DIRECT FROM MIDREX

1st Quarter 2000

IN THIS ISSUE

Increasing Product Carbon

Recent Business Developments Highlight 10th Anniversary at Professional Services International, Inc.

MIDREX Direct Reduction Plants — 1999 Operations Summary

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Editorial Staff

Derek M. Sheedy
Editor

John T. Kopfle / Antonio Elliot
Research/Statistics

Adgroup International, Inc.
Graphic Design/Production

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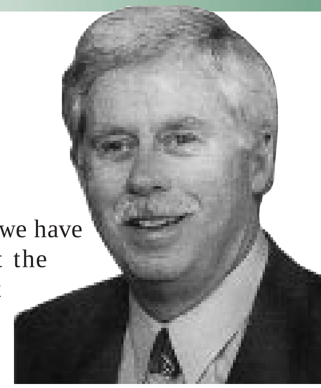
All tons referred to are metric tons (t) or million metric tons (Mt)

Commentary



Winston L. Tennies

Charging Into the New Millennium

The start of a New Year is a time to reflect on what we have achieved during the past year and also to look at the promise of the year ahead. This is especially true at the start of a new decade/century/millennium.

In the past year Midrex achieved several firsts. In June, operations began on the first MIDREX STRETCH MEGAMOD™ at Caribbean Ispat Ltd.'s DR3. This 1.36 Mt/y MEGAMOD is the largest single module direct reduction facility in the world. Great things are expected from this plant, as its smaller sister plant at IMEXSA has produced over 1.5 Mt/y in each of its first two years of operation.

Not to be overshadowed, Saldanha Steel completed the final stage of its steelworks with the start-up of an 800,000 t/y MIDREX™ Plant. This is the first shaft furnace to use reducing gas produced by coal gasification. The linking of the these two technologies opens up many opportunities for direct reduction and ironmaking in the new millennium. Another feature that individualizes the Saldanha Steel MIDREX Plant is the fact that is was specifically designed to use over 70 percent predominantly indigenous lump ore in its feed mix.

As Midrex ushers in the year 2000, we are looking ahead at what the future holds and have undertaken many changes to prepare ourselves for the challenges of the future.

One of the most obvious changes we have made is the new look of *Direct From Midrex*. Every few years we change the look of this publication to reflect the direction Midrex is taking as a company and as a technology. In addition to the images of the Shaft Furnace and the Rotary Hearth Furnace (representing the MIDREX® Process and the FASTMET®/FASTMELT™ Process respectively), we have added the image of an Electric Arc Furnace and BOF, symbolizing that Midrex is paying special attention to the needs of the steelmaker. We realize that our job does not end with the discharge of DRI at the bottom of the shaft furnace. It is our job to increase the value of DRI and HBI to the steelmaker.

Another exciting change is the development of the HOTLINK™ System. This new addition to the MIDREX™ Technology uses gravity to transfer hot DRI (HDRI) from a MIDREX™ Shaft Furnace to an EAF. Hot charging DRI can reduce a steelmaker's production costs, its productivity and improve their bottom line.

Midrex is also responding to the steelmakers' demand for higher carbon charge materials. This increased demand is facilitated by the increased availability of oxygen in a steel mill. Tests are being run on the production of DRI with a high carbon content and we hope to report results in future issues of *Direct From Midrex*. COMSIGUA recently ran tests producing HBI with increased carbon content. Carbon levels of 2.8 percent were achieved with metallization around 95 percent.

Midrex recently completed a physical change, as we moved into our new headquarters. This move brings Midrex and its sister company, PSI, together in one location, creating a single headquarters for all of your direct reduction needs. We hope these actions will improve the services we provide to our customers and clients.

Through these changes we hope to grow as a company and to continue to lead the direct reduction industry toward a bright future in the new millennium.

MISSION STATEMENT

Midrex Direct Reduction Corporation 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.

INCREASING PRODUCT CARBON

By Gary E. Metius
Manager of Technical Sales
Midrex Direct Reduction Corporation

Introduction

The performance of DR plants has become increasingly more demanding in today's steel market. Increasing the utilization of reducing gases, expanding the sources of reducing gas, and improving product quality are the hot issues in DR plant operations. Given the wide diversity of the operating plant situations around the world, the effort to address these issues must cover a very wide field of study.

