DIRECT FROM MIDREX

2nd Quarter 2001

IN THIS ISSUE

www.midrex.com

DIRECT FROM MIDREX

2nd Quarter 2001

Table of Contents

Editorial Staff

Christopher M. Ravenscroft
Editor

Adgroup International, Inc.
Graphic Design/Production

For more information or general comments, please e-mail:
info@midrex.com
www.midrex.com

AN ISO 9001 CERTIFIED COMPANY

DIRECT FROM MIDREX is published quarterly by Midrex Technologies, Inc., 2725 Water Ridge Parkway, Suite 100, Charlotte, North Carolina 28217 U.S.A., Phone: (704)373-1600 Fax:(704)373-1611, Web Site: http://www.midrex.com under agreement with Midrex International B.V. The publication is distributed worldwide free-of-charge to persons interested in the direct reduced iron (DRI) market and its growing impact on the iron and steel industry.

Commentary

What's in a Name?

Winston L. Tennies
President

Last issue we told you we did it — this issue we are showing how. Midrex Direct Reduction Corporation is now Midrex Technologies, Inc. but this is more than simply a name change for us, it heralds an expanded vision for the company and a sign of good things to come.

The reason for the change is simple. We have expanded our business development activities beyond the traditional iron and steel industry to make better use of Midrex's engineering, marketing and project execution strengths. We have already identified opportunities in oil and gas, and non-ferrous metals, and we are actively pursuing others, including petrochemicals, chemicals, minerals processing and process engineering.

Technology and innovation have been the keys to our success over the past three decades. Our strength as a process technology company is reflected in our 50 plus patents and our ongoing technology development effort. Our Business Development Group is seeking opportunities to utilize the company's pyro-processing knowledge, process development skills and project execution expertise in other areas. We are currently accomplishing this through internal development, business ventures and alliances or licensing other technologies.

Although this new direction for the company is a departure from our traditional business, our commitment to direct reduction remains strong. In this issue, we feature stories on Ispat Mexicana (IMEXSA), that in a few years since start-up has set a new trend in the DR industry with high quality DRI and remarkable productivity. Our other feature story takes place half a world away at Essar Steel. Essar is successfully hot charging its electric arc furnaces with hot DRI (HDRI) that provides several benefits, including reducing electrical power and increased productivity. We also are briefly spotlighting the future of hot charging – HOTLINK™, which now is a patented technology.

This month we are also unveiling our new website, that will be easy to use and the ideal place to learn more about the latest happenings within Midrex and in the direct reduction industry (see story on page 11). The new site, like our name change, will be more representative of the company and our future business, but at the same time provide a place where you can keep up with the world of DRI. Already we have begun posting information online before it is available in print, and this is just the beginning.

As our new website proclaims, we at Midrex Technologies are building on a solid foundation in direct reduction to grow into other areas. What's in a name? We are confident that this is just the start of a brighter future.

MISSION STATEMENT

Midrex Technologies, Inc. will lead in the ironmaking technology industry by supplying superior quality services that provide good value for our clients. We will meet or exceed performance expectations, execute projects on time, enhance existing product lines, and develop or acquire new technologies. Our employees are the key to our success, and we are committed to encouraging them to grow professionally and personally.

IMEXSA

Setting A New Standard

World-record Production and Improved Quality DRI

By Ismael Sandoval - Manager DR Plants IMEXSA

Russ Kakaley - Senior Process Engineer Midrex Technologies, Inc.

Ispat Mexicana (IMEXSA) is setting a trend in the steel industry, producing high quality DRI and in the process setting new records for a DRI Plant. From the construction phase through production, IMEXSA has achieved outstanding results. This includes optimized production from the plant, exceeding rated capacity, boosting metallization, and increasing product carbon to meet the demands of the Electric Arc Furnaces (EAFs).

During the best month of production, the IMEXSA MIDREX® Plant produced over 164,000 metric tons (t) of DRI with average metallization and carbon levels of 94.2 percent and 2.2 percent, respectively. This is an average production rate of over 220 t/h. IMEXSA's current and future success is dependent on a strong yet flexible technology, control of raw materials, well-trained operators and Ispat's commitment to continuous improvement.

THE BEGINNING

IMEXSA's 1.2 Mt/y MIDREX MEGAMOD® Module produced its first product on August 25, 1997, one month ahead of its contracted schedule. This established a new record for engineering, construction and start-up of a MIDREX Plant – only 23 months from contract effectiveness to first production.

Process natural gas was introduced to the shaft furnace on August 21, 1997, to begin the direct reduction process. For the next four days, production was

restrained while the furnace went through a normal first-time start-up cycle. The first on-grade DRI, defined as DRI having a minimum metallization of 92 percent, was produced a few days later. The initial on-grade DRI produced on August 25 was transferred to storage silos and shortly thereafter consumed in IMEXSA's EAFs for conversion to steel slabs.

From September 13-19, 1997, the new plant underwent performance testing, as per the plant supply contract, using pellets produced at the new IMEXSA pellet plant. Over the course of the performance test, the MIDREX Plant operated at an average of 157 t/h, compared to its rated capacity of 150 t/h, producing a total of 24,079 t of 92 percent metallized DRI with an average carbon content of 1.7 percent. The plant consumed an average 2.4 Gcal of natural gas per ton of DRI.

Over the following months IMEXSA optimized the performance of the MIDREX Plant, which provided the ideal combination of production, metallization and carbon to meet the demands of the EAFs. As shown in Figure 1, the plant has consistently exceeded its rated production capacity of 150 t/h. Figure 2 shows cumulative production, illustrating that a well-run MIDREX Plant can consistently and reliably supply millions of tons of DRI for the meltshop.

