxide ratio of 1.5/1. The OPCO Plant in Venezuela reforms natural gas using a steam reformer, which generates a syngas with a ratio of 3.5/1. A MIDREX Plant was built at Saldanha Steel in South Africa for the use of COREX® Offgas made from coal, with a ratio of 0.5/1.

Product Form

Until the mid-1980s, all MIDREX Plants produced cold DRI, primarily for use at an adjacent mini-mill. Midrex responded to the market demand for a safe way to ship DRI with the application of hot briquetting expertise from Maschinenfabrik Köppern GmbH & Co KG (Köppern), a world leader in briquetting technology. Köppern and Midrex

successfully developed expertise and equipment to hot briquette DRI, separate the briquettes, and cool them. The first MIDREX Plant to employ hot briquetting was Antara Steel (originally called Sabah Gas Industries) in Malaysia in 1984. There are now 10 MIDREX Modules employing hot briquetting, with four under construction. Annual MIDREX HBI production is over five million tons.

Major technology developments commercialized from 1970-2006 are shown in Table I. MIDREX Plant operators contributed greatly to this effort by pioneering and demonstrating several of the enhancements.

SOLUTIONS FOR STEELMAKERS: 2007 AND BEYOND

Midrex is continuing to refine and enhance the MIDREX Process. As always, the first step in technology development should be to determine the needs of the steel industry. Then, a strategy can be formulated to apply the company's expertise and skills to develop new technologies, what we call "Solutions for Steelmakers." What are the requirements for the steel industry of the future? Following are several:

- Fewer unit operations and more continuous processing
- Lower capital cost (CAPEX)
- Higher capacities, to maximize economy-of-scale
- Lower environmental impact
- Higher energy efficiency
- Use of low cost energy sources
- Use of fines, low grade ores, and waste materials

From mid-2006 through 2008, there will be over 14 Mt of new MIDREX Plants or expansions started up, as shown in Table II.

In-situ reforming
Standard/alternate flowsheet configurations
Lump ore use
Larger module sizes
Improved catalysts
Gas preheating
Hot discharge shaft furnace
Hot briquetting
Top gas fuel preheat
Iron oxide coating
Oxygen injection
Alternate reducing gases:
steam reforming and coal gasification
Briquette slow cooling
Centrifugal compressors

Table I - Major MIDREX Technology Developments commercialized from 1970-2006

PLANT	Country	Start-Up	Capacity (tpy)	Product
Essar Module V	India	2006	1,500,000	Hot DRI & HBI
Mobarakeh VI	Iran	2006	800,000	Cold DRI
Nu-Iron (Nucor)	Trinidad	2006	1,600,000	Cold DRI
Acindar Expansion	Argentina	2007	250,000	Cold DRI
Al-Tuwairqi	Saudi Arabia	2007	1,000,000	Cold DRI
Hadeed Mod E	Saudi Arabia	2007	1,760,000	Hot & Cold DRI
LGOK Module 2	Russia	2007	1,400,000	HBI
Lion Group	Malaysia	2007	1,540,000	Hot DRI & HBI
QASCO Module 2	Qatar	2007	1,500,000	Cold DRI & HBI
Shadeed	Oman	2008	1,500,000	HOTLINK & HBI
Tuwairqi Steel Mills	Pakistan	2008	1,280,000	Hot & Cold DRI
TOTAL			14,130,000	

Table II - New MIDREX Projects

Many of these plants incorporate new developments that address the steel industry needs listed above. These developments and their benefits are shown in Table III.

Midrex has technology development programs in place for 2007 and future years to continue advancing the state-of-the-art in shaft furnace direct reduction. These programs include the use of gasification to provide the reducing gas, process options to reduce CO₂ and other emissions, and use of lower-grade iron ores.

With all these technology development efforts, Midrex has broadened its product offerings both upstream and downstream to include preparing the iron ore for processing and use of the DRI product. Midrex no longer supplies just natural gas-based plants to produce cold DRI using standard iron ores and energy sources. There are options available or under development for various energy sources, alternatives for product form and use of lower grade ores. These provide a wide variety of solutions for steelmakers, as shown in Table IV.