The wide acceptance of oxide coating through the use of either in-plant coating or pre-coating of oxide feed materials has brought about major changes in plant operations. The benefits of coating have allowed plants to push well past earlier barriers in plant productivity and product quality, through increased reducing gas temperatures and correspondingly higher utilization of the reducing gas.

Temperature Impacts

1. Higher production has been the major benefit from the advances in plant operations due to oxide coating.
2. Higher metallization has been an option that is available where desired by the steel maker, in lieu of some of the production increase.
3. Carbon, from CO, is difficult to maintain as the result of higher burden temperatures.
4. Increased natural gas cracking and /or in-situ reforming can occur from the additional heat available in the reduction furnace.

Carbon – How Much?

Traditionally, the quantity of carbon found in DRI has been 1.5 percent to 1.8 percent and in HBI has been 1.0 percent to 1.3 percent. The reason for the difference between DRI and HBI has been the difficulty in adding carbon in an HBI furnace while maintaining the required discharge temperature for briquetting.

There is a point that has often been referred to where there is a theoretical balance between the quantity of carbon present in the DRI and the quantity of oxygen remaining combined with iron in the DRI. For each 1.0 percent Fe combined as FeO, there is a theoretical need for 0.215 percent carbon in the DRI to achieve the balance. When we look at typical DRI where total iron is 93 percent and metallization is 93 percent, then the theoretical carbon requirement will be:

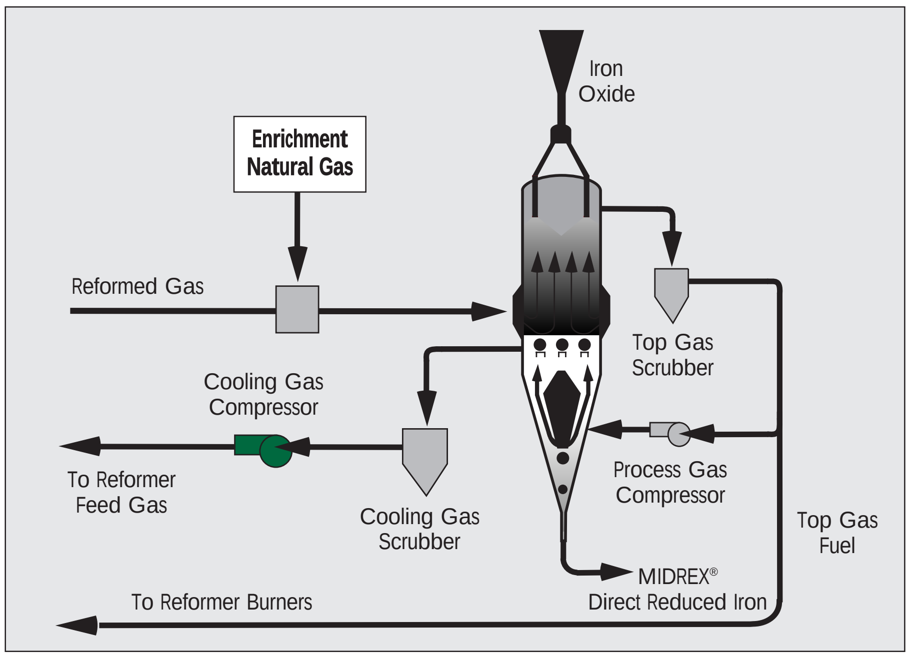
$$(100-93) \times 93 / 100 \times 0.215 = 1.40\%$$

This has historically been one of the reference points used in evaluating carbon needs in an EAF.

The more recent trend has shown carbon levels increasing by about 0.5 percent as the result of increased use of oxygen in EAF melting. Some melt shops have pushed the carbon content of their DRI even higher, as they have sought to replace more electrical melting energy with chemical energy by oxidizing carbon in the bath.

The newest question concerns the issue of how much carbon is too much carbon. Do carbon contents in the range of 3.0 percent to 4.0 percent, or higher, have a place in a high production, high percentage DRI feed melting operation? There are as many answers to this question as there are meltshops in operation.

The purpose of this paper will be review the methods available to generate various levels of carbon in the reduced product and the effects of those methods on plant productivity.