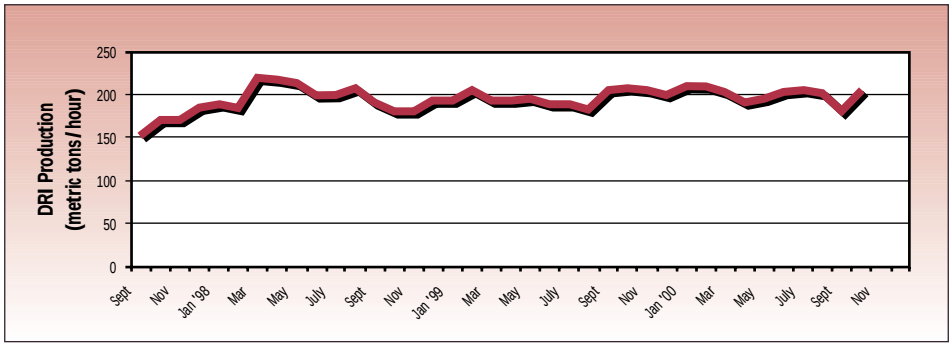


Figure 1 Average DRI production rate

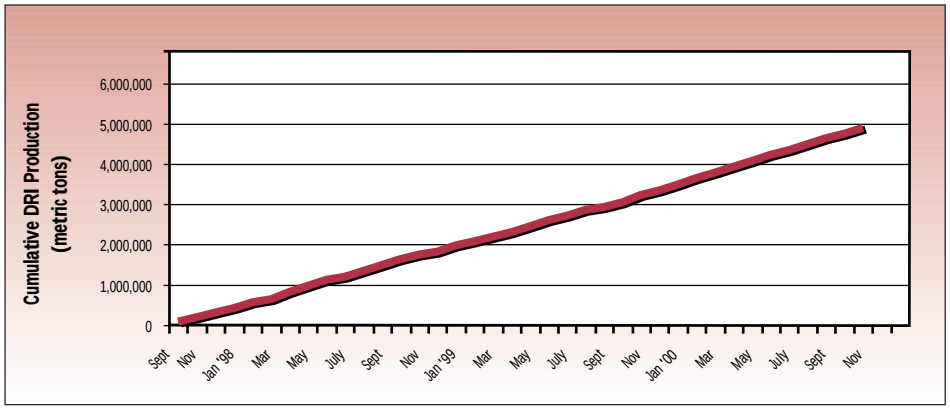


Figure 2 Cumulative DRI production

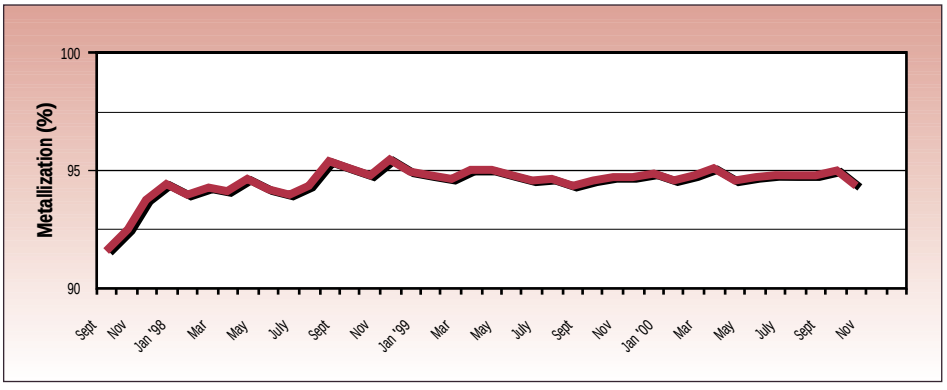


Figure 3 DRI metallization

Quality, Metallization and Carbon

The MIDREX MEGAMOD at IMEXSA has been instrumental in meeting the needs of the meltshop by optimizing DRI quality. Specifically, the metallization and carbon content of the DRI have been adjusted to provide the most cost-effective feed material to the meltshop.

Soon after start-up in August 1997, the target for product metallization was raised from 88 percent to 93 percent; in 1998, it was raised to 95 percent. IMEXSA has studied the results of using higher metallization DRI in the EAF feed to guarantee that the benefits to the steelmaking plant exceed the additional cost in the DRI plant. IMEXSA has found that increasing the metallization of the DRI reduces meltshop power consumption, increases arc furnace yield, decreases refractory wear, and decreases electrode wear. As shown in Figure 3, IMEXSA has operated at 95 percent metallization since 1998.

IMEXSA has chosen to increase product carbon as well. At the time of start-up, product carbon was typically 1.2-1.5 percent. In 1998, the target was increased to 1.8-2.0 percent. At the end of 1999, IMEXSA began to experiment with even higher carbon levels and evaluated the impact of higher carbon DRI in the meltshop. It appears that higher carbon in the DRI has several advantages. First, it reduces the FeO in the DRI before the FeO dissolves in the slag. Second, the carbon in excess of this need reacts with the FeO in the slag from other sources (e.g., scrap or iron oxidation from air or oxygen lancing), or it dissolves in the bath and then reacts with lance oxygen. Third, higher carbon improves slag foaming, thereby reducing heat losses and electrical power consumption. (DRI Carbon is more effective than charge carbon or injected carbon in these reactions). Fourth, the use of high carbon DRI and more oxygen in the meltshop raises EAF productivity. After these successful tests, the target carbon was increased to 2.5 percent in February 2000, as shown in Figure 4. IMEXSA now operates at discharge rates in excess of 200 t/h with 95 percent metallization and 2.5 percent carbon.