Applications	Integrated steel complex with EAF Merchant sales
Options	Energy source: natural gas or coal (gasification) H ₂ /CO ratio: 0.5 to 3.5 Module size: 300,000-2,500,000 tpy Product form: cold DRI, hot DRI, HBI Product carbon content: up to 3% Hot transport/charging: HOTLINK, containers, conveyor

Table IV - MIDREX Process Options

Development	Benefits
Hot DRI discharge/transport/charging (containers, conveyor, or HOTLINK®)	EAF productivity increase and electricity savings More continuous steelmaking
External DRI cooler	Product flexibility
"Combo" plants	Capability to produce hot DRI and either cold DRI or HBI
Higher capacity shaft furnaces (7 m diameter furnace for 1.76 Mtpy)	Lower specific CAPEX
Nineteen bay MIDREX® Reformer	Lower specific CAPEX
Centrifugal compressors applied to the process gas loop	Lower specific CAPEX Higher pressure capability
Higher capacity briquette machines (up to 70 tph)	Simpler plant layouts Lower specific CAPEX
HBI slow cooling conveyor	Enhanced product quality
SIMPAX® Expert Control System	Better process control Higher energy efficiency

Table III - New MIDREX Technology Developments and Benefits

CONCLUSION

Since 1969, Midrex and its partners have built (or are constructing) 63 MIDREX® Modules (shaft furnaces plus reformers and associated systems) in 21 countries. The successful operation of MIDREX Plants has resulted in a market share for MIDREX® Technology of 60 percent or more each year since 1987. This success is based on the firm foundation of the work done by Donald Beggs and his colleagues, who conceived the idea of pairing a stoichiometric CO₂ reformer with a shaft furnace to reduce iron oxide. In addition to the soundness of the basic concept, the other factor that has enabled the MIDREX Process to remain the dominant direct reduction process for almost 30 years has been continuous technology development. Improvements have been made in plant capacity, productivity, energy consumption, raw materials and reductant flexibility, and product form. Midrex has an ongoing, extensive technology development program, with much of the work done at the Midrex Technical Center. There is over 14 million tons of new MIDREX Plant capacity in start-up or under construction around the world, and numerous innovations are being commercialized at these facilities. A major focus is hot discharge of product, transport to the meltshop, and hot charging to the EAF. Midrex is continuing to advance the state-of-the-art in gas-based direct reduction.

MIDREX® Direct Reduction Plants 2006 Operations Summary

Thanks to stable market conditions, MIDREX® Plants produced 35.7 million tons in 2006, approximately two percent more than in 2005. MIDREX Plants accounted for nearly 60 percent of the 59.8 million tons of DRI produced worldwide in 2006. The one remaining MIDREX Plant in the U.S. (belonging to Mittal Steel USA - Georgetown) continued shut down throughout the year due mainly to high natural gas prices. Many plants established new production records (12 annual and 17 monthly production records), thanks to the continued good demand for metallics, and the plants in general were successfully able to withstand the continued pressure for maximum production. Twenty-one (21) MIDREX® Modules operated in excess of 8,000 hours, and Mittal Canada's Module I restarted operations in March 2006. Iron ore raw material prices increased again in 2006 due to the high demand worldwide caused by improved steel prices, and Venezuelan DR plants began importing pellets around the middle of the year due to shortages of locally produced pellets. MIDREX Plants have produced over 480 million tons of DRI/HBI to date and are poised to pass the 500 million ton mark in mid-2007.

ACINDAR

ACINDAR operated above rated capacity for the fifteenth consecutive year, set a new annual production record, and a new monthly production record, averaging 135.1 t/h in October. A plant expansion currently under way is due to start up in mid-2007. ACINDAR has produced over 20 million tons of DRI since its start-up in 1978, the most that any single MIDREX Module has produced to date.



ACINDAR

Antara Steel Mills

Plant operations restarted in April and, with the start of oxygen injection in June, proceeded to set a new monthly production record in September.

COMSIGUA

Despite oxide pellet shortages in Venezuela, COMSIGUA exceeded their annual rated capacity for the seventh consecutive year and operated over 8,300 hours in the year.

Corus Mobile

These two modules have been relocated by the Al-Tuwairqi Group from Mobile, Alabama, USA to Dammam, Saudi Arabia, and are due to restart in 2007.

Delta Steel

The two Delta Steel modules, which have been inoperative since 1988 and 1996 respectively, restarted operations in May and November this year under new management.

Essar Steel

Modules 1, 2, and 3 exceeded rated capacity, and Module 1 established a new annual production record and broke their monthly production record in March. A significant portion of the DRI produced is charged hot to Essar Steel's EAFs.



Essar Steel



EZDK



Hadeed

EZDK

EZDK set a new annual production record for Module 1 for the fourth consecutive year, and Module 2 also set a new annual production record (exceeding the 1.1 million ton mark). All three modules combined produced over 3.1 million tons of DRI in the year and operated over 8,250 hours per year on average. Modules 2 and 3 set new monthly production records in January and December. In 2006, EZDK surpassed the milestone of 30 million tons produced from all three modules.