Alternate flowsheet

In the Early Days

In the early days of DR, there was the alternate flowsheet with reducing gas temperatures of from 740°C to 760°C. Both of these conditions promoted reasonable carbon by putting CO rich gas in temperature zones which tended to promote carburization by CO:

$$2CO \rightarrow [C] + CO_2$$

The problem with this arrangement was the difficulty in cooling effectively and in maintaining control of the process under the alternate flowsheet. The solution was to adopt the standard flowsheet, which allowed for better cooling and upflow control, but lacked the CO rich gas in the cooling zone. To compensate for this, the system of cooling zone bleed was adopted, where some of the cooling gas was bled to the top gas fuel system, thus pulling bustle gas down into the cooling loop and increasing the CO content of the cooling gas.

The next advance came with the introduction of lump ore and the elevation of the reducing gas temperature. This increased production but decreased carbon content. To recover from this loss of carbon, the reducing gas enrichment was increased as much as possible without limiting the bustle temperature. But ultimately, this became a balance between productivity and carbon content. The obvious question was where else could natural gas be injected to increase carbon content.

$$CH_4 \rightarrow [C] + 2H_2$$

The first solutions were attempts to inject natural gas into the transition zone through various openings and locations. This was efficient and effective for all flowsheets, but very difficult to keep in operation over a long period of time due to plugging of the injection points by carbon from cracking natural gas.

The second solution was the addition of natural gas directly into the cooling gas stream. Previously, the cooling loop had been pressured by adding seal gas to the inlet of the cooling gas compressor. With the introduction of natural gas to the cooling loop, this seal gas addition became obsolete. It was a great solution, in that it increased product carbon, improved the performance of the cooling system significantly, and did not plug up with carbon.

Developments since these early steps have refined the process of adding natural gas to the reduction furnace to the point where carbon levels in excess of 3.0 percent have been achieved at several plant locations.

Today

Today, the standard methods of adding natural gas to increase the carbon content of the DRI product, employ one or all of the following flowsheet options:

1. Bustle Enrichment
2. Cooling Gas Addition
3. Transition Zone Addition
4. Cooling Zone Bleed

The most recent development in production optimization involves the use of oxygen injection to increase the temperature of the bustle gas by 75°C to 100°C. This additional bustle gas temperature increases the rate of the reduction reactions in the furnace and is partially consumed by some of these reactions. The remainder of the heat must be used or removed prior to furnace discharge. Ideally, we would like to use most of this heat for increased in-situ reforming and natural gas cracking.

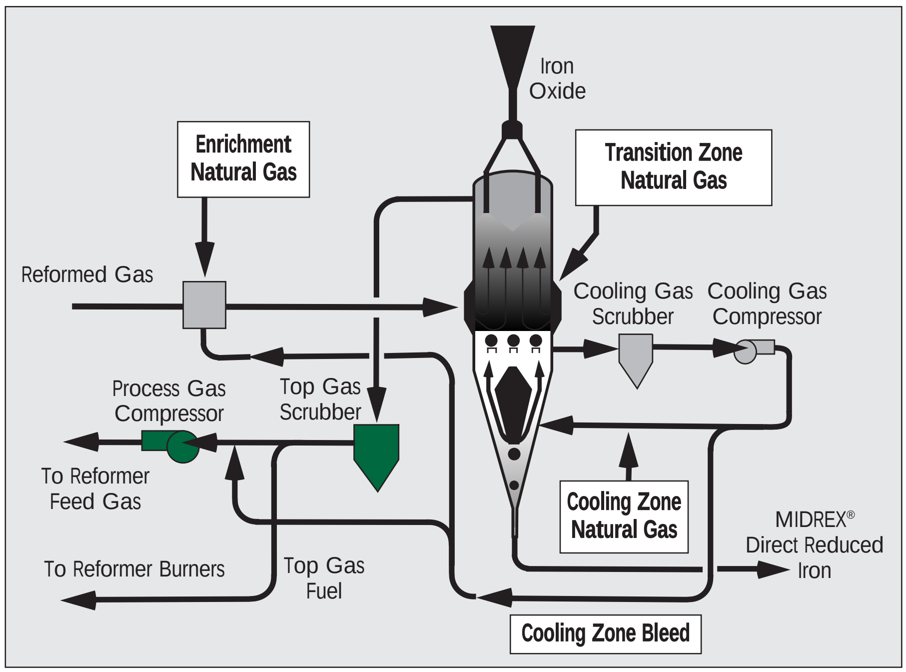
Again, as it happened with the introduction of lump ore 25 years ago, the effect of increasing the bustle gas temperature and furnace production has made carburizing the DRI more difficult. There are more available options today, and in fact there is a side benefit in adding additional natural gas to the furnace. When carbon is deposited from the cracking of natural gas, hydrogen is liberated and plant efficiency improves since we are generating reducing gas outside of the reformer from excess heat in the reduction furnace burden.