IMEXSA has tested the ability of the MIDREX Plant to produce even higher

carbon levels. During April 2001, the DRI had an average carbon content of 3.1 percent. IMEXSA has also explored the possibility of preheating the transition zone natural gas to achieve carbon levels up to 3.5 percent. Even though higher carbon levels can be sustained, IMEXSA will maintain the 2.5 percent carbon level for the short term due to oxygen limitations in the meltshop.

Adjusting transition zone natural gas flow is the primary means of controlling product carbon. As methane in the natural gas cracks to form carbon, hydrogen is released, thus providing more reductant. In this way, higher carbon provides higher production as well. Midrex has referred to this as the "waste heat" approach to making higher carbon. Since IMEXSA routinely operates with furnace bed temperatures of 900°C, there is a large amount of waste heat that can be utilized to make carbon in the transition zone of the furnace.

Even when operating with high product carbon, the carbon is not deposited as "soot" on the surface of the pellet. Instead, it is deposited and bound inside the porous pellets. This is important because the carbon cannot be lost during transport to the meltshop or lost in the off-gas system of the EAF. It has been shown that the majority of this carbon has been converted to iron carbide while in the MIDREX® Furnace.

THE IMEXSA PELLET

The IMEXSA oxide pellet plant produces 100 percent of the feed used in the MIDREX Plant. While the MIDREX Furnace can process a wide variety of feed mixtures, using 100 percent IMEXSA pellets allows the direct reduction process to be optimized while producing the optimum DRI for the meltshop.

In DRI production, raw material quality is critical. In addition to high total iron, low gangue, low phosphorus and low sulfur, IMEXSA pays careful attention to properties that are specifically important for the MIDREX Process. By working closely with ore suppliers and by carefully controlling process parameters at the pellet plant, IMEXSA has improved pellet reducibility, resistance against degradation during reduction and sticking resistance. Using 100 percent IMEXSA pellets not only improves the performance of the MIDREX Shaft Furnace, but it results in an improved quality DRI feed for the meltshop.

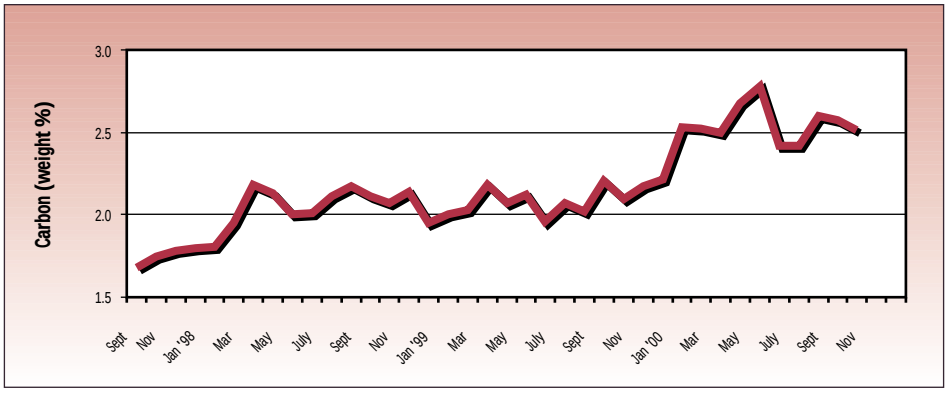


Figure 4 Carbon content of DRI

NEW TECHNOLOGIES

IMEXSA's MEGAMOD is one of the world's largest operating direct reduction modules and it incorporates many state-of-the-art features into its design.

Oxide Coating

Oxide coating provides greatly increased DRI production rates. This involves coating the ore feed to the direct reduction plant with lime. Oxide coating reduces the tendency for DRI to stick and form clusters inside the reduction furnace. Therefore, the reduction furnace can be run at elevated temperatures, which provides faster reduction kinetics and thereby increases the production rate and metallization.

Oxygen Injection

Oxygen injection increases DRI production rates and metallization. It is accomplished by injecting oxygen into the bustle gas using a series of nozzles, increasing bustle gas temperature and furnace temperatures. As mentioned previously, higher furnace temperatures give faster reduction reaction kinetics and

thereby increase the production rate and metallization. However, it should be noted that oxygen injection and oxide coating work together to maximize production. Oxygen injection provides the higher temperatures, while oxide coating allows the higher temperatures to be used without forming clusters.

Double Bustle

The IMEXSA Furnace uses a patented MIDREX® Double Bustle design to distribute the reducing gas to the shaft furnace. The double bustle consists of two rings of ports around the circumference of the shaft furnace. Compared to a single bustle, the double bustle allows better distribution of the reducing gas to the furnace and higher flows of reducing gas to the furnace without local fluidization of the DRI. Both of these advantages allow increased production rates.

Transition Zone Natural Gas

IMEXSA injects natural gas into the transition zone of the furnace, providing higher product carbon levels and greater production rates. The transition zone is the part of the furnace that is below the reduction zone and above the cooling zone. As the DRI descends from the reduction zone into the transition zone it is very hot. At this point the excess heat must be removed before the DRI is discharged from the furnace. By injecting transition zone natural gas, some of the waste heat can be used to crack hydrocarbons. Cracking deposits carbon in the product and releases hydrogen, a reductant, which flows upward and provides for additional reduction.

Preheated Natural Gas

IMEXSA has explored the possibility of preheating the natural gas that goes to the transition zone. The benefit would be higher product carbon and higher production rates because more transition natural gas could be added. Currently, the flow of transition zone natural gas is limited by its cooling effect. By preheating the transition zone natural gas, more can be injected without quenching the reduction zone.