Hadeed

Hadeed exceeded rated capacity for the 22nd consecutive year in Modules A and B, and for the 14th consecutive year in Module C. All three Modules set new monthly production records. Module C produced over 1,150,000 tons in 2006 (operating in excess of 8,500 hours), a new annual production record for 5.5 m MIDREX Shaft Furnaces, surpassing their previous record by 7.1 percent.

Ispat Industries, Ltd

IIL of India exceeded rated capacity but again experienced restricted production due to limited availability of natural gas. Lump ore usage averaged 67 percent for the year.

Khuzestan Steel

All four modules exceeded rated capacity again in 2006 for the fourth consecutive year.

LISCO

LISCO set a new annual production record in Module 2 for the third consecutive year.

Mittal Canada Inc

Despite high raw material costs, Module I was restarted in March. Module II continued shut down.

Mittal Steel Hamburg

In its 35th year of operation, MS Hamburg's MIDREX Plant operated well over rated capacity in 2006 for the fifth consecutive year.

Mittal Steel Lazaro Cardenas

MSLC continued operating at high capacity throughout the year, averaging 215 t/h.

Mittal Steel Point Lisas

MSPL's three modules produced over two million tons and exported over 1.2 million tons of DRI by ship in 2006. Modules 2 and 3 established new monthly production records.



LISCO



Mobarakeh Steel



Nu-Iron



OEMK

Mittal Steel South Africa (Saldanha Works)

Saldanha achieved over 7000 hours of operation in the year at their COREX Export Gas-based DR Plant and averaged 64 per cent Sishen lump ore usage for the year.

Mittal Steel USA - Georgetown

Mittal Steel's MIDREX Plant in Georgetown, S.C., remained shut down the whole year due to the high cost of raw materials.

Mobarakeh Steel

Mobarakeh Steel Module F started up in July 2006. For the third year running, Mobarakeh Steel set annual and monthly production records in Module E, and produced a total of almost 4.2 million tons. Modules A through E had an operating availability in excess of 8,350 hours on average.

Nu-Iron

Nucor Corp. dismantled the American Iron Reduction (AIR) MIDREX Plant and relocated it to Trinidad, where the plant (expanded) restarted as Nu-Iron Unlimited at the end of December 2006.

OEMK

With four modules that operated on average over 8,250 hours, OEMK produced 2.25 million tons in 2006. Using OXY+ Center Injection® OEMK set a new annual production record in Module 4. Module 1 set a new monthly production record in December.

OPCO

Production was restrained by oxide pellet availability. Oxide pellet importation commenced around the middle of the year.

Qatar Steel Co.

In 2006, Qatar Steel exceeded their previous annual production record by more than five percent through operating over 8,500 hours in the year, and also set a new monthly production record in December.

TenarisSiderca

In the 30th year of operation, TenarisSiderca exceeded their previous annual production record for a second year in a row through increased hourly productivity to 115 t/h, with very good plant availability. The plant also set a new monthly production record in December.

Ternium Sidor

Ternium Sidor's MIDREX I module, with a five meter diameter MIDREX Shaft Furnace, again produced over one million tons in a year. Production from all four of Ternium Sidor's MIDREX Modules reached 3.36 million tons in 2006.

VENPRECAR

VENPRECAR's annual production was restricted by the limited availability of iron ore pellets in Venezuela. Plant availability exceeded 8,000 hours in the year. Total HBI production since start-up surpassed the 10 million ton mark in January 2006.



Qatar Steel Co.



TenarisSiderca

Midrex Global Solutions

• Providing Solutions for the Aftermarket •

For decades, Midrex has provided extensive technical support, assisted with plant modifications and supplied aftermarket parts, materials and equipment. Now that function



Nelson Boulton

has a name and a mission - to provide MIDREX® Plants with solutions for an ever-changing global market. Led by Nelson Boulton, Midrex Global Solutions offers all goods and services necessary to maintain, operate, and improve existing MIDREX Plants, including the sale of spare parts, materials and equipment, engineered solutions, MRO-type procurement services and staffing services.

Midrex Global Solutions benefits from having extensive in-house support resources in the areas of engineering, new technologies, experienced field personnel, and a knowledgeable and agile procurement and logistics staff.

Robert Cheeley manages activities related to engineered solutions, providing



Robert Cheeley

Midrex's engineering services and technological advancements. In many instances, this is in conjunction with the supply of parts, materials, and equipment. Don E. Rice is in charge of supplying MIDREX Plants with all required spare parts, materials, and equipment, including the latest technologies needed for the proper operation of the plant.