Today, by using various combinations of the above listed flowsheet options for adding natural gas, those plants using oxygen injection are able to maintain more than 2.0 percent carbon while operating at new production levels and temperatures. To date, none of the HBI plants routinely operates at this level of carbon or bustle gas temperature.

What's Next

As mentioned earlier, there is a growing level of interest in even higher levels of carbon, even into the plus 4.0% range. Historically, carbon flexibility has been an inherent part of the MIDREX® Process. Plants have been able to generate whatever carbon content the meltshop operators wanted, with the exception that HBI plants have an additional restriction due to their limitation on minimum discharge temperature.

There have been short periods of high carbon production, plus 3.0 percent, but not sustained and not with bustle gas temperatures greater than 950°C. This is the direction that is currently being investigated by Midrex. We believe that we have the tools available in our current designs to achieve stable carbon levels greater than 4.0 percent. On the next page are six graphs that summarize the projected effects of increased carbon on plant performance.



Standard flowsheet

Transition Zone Addition

The approaches available to the plants to achieve the higher carbon levels are primarily increased natural gas additions in the transition zone and/or in the enrichment. We know that plants can achieve significant increases in carbon by increasing the transition zone natural gas additions, but at the expense of reduction

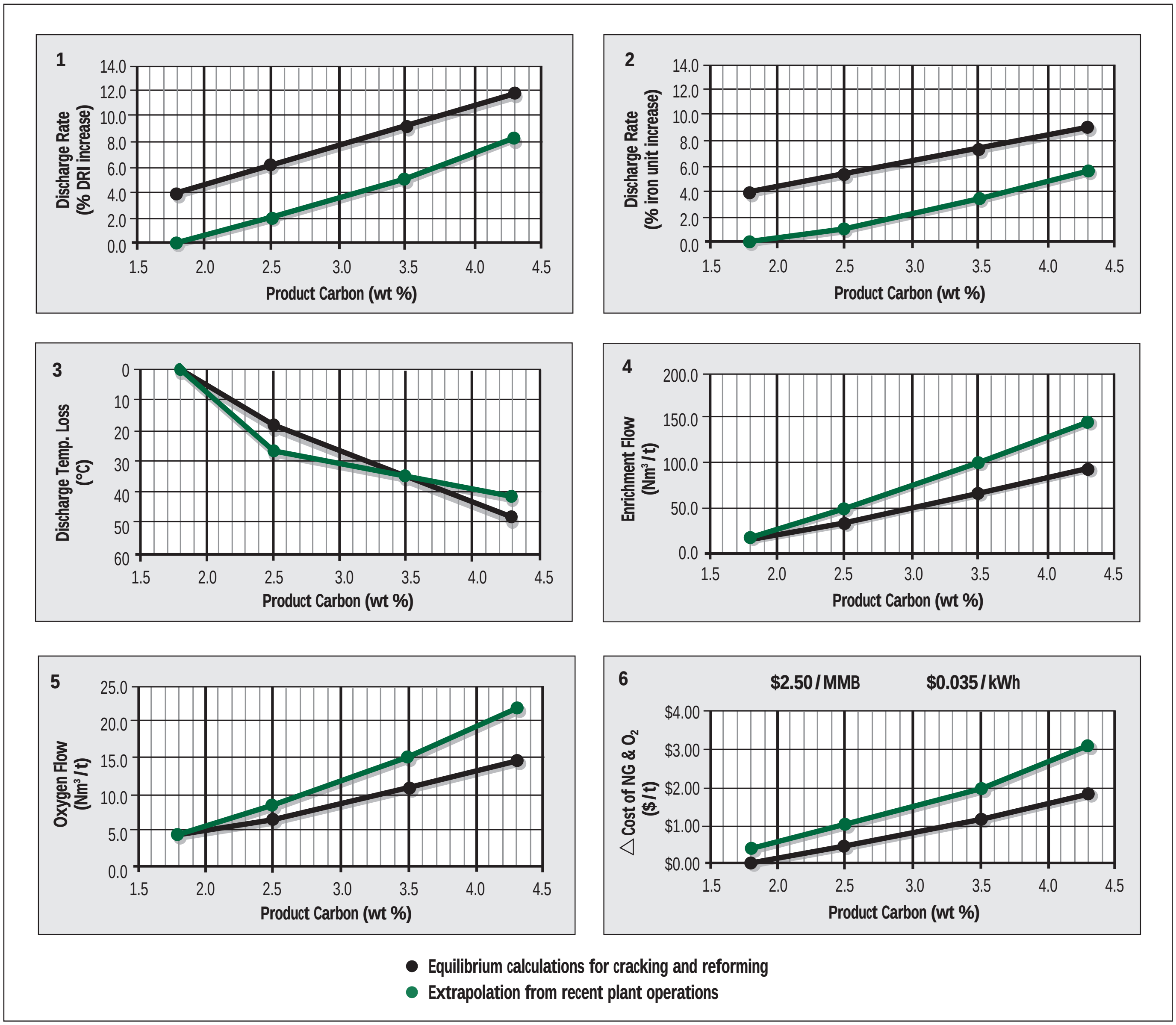


Figure 1 Projected/Actual effects of increased carbon on plant performance

zone center bed temperatures. This can be a major limitation to maintaining production in cold discharge plants and maintaining temperature in hot discharge plants. Between 50 percent and 70 percent of natural gas added to the transition zone will typically be cracked to generate carbon in the DRI.

Enrichment Addition

Historically, there has been an observed barrier in maximum enrichment at about 5 percent. We believe that with the use of oxygen enrichment and later reformer augmentation, this barrier will disappear. The major area of study has involved how to achieve higher carbon through an increase in enrichment in conjunction with oxygen injection to provide additional energy in the burden. The graphs shown above in Figure 1 depict our estimates of where we think plant operations will end up under the new conditions. These graphs display the results of two studies.

The resulting range of enrichment percentages varied from a low of 3.0 percent to a high of 11.25 percent and the operation modeled utilized transition zone natural gas and oxygen injection in support of the higher enrichment.

Conclusion