SPECIFIC CONSUMPTIONS

Natural Gas

At 2.2 net Gcal/t, the IMEXSA MIDREX Plant has one of the lowest specific natural gas consumptions in the industry. This is due in part to the state-of-the-art heat recovery system that captures waste heat from the reformer flue gas. It is also due to the high furnace temperatures achieved through 100 percent IMEXSA pellet feed, oxide coating and oxygen injection. High furnace temperatures allow efficient use of the reductant in the furnace. Figure 5 shows that gas consumption has been consistently low, averaging 2.2 net Gcal/t over the entire history of the plant.

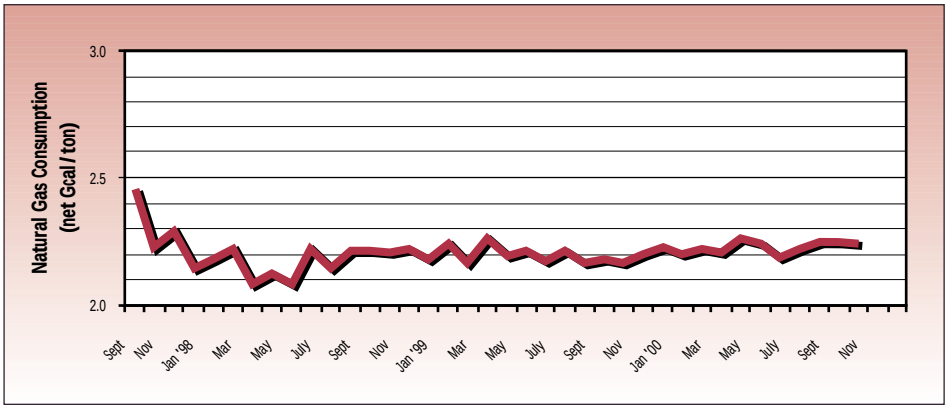


Figure 5 Natural gas consumption

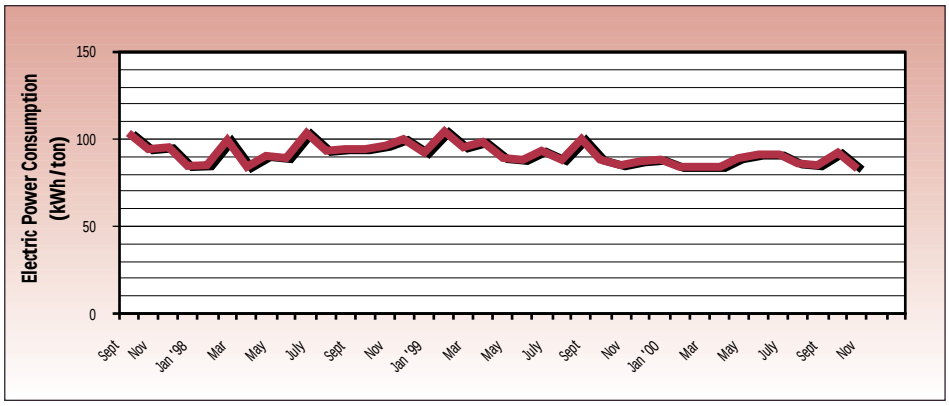


Figure 6 Electrical power consumption

Electricity

The IMEXSA MIDREX Plant has averaged an electricity consumption of 91 kWh/t of product over the entire history of the plant. Figure 6 shows that recent electricity consumption is slightly lower than in the past, averaging 85-90 kWh/t. IMEXSA has reduced the specific electricity consumption by increased production.

Oxygen

IMEXSA installed an oxygen injection system and started using it in February 1999. The current oxygen consumption averages 10 to 15 Nm^3/t. More oxygen could be used (if available and if desired) to raise production.