Don E. Rice

Spare Parts and Materials

Midrex understands the special requirements of replacement parts and consumables necessary during the operation of a MIDREX Plant. We have relationships with a large number of manufacturers and vendors worldwide, which allows Midrex to provide cost-effective and timely supply of necessary spares and materials. In addition, purchasing these parts from Midrex includes the supply of genuine goods specifically developed for use at Midrex facilities, Midrex's technical support and latest technological improvements, along with expert packaging and export methods and procedures.

Engineered Solutions

Midrex Technologies has a dedicated group in Midrex Global Solutions to assist clients in developing cost-effective, engineered solutions and equipment designs that increase plant productivity, reduce operating cost, and increase capacity. Midrex Global

Solutions serves the technical and commercial needs of MIDREX Plants for small capital projects involving engineering, new equipment designs and supply, and services.

MRO Services

Midrex has extensive procurement capabilities for assisting plants with maintenance, repair, and operation (MRO) services on an ongoing basis. Some MIDREX Plants have contracted Midrex Technologies to procure all items that must be acquired offshore, which frees up plant operations and administrative personnel from these time-consuming tasks, while providing a number of value-added benefits.

Field Services

Midrex maintains a roster of highly qualified personnel worldwide with extensive experience in various disciplines in the operation of MIDREX Plants. We are able to provide contract workers for plant support functions, including operations, maintenance, plant expansions and improvements, and purchasing.

Midrex can and has provided the following engineered solutions for various clients:

- Thin Wall Refractory / Double Bustle Port design & material supply
- Oval Top Gas Duct design & material supply
- Reformer refractory design upgrade & material supply
- Oxygen injection design & material supply
- Oxide coating design & material supply
- Transition Zone Natural Gas Injection design & material supply
- Process Evaluation (to determine predicted production bottlenecks at higher capacities)
- Plant Debottleneck Engineering (to engineer the removal of production bottlenecks)
- Additional reformer tubes per bay design & material supply
- Larger sized reformer tube application design & material supply
- Ejector Stack System evaluation & upgrade
- Heat Recovery System upgrade & material supply
- Dust Collection System evaluation & upgrade
- Material Handling System evaluation & upgrade
- Top Gas Scrubber Debottlenecking
- Flow Aid Insert upgrade design & material supply
- Cooling Gas Distributor (christmas tree) upgrade & material supply
- Process Gas Compressor system evaluation
- Mist Eliminator upgrade design & material supply
- Feed gas desulfurization system design & material supply
- Adding dilution air blower
- Using liquid hydrocarbons as fuel and for injecting into Shaft Furnace

And more... see www.midrex.com for more solutions.

Midrex News & Views



Todd Ames
Plant Sales Manager -
Commercial Department

Todd Ames Named Plant Sales Manager

Todd Ames is the new Plant Sales Manager for the Commercial Department of Midrex Technologies, Inc. He will be instrumental in the promotion and negotiation of new MIDREX Shaft-Furnace Direct Reduction Plant sales worldwide.

Mr. Ames has held numerous engineering positions within Midrex. Most recently he served as the Lead Mechanical Engineer for the MEGAMOD® under construction for the Lion Group in Malaysia.

Mr. Ames specializes in the design integration between the DRI and EAF areas.

Prior to joining Midrex, Mr. Ames worked for a variety of companies including Celanese Acetate as an International Construction Manager and General Dynamics Electric Boat Division as part of their Submarine Nuclear Systems Group. He has more than 15 years large-scale industrial project management and construction management in Europe and Asia, and is the holder of six US and European patents in various mechanical applications.

Mr. Ames has a Bachelor's of Science in Mechanical Engineering from Virginia Tech and a Masters in Mechanical Engineering from Rensselaer Polytechnic Institute. He currently lives in York, South Carolina with his wife and three children.

Christopher M. Ravenscroft: Editor

DIRECT FROM MIDREX is published quarterly by Midrex Technologies, Inc.,
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North Carolina 28217 U.S.A.,
Phone: (704)373-1600 Fax: (704)373-1611,
Web Site: <http://www.midrex.com> under agreement
with Midrex Technologies, Inc.

The publication is distributed worldwide by email to persons interested in the direct reduced iron (DRI) market and its growing impact on the iron and steel industry.

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MISSION STATEMENT

Midrex Technologies, Inc. will be a leader in design and integration of solids and gas processes. We will meet or exceed performance expectations, execute projects on time, enhance existing product lines, and provide value-added design, procurement, logistics and field services to our clients. We will develop new business opportunities that will challenge our employees and maintain the economic vitality of our company. Our employees are the key to our success, and we are committed to encouraging them to grow professionally and personally.

For the latest information, visit www.midrex.com