The interest that seems to be surfacing for higher carbon levels in DRI/HBI can have as many answers are there are DR plants. The specific cost and availability of natural gas and oxygen in each plant will determine the feasibility of increasing carbon above current levels. Certainly, very few plants have the capability of delivering the specific flows of oxygen and natural gas that would be required to achieve the highest levels of carbon.

We remain convinced that with minimum improvements, higher carbon levels are certainly within the capabilities of any MIDREX Plant.

Recent Business Developments Highlight 10th Anniversary at Professional Services International, Inc.

Since it was incorporated ten years ago, Professional Services International, Inc. (PSI) has capitalized upon its project procurement experience to broaden its business focus well beyond its original charter. Originally created from the Purchasing Department of the Midrex Direct Reduction Corporation, PSI's initial mission was to render project purchasing services to Midrex and Kobe Steel, Ltd., provide aftermarket sales of replacement equipment and parts to MIDREX™ Direct Reduction Plants, and provide Technical Field Support Services.

As the needs of their clients changed, PSI remained flexible enough to allow them to change in order to better serve the needs of their customers. Today PSI's services have branched out into several other fields, broadening its business focus and developing other business opportunities.

PSI's current business focuses on the following areas:

1. Comprehensive procurement services in support of Midrex and Kobe Steel, Ltd. projects
2. Long-term procurement assistance for clients operating MIDREX Plants and other industrial facilities
3. Construction, start-up and ongoing technical support services for Midrex projects and plants
4. Aftermarket sales support for MIDREX Plants and other industrial facilities
5. Ocean and air freight forwarding and logistics services
6. Manufacturers' representation of industrial products.

PSI – The Core Business

PSI was formed ten years ago when the Purchasing Department of Midrex Direct Reduction Corporation was developed into its own corporation. Since that time, PSI has purchased over $175 million worth of spare parts and equipment for industrial plant applications. One of PSI's first customers, OPCO, a MIDREX™ HBI Plant, located in Puerto Ordaz, Venezuela, recently renewed its long-term purchasing service contract. Under this renewed three-year contract, PSI will continue to provide all United States purchasing and procurement services for OPCO through the year 2002. OPCO and PSI have had ongoing purchasing and procurement contracts in place since the companies were formed in 1990. Since the original contract was signed, PSI has processed nearly 10,000 purchase orders for OPCO, with a combined value of over $50 million.