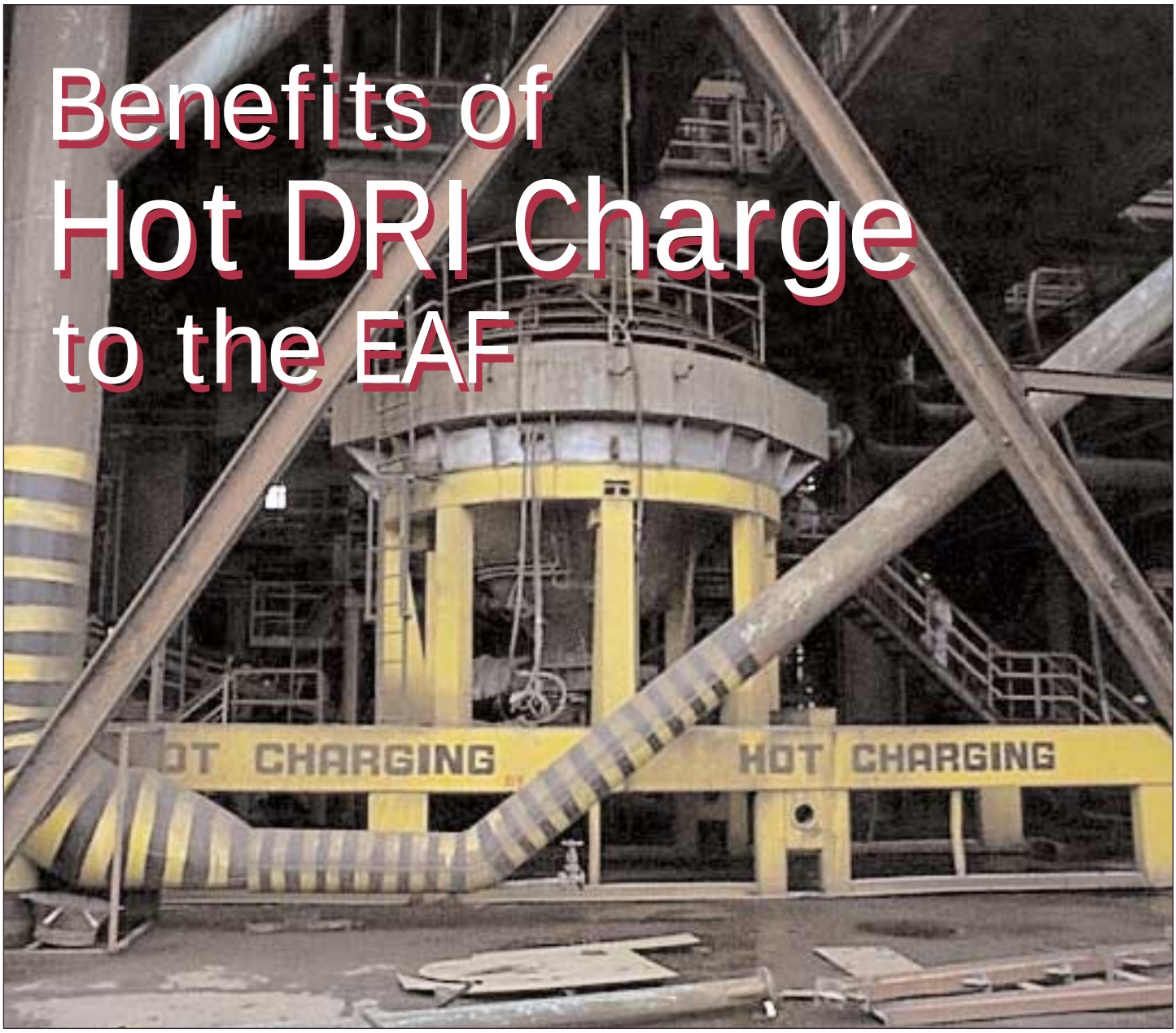
Iron Ore

At IMEXSA the ratio of ore to product is 1.39/1. The only real loss of iron units is due to dust being carried out of the furnace by the top gas or cooling gas. IMEXSA minimizes this loss by using 100 percent IMEXSA pellets and by ensuring high pellet quality.

CONCLUSION

IMEXSA's MIDREX Plant start-up and production have raised the level of expectation for DR plants. The MIDREX Plant is consistently meeting the increasing demands of the EAFs by producing high quality DRI, with high metallization and carbon, at tonnage rates that far exceed the rated capacity. IMEXSA looks to maintain its success through continuous improvement. It can achieve this by using strong yet flexible MIDREX Technology, control of raw materials and well-trained operators.

Benefits of Hot DRI Charge to the EAF



Originally presented by
Russ Bailey - Chief Executive (HBI)
Essar Steel, Ltd. at the
2000 Midrex Operations Seminar

Edited for publication by
Brian Voelker - Senior Mechanical Engineer
Midrex Technologies, Inc.

The benefits of charging hot DRI (HDRI) have been known for many years, however, not until recently have any MIDREX® Direct Reduction Plants seriously pursued the goal of using hot product directly from the MIDREX® Shaft Furnace. Essar Steel began experimenting with hot transport in 1999 on a small scale. Since mid-1999, the production and use of HDRI have increased continuously. Equipment modifications have been undertaken and application of process know-how has shown significant benefits to both operations and cost. Essar Steel has set itself the target of 75 percent HDRI use in the Electric Arc Furnace (EAF) meltshop.

With the high price of electricity in India, the economics certainly provide enough incentive to work out the logistical problems of handling greater than 600°C HDRI.

INTRODUCTION

Essar Steel Ltd. owns and operates a two million ton per year (Mt/y) steelmaking and hot-rolled coil facility in Hazira, Gujarat State, Western India. Compared with energy costs in most parts of the world, those applicable in India are extremely high.

The MIDREX Plant was originally designed as a two-module HBI plant. The plant now has three MIDREX® Series 400 Modules, Module Three being started up in 1992. With the previously completed modifications and those currently in hand, the capacity of all three modules is more than 2.4 Mt/y.

HDRI is discharged from the furnace discharge system upstream of the briquette machines. The HDRI is then fed into hot transport vessels and transported to the meltshop on specially-designed flatbed-trailers. The shaft furnace discharges

HDRI at about 650°C to more than 700°C and measurements show that there is less than a 50°C temperature loss between the charging vessel and use in the meltshop. Measurements have shown that once charged, the temperature loss of the HDRI is less than 5°C per hour.

The meltshop consists of three 160 MVA single electrode DC EAFs that have been in operation since 1995/1996. Each has a tapping weight of 152 t and operates with a hot heel of 80 t.

Originally the EAFs were fitted with consumable pipe oxygen and carbon lances on a common lance manipulator. Water-cooled lances have now been fitted to each furnace to enhance oxygen consumption and yield. A large variety of feed material percentages are charged depending on the metal quality required by the client and raw material availability.

If scrap is in the charge, a bucket charge is made and HBI and slag formers are charged via bins and conveyors through a chute in the roof. The meltshop has a separate baghouse and a 28 MVA ladle furnace for each EAF. The meltshop is located about one kilometer by road from the DR facility.

Additional facilities include an oxygen plant, two lime kilns and a downstream facility including hot skin pass mill, slitting and shearing lines.

HISTORY

To take advantage of the energy in the HDRI fed to the briquetting presses in the three MIDREX HBI Plants, Essar developed a basic concept for "hot transport of DRI" over the years. In August, 1999, the first commercial-scale trials took place where HDRI was discharged from the DR furnace at 650°C, transported by a specially-designed 45 t net weight container to the steel meltshop and charged to the electric arc furnace.

The first trials were a complete success and work immediately started on the second 45 t container. At the same time, design work was taken up on a new 90 t container.

Substantial data collection, studies and work were carried out to ensure that the developed systems were safe and the plant operators were comfortable working with them.

At present, there are two 45 t containers and five 90 t containers in service. Today all three MIDREX Modules are able to discharge HDRI and all three EAFs are able to charge HDRI. Until recently, one module could only accommodate the 45 t containers due to clearance problems with material handling conveyors. The conveyors have been relocated so that now all three HBI modules are now able to discharge to the 90 t containers. The two 45 t containers will be phased out shortly.

Essar has increased the amount of HDRI transported each month with April 2001 achieving 44,671 t. In the 2001-2002 business year, Essar expects to reach a level of 1.2 Mt.

BENEFITS IN THE MELTSHOP

Some of the advantages of using HDRI in the meltshop are increased production, electrical energy and electrode savings, increased yield and decreased moisture in EAF feed.

Essar has found that the production increase in the meltshop can be substantial. Data from last year shows that by hot charging one 45 Mt container of HDRI, the average tap-to-tap time for one heat in the EAF can be reduced from 72 minutes to 69 minutes. If a 90 t container of HDRI is charged, the average tap-to-tap time is reduced to 66.6 minutes. In April, 2001, Essar set a new HDRI transport monthly record of 44,671 t, which translates to about 496 x 90 t containers or a theoretical savings of almost 48 hours production time in the meltshop.

In addition to the increased productivity, savings in electricity and electrode consumption are also considerable. Data shows that EAF heats using one 90 t container of HDRI had an average 60 kWh/t liquid steel (LS) reduction and heats using 135 t of HDRI saw a savings of more than 90 kWh/t. This converts to an average electrical consumption savings in excess of 120 kWh/t LS when operating on 100 percent HDRI charges.

On a daily average basis, electrical consumption in the meltshop has been reduced from 600 kWh/t LS when no HDRI was being used, to 537 kWh/t LS during the best day in April 2001 when 20 heats had HDRI charged in the feed. The additional savings come from improved operation and secondary benefits when using large amounts of HDRI in the charge.

With the reduction in electrical consumption also comes a reduction in electrode consumption. Based on data from last year, an average reduction of 0.3 kg/t in electrode consumption was observed over a period of eight months.

In a typical HBI plant, the briquettes are cooled by quenching them in water either by submersing or spraying. The quenching process has the inherent disadvantage of lowering the metallization of the product and of adding water to the briquettes, which must be evaporated in the EAF.

At Essar, a hot sampling device was recently commissioned to provide reliable data on HDRI quality compared to HBI quality. It was found that due to the quenching of HBI, HDRI has 1.0 – 1.5 percent higher metallization. Also, HDRI is never exposed to water, so no energy is needed in the EAF to evaporate the 0.75 percent moisture normally contained in the briquettes.

As more HDRI is being transported to the meltshop every month, Essar is well on the way to achieving the 75 percent target HDRI use and has seen significant operating cost savings in the meltshop and at the MIDREX Plant. Essar is saving on electrical energy consumption and is simultaneously maximizing meltshop productivity, thus gaining production capacity.

For existing plants with a limitation on steelmaking capacity, hot transport could also be an alternative to a new EAF.

FUTURE

Essar is presently working on a hot screening process and surge bin system to further enhance the tonnage of HDRI available for transport. This will also maximize the yield at both the HBI plants and the meltshop, enabling feeding of minus six mm DRI back into the hot briquetter. This fraction would otherwise be lost into the slag layer and EAF combustion system. Further improvements in process data collection and translation of this data into improved EAF operation are also under development.

Second FASTMET® Plant Begins Commercial Operation

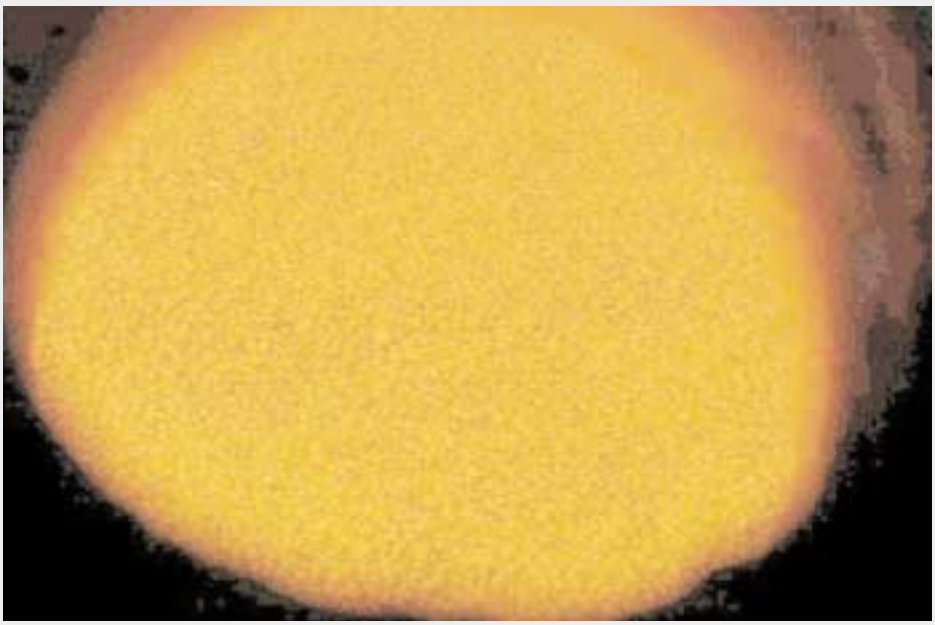
Important Step in Kobe Steel Zero Emissions Program

Building on the success of the first commercial FASTMET Recycling Plant at Nippon Steel's Hirohata Works in Japan, Kobe Steel, Ltd. has converted the FASTMET Demonstration Plant at its Kakogawa Works into an iron-bearing solid waste recycling facility. Using waste oil as the primary fuel source, the demonstration plant has been modified to process blast furnace and steelmaking dust, including upgrading the offgas cleaning unit to recover high zinc content dust. This is part of a plan to turn Kakogawa into a zero emissions facility by the end of 2001, an industry first.