PSI has also renewed its long-term purchasing service contract with COMSIGUA, another MIDREX HBI Plant, also located in Puerto Ordaz, Venezuela. PSI provided all of the procurement services during construction of this plant, which was completed in 1998. With its new contract in place through the year 2001, PSI will continue to provide purchasing services and supply spare parts and equipment to keep COMSIGUA operating smoothly.

There is such a concentrated demand for PSI's services in Latin America that it has operated a branch office in Caracas, Venezuela, since 1994. Professional Services International, Sur America, S.R.L. supports PSI's efforts in Latin America and also provides manufacturers' representation for several companies in the area.

This year will also complete the third year of a contract with American Iron Reduction (AIR), a MIDREX Plant in Convent, Louisiana. Under the current agreement PSI serves as an Integrated Spare Parts Supplier for AIR. In this role, PSI works with local vendors and suppliers to maintain in-plant parts supplies, as well as periodic capital equipment purchasing. This type of customer relationship was developed to match the needs of the customer, and is an example of the different roles PSI is willing to assume.

In addition to purchasing on a contract basis, PSI is the aftermarket supplier of equipment, parts and services to many MIDREX Plants and other third-party companies around the world. The Direct Sales division of PSI has a solid history of timely equipment supply in urgent situations and of meeting particularly difficult procurement needs that, if not handled in a timely manner, could affect plant operations. More than $50 million worth of equipment and parts have been purchased through PSI's Direct Sales Department since 1990.

One of PSI's largest customers is its parent company, Kobe Steel, Ltd. PSI serves as the North American center of the Procurement Department of Kobe Steel's Engineering Company. In this arrangement, PSI provides purchasing and procurement services in North and South America for Kobe Steel's Engineering Company, and provides purchasing support for Kobe Steel's manufacturing facility in Takasaga, Japan. PSI has procured over $115 million worth of equipment and parts for Kobe Steel Projects and manufacturing facilities since assuming this role in 1990.

Although procurement and aftermarket sales currently represent the majority of PSI's business, its expertise reaches into many other areas. PSI also provides freight forwarding/logistics services, field services personnel and product representation support for industrial equipment manufacturers.

Field Services

As the leader in Technical Field Services for MIDREX Plants, PSI also serves other industries such as steel, mining, petrochemical and construction. In its ten-year history, PSI has provided over 1,800 man-months of industrial field service personnel to clients in Qatar, Venezuela, Japan, Russia, Argentina, India, Malaysia, and Mexico. Field services include qualified personnel for positions such as construction supervision, start-up assistance, plant operation and maintenance.

Forwarding Services

Forwarding Services International, Inc. (FSI) was formed in 1998 as a wholly-owned subsidiary of PSI. The formation of FSI is an example of how PSI has expanded its business charter to become more of a "full service" provider. Through the formation of FSI as a subsidiary, PSI could control the procurement process from design to delivery, without relying on third-party involvement. FSI is licensed by the Federal Maritime Commission as a freight forwarder and NVOCC (non-vessel Operating Common Carrier), and has achieved certification from the International Airline Transportation Association (IATA). Thus far, FSI has shipped materials to nearly 20 countries around the world.

Recently, FSI has signed a cooperation agreement with Kobelco Logistics, Ltd. (formerly Shinko Kaiun), located in Japan. Under this agreement, FSI will serve as Kobelco Logistics' agent in North

COMSIGUA

America, and Kobelco Logistics will serve as FSI's agent in Asia. This agreement will be mutually beneficial by exposing both companies to new, worldwide markets.

Product Representation

One of the most significant developments in PSI's business is the recent appointment by GAI-Tronics to be its Sales Representative for North and South Carolina, USA.

GAI-TRONICS®
A Salient 3™ Company www.gai-tronics.com

GAI-Tronics, located in Mohnton, PA, is the preeminent manufacturer of industrial-grade communications systems in the United States. GAI-Tronics was founded by Gilbert Associates, Inc. to service the power-generating industry, and is now owned by Salient 3 Communications, Inc. The good name of GAI-Tronics in the heavy industries sector will be used as a launch pad as PSI looks to develop other sales representation agreements with quality manufacturers.