The FASTMET Plant, which began commercial operation in May, will reclaim zinc-rich iron oxide dust from blast furnace and steelmaking operations, with a treatment capacity of 14,000 metric tons per year. The facility uses pellets made of blast furnace and steelmaking dust that are then fed to a rotary hearth furnace and heated to a high temperature.

FASTMET Recycling Plant at Nippon Steel's Hirohata Works in Japan

The carbon in the waste acts as a reductant and reacts with the oxygen in the iron oxide in a relatively short time, producing highly metallized DRI. The DRI will be returned to the steelworks and used in steelmaking operations. The zinc oxide is a valuable by-product and will be sold off-site.



Pellets made from blast furnace and steelmaking dust inside the FASTMET Furnace as they are being heated and converted into highly metallized DRI

The Kakogawa Plant is the second commercial facility using the FASTMET Process. The world's first commercial FASTMET Plant at Hirohata Works is designed to process 190,000 metric tons per year of steel mill waste into highly metallized DRI. The plant started up in April 2000. The DRI is being hot charged into Hirohata's steelmaking shop along with scrap and pig iron to produce steel.

The Kakogawa Works currently produces 300,000 metric tons per month of waste, including steel slag, mill dust, used refractory bricks, waste oil and other by-products. While already recycling slag and dust, which makes up a large portion of the waste, Kakogawa has invested roughly 500 million yen to reuse the remaining by-products under the ECOST–21 program launched in May 1999. ECOST–21 consists of a quality control program covering over 300 improvements to recycle waste. Kakogawa's recycling rate of 96% prior to the start of the program has risen to nearly 100%, thus greatly decreasing disposal costs. By end of 2001, Kakogawa intends to achieve zero emissions.

Midrex Expands Business Beyond Iron and Steel

Business Development Targets Industrial and Technology Partners

After decades of innovation in direct reduction, Midrex Technologies, Inc. has expanded its business development activities beyond the iron and steel industry with the formation of the Business Development Group.

Structured to make use of Midrex's engineering, process development, marketing and project execution strengths, the Business Development Group is now performing business evaluations with companies looking to develop process technologies. Identified opportunities include non-ferrous metals, oil and gas, petrochemicals, chemicals, minerals processing and process engineering. These efforts are being accomplished through internal development, alliances or licensing.

Midrex is also marketing its ability to provide engineering, project management, procurement, quality assurance, construction management and start-up services for projects other than MIDREX Plants. Since 1969, Midrex has been the recognized leader in designing and building direct reduction plants around the world. Over the last 10 years, Midrex has participated in major projects of various scopes in seven countries with a total installed cost of over $1.5 billion.

Midrex is unique in its level of pyro-processing capabilities, including high temperature refractory and equipment design, super-alloy selection and application, combustion systems, reforming, waste heat recovery systems and high temperature furnace applications. All services are provided in strict accordance with our ISO 9001 Quality Management System.

Beyond Iron and Steel

"As a company, we have focused on direct reduction for many years; however, much of the technology, equipment and expertise that was developed and refined can be applied to a multitude of industries," said Greg Hughes, Vice President of Midrex's Business Development Group. "Midrex's corporate mission statement highlights the importance of technology development to the company and our Business Development Group further exhibits our commitment to this goal."

"Midrex is seeking out companies and industries that can benefit from our project execution, process and technology development, and global sales and marketing expertise," Hughes said. "We are looking for technologies that require development, marketing or project execution expertise."

Midrex focuses its technical skills on supplying basic and detailed engineering and proprietary plant equipment. In executing projects, Midrex works with local engineers, contractors, and equipment suppliers for supply of non-proprietary engineering and equipment, as well as for plant construction.

"Midrex's mission statement highlights the importance of technology development ... our Business Development Group further exhibits our commitment."

Midrex has experience in developing new markets for existing or new products from market inception through promotion and sales, as well as providing assistance in developing and executing commercialization plans for any developing technology including technical plans, licensing policy and implementation, marketing plans and sales strategies.

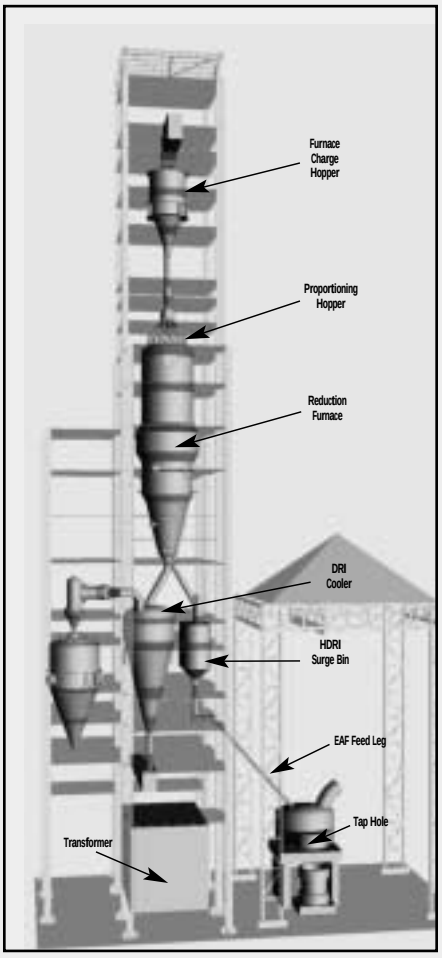
With contacts at principal international banks, lending institutions and investment firms, Midrex can assist potential customers in seeking project financing. By drawing on the company's extensive experience in developing multi-million dollar international projects, Midrex finds creative methods to execute projects.

For more information or to propose a business venture contact Midrex at E-mail: BizDev@Midrex.com or call Greg Hughes, Vice President – Business Development at (704) 378-3315 or Dan Sanford – Vice President Engineering at (704) 378-3372.

HOTLINK™ Now Patented

Midrex recently was awarded a US patent for its unique gravity transport HOTLINK system. HOTLINK provides for hot charging of DRI to an adjacent electric arc furnace with a close-coupled system. Using gravity to transport the hot DRI (HDRI), HOTLINK provides a simple, reliable and economical means for retaining the sensible heat contained in HDRI.

The benefits of HOTLINK include: reduced EAF power consumption; reduced electrode consumption; increased EAF productivity or reduced EAF electrical system requirements; and it provides the possibility to produce low nitrogen steel for flat products.



Typical HOTLINK arrangement with transformer located underneath the DR furnace

New Midrex Website On-line in June

www.midrex.com Brings a Wealth of Information

In June Midrex Technologies, Inc. will unveil its new website. Not only will the new site embody the spirit of continued change and growth that Midrex is undergoing, but it will also better showcase our services and expertise. The site will feature a wealth of new and easy-to-access information ranging from the latest news releases and technical papers to specific *Direct From Midrex* articles and other materials.

By bookmarking Midrex's new home page, www.midrex.com, one is sure to keep abreast of the latest Midrex happenings and technologies. The home page will feature a regularly updated What's New section, search engine, easy-to-reference contact page and a simple, logical layout to find information quickly and easily.

INFORMATION WILL BE DIVIDED INTO THE FOLLOWING CATEGORIES:

The Company: This newly created section will contain company information including bios, a history and timeline of Midrex as well as Midrex's expansion and diversification in other areas of business and industry.

Information Center: This section will continuously grow to contain the latest news about Midrex, white papers, conference presentations and a repository for *Direct From Midrex* and other Midrex-related information. Articles and presentations will be available in user-friendly PDF format and text files and in the future we will have additional downloads as well.

[Starting with the 3rd Quarter, Direct From Midrex will be exclusively available as a free web download a week or two before subscribers will receive it by mail. This will also be the case for the 2001 World DRI Statistics that will be completed in early 2002.]

Iron and Steel — Direct Reduction: For those who think they know all about the MIDREX® Process, think again. This section provides details about the MIDREX Process, as well as FASTMET® and FASTMELT®, describing the proven commercial technologies, benefits, environmental parameters and the latest innovations to these technologies.

Also featured will be a section on the alternative iron market, Midrex sales and support and an in-depth description of DRI and HBI product and uses.

Products and Technology Development: This is not only a new section to our website, but also a new side of Midrex. Over the past three decades Midrex has assembled a vast array of talent, technologies and experience. Now the company is applying it to other areas outside of iron and steel, venturing into non-ferrous metals, oil and gas, petrochemicals, chemicals, minerals processing and process engineering.

Also detailed in this section is Midrex's state-of-the-art, but not often publicized, Technical Center located in Pineville, NC.

Midrex Solutions: Started in early 2000 and devoted to executing valued-added engineering projects and services for MIDREX® Plants. This will hold the latest information available.

Midrex has spent a lot of time, research and effort to make this new site user-friendly and dynamic. It is a continuous work in progress and will be updated at least once per month.

Midrex Presents DR Seminars

During the first half of 2001 Midrex co-sponsored direct reduction seminars at two major steel industry conferences on each side of the globe. In March, a Direct Reduction seminar covering the MIDREX® Process, DRI/HBI use and the FASTMET® Process was held in Baltimore, MD, USA at the Iron & Steel Society Conference. In May at the 2001 SEAISI (South East Asian Iron & Steel Institute) Singapore Conference, Midrex co-sponsored a DRI/HBI usage seminar. Both events were well received and provided attendees the opportunity to learn about direct reduction and DRI/HBI use as well as interact with other industry professionals. These seminars are part of Midrex's continuing effort to expand knowledge and use of DRI.

An Old Face in a New Place:

Helle Oversees Midrex Solutions™

Jim Helle, a Midrex veteran with more than 30 years experience in developing and designing MIDREX® Plants, has been appointed as Manager of Midrex Solutions. Midrex Solutions is a dedicated commercial group that concentrates solely on existing MIDREX® Direct Reduction Plants and their unique project execution needs. Helle will assume all of the responsibilities for leading Midrex's effort to expand business opportunities with existing MIDREX Licensees.

Officially launched in the first quarter of 2001, Midrex Solutions serves the commercial needs of MIDREX Plants when executing small capital projects involving engineering, new equipment designs and aids plants interested in improving performance, reliability, maintenance and enhancing environmental impact.

In his more than three decades at Midrex, he has managed several MIDREX Plant projects and spent approximately 12 years in the Midrex sales group.

For more information on Midrex Solutions, please contact Jim Helle at solutions@midrex.com or by phone at 704-378-3393.

DIRECT FROM MIDREX

published by

Midrex Technologies, Inc.
2725 Water Ridge Parkway, Suite 100
Charlotte, NC 28217
USA

ADDRESS SERVICE REQUESTED