This new business adds to PSI's product representation line, where they have been representing bearing products for Maschinenfabrik Joseph Eich KG since 1995. Eich is a manufacturer of high-temperature, flexible roller bearings used in the steel industry as well as other industrial applications.

OPCO

Conclusion

As PSI celebrates its tenth anniversary, it continues to position itself for even greater growth in the twenty-first century. Through its subsidiary companies, supplier agreements, professional staff, manufacturers' representation line, and developing e-commerce initiatives, PSI intends to become the ultimate full-service provider of purchasing and procurement services.

MIDREX™ Direct Reduction Plants

1999 Operations Summary

When 1999 began, the attitude in the world steel industry was less than optimistic. Steel and metallics prices and production were at the lowest levels in over a decade and steel demand off significantly. As the year unfolded, the industry turnaround progressed faster than most people expected, with steel demand increasing and prices rebounding back to healthy levels. This quick turnaround helped DRI producers through a difficult year.

For 1999, world DRI production increased over four percent compared to 1998. MIDREX™ Plants set 12 annual production records and 16 monthly production records. SIDOR's MIDREX I Plant set an annual production record of over 650,000 tons, exceeding its previous best by over 200,000 tons. This improved performance can be credited for the most part to the new management team that has been operating the plant since early 1998.

Another tool that is becoming more important to MIDREX Plants is oxygen. More MIDREX Plants are experimenting with increasing production by using oxygen to increase bustle gas temperatures.

Helping to boost 1999 production, two MIDREX Plants successfully began operation, each of them a first-of-a-kind.

In July 1999, Caribbean Ispat, Ltd. (CIL) commissioned its 1.36 Mt/y MIDREX Stretch MEGAMOD™, referred to as DR3. Producing nearly 600,000 tons in 1999, DR3 is expected to produce approximately its guaranteed capacity in 2000. The majority of the DRI produced will be consumed within the Ispat family of steel mills with excess product sold on the merchant market.

In August 1999, Saldanha Steel's MIDREX Plant began operations and became the first direct reduction facility to use COREX® Offgas as reducing gas. Combining these different processes has made this an especially challenging start-up. Just over 200,000 tons of DRI were produced by the MIDREX™ Shaft Furnace, whose performance continues to be one of the most consistent and reliable components of the new steelmaking facility. In 2000, Saldanha Steel expects the MIDREX Shaft Furnace to produce around its capacity of 804,000 tons.

ANDSK II

CIL DR3

For the 13th consecutive year, MIDREX Plants accounted for over 60 percent of the world's DRI production.

Following are highlights from selected MIDREX Plants and their performances.

ANSDK

Alexandria National Steel Company (ANSDK) enjoyed impressive production from both of its MIDREX Plants. With over 90 percent availability, ANSDK I produced over 800,000 tons. ANSDK II was one percent shy of setting an annual production record in its second year of operation. With 95 percent plant availability, ANSDK II produced over 860,000 tons of DRI. In the first quarter of 2000, ANSDK started up its third MIDREX Plant, with a capacity of 800,000 t/y.

Caribbean Ispat Ltd.

CIL celebrated the start-up of its latest and largest MIDREX Plant in July when the 1.36 Mt/y MEGAMOD, referred to as DR3, produced its first DRI. Although the start-up of the facility was delayed due to market conditions, production has been solid and the plant produced nearly 600,000 tons in 1999, setting both annual and monthly records.

COMSIGUA

In September of 1999, COMSIGUA reached two milestones simultaneously. As it passed the one million ton mark, it also reached its annual capacity within its first 12 months of operation. An availability level of over 90 percent was one of the factors that helped COMSIGUA make such a noteworthy achievement. COMSIGUA set an annual record of nearly one million tons and also set a monthly record of over 95,000 tons.

In late 1999 COMSIGUA ran tests producing HBI with high levels of carbon. Carbon levels in excess of 2.5 percent were achieved in the test batches which were performed at a customer's request. The product was later shipped to a customer in North America.

Corus Mobile

Formerly known as Tuscaloosa Steel and Mobile DRI, both of Corus Mobile's Modules set annual and monthly production records. Module I produced near capacity, producing around 400,000 tons for the year, while Module II set an annual production record with over 325,000 tons of DRI produced for the year. Late in the year each module produced around 45,000 tons to set new monthly production records.

Essar Steel

At Essar Steel, Modules I and II each took short shutdowns for expansion and all three modules achieved solid performance. After expanding its reformer early in the year, Module I set a monthly record by producing over 62,000 tons. Module II also took an expansion shut-down towards the end of the year for work on its reformer. Early in the year, Module III was retrofitted with a system to allow hot charging. This system allows Essar to transport hot DRI (HDRI) to its meltshop using pallet transporters and charge the material hot to the EAF's. After analyzing the success of the project, Essar will decide if the other two modules will be retrofitted with the system at a later date.

Georgetown Steel

For the seventh consecutive year Georgetown Steel's MIDREX Plant exceeded capacity with over 450,000 tons of DRI produced. All of Georgetown's product was consumed in its meltshop.

Hadeed

Despite the market downturn, two of Hadeed's three MIDREX™ Modules produced above capacity. Module C set a monthly production record by producing over 80,000 tons of DRI in December. This is the sixth consecutive year that Module C has exceeded its capacity of 650,000 t/y.

IMEXSA

For the second straight year, IMEXSA's MEGAMOD produced over 1.5 Mt of DRI. Running just one percent short of its annual record set in 1998, IMEXSA averaged nearly 200 tons per hour in 1999.

Ispat Industries, Ltd.

Ispat Industries produced over 1.1 million tons of DRI in 1999. Ispat Industries' MEGAMOD has exceeded capacity every year since beginning operations in 1994. The Ispat Industries' MEGAMOD operated over 8,100 hours in 1999.

Ispat Sidbec

Due to the market downturn Module I at Ispat Sidbec was shut down for most of the year. Module II experienced a solid year of production, less than four percent shy of its previous annual record.

Khouzestan Steel

The three modules at Khouzestan operated at their combined capacity. Module II set a monthly record in December by producing over 45,000 tons.

LISCO

LISCO's Module IA set an annual production record reaching nearly 500,000 tons in 1999, beating its previous record which was set in 1993. Module II set an annual record as well as a monthly record, producing just under 60,000 tons in December.

Sidor

Saldanha

NISCO

NISCO experienced a good production year with records set by three of its five modules. Module C set both annual and monthly records, producing over 62,000 tons in December, and over 550,000 tons for the year. Module D set an annual record by producing over 480,000 and also set a monthly record in May, with nearly 60,000 tons of DRI produced. Module E set an annual record, producing over 600,000 tons for the second consecutive year, beating its previous record by a few hundred tons.

Oskol Electrometallurgical Combinat (OEMK)

Three of OEMK's four modules exceeded capacity and combined they produced at 108 percent of their rated capacity. Module IV set annual production record with just under 475,000 tons. Module I produced nearly 45,000 tons in December to set a new monthly record. Consistent production of DRI with metallization around 96 percent demonstrates the skill of the operators at OEMK.

Operaciones al Sur Del Orinoco (OPCO)

OPCO used the market downturn as an opportunity to take an extended maintenance shutdown. During this downtime it added a double bustle system and thin wall refractory to its MIDREX Shaft Furnace. After restarting the plant, OPCO produced over 775,000 tons of HBI, most of which was shipped to the North American market.

QASCO

QASCO experienced another good year, producing over 650,000 tons of DRI. QASCO is producing a 95 percent metallized product and is currently investigating plans to construct additional DRI capacity.

Saldanha Steel

In June 1999, the MIDREX Plant at Saldanha Steel became the first direct reduction facility to use the offgas from a COREX ironmaking plant as the reducing gas to make DRI. In the first six months of operation over 250,000 tons of DRI were produced. All of the DRI made at the facility will be consumed in Saldanha Steel's meltshop.

Siderurgica Del Orinoco C.A. (SIDOR)

SIDOR's DRI facilities experienced a good year, setting one annual record and three monthly records. Module I produced over 650,000 tons to beat its previous record by nearly 200,000 tons. The sharp increase in production can be credited to the new management team, which has been in place since late 1998. SIDOR I also set a monthly record by producing nearly 65,000 tons in September.

Modules II B and II C also set monthly records late in the year, each producing around 60,000 tons.

VENPRECAR

This was another outstanding year for VENPRECAR as it set a monthly record by producing over 80,000 tons of HBI in July. VENPRECAR nearly broke its annual record, coming within one percent of their previous goal set in 1996.

Midrex and PSI Complete Move to New Offices

On March 20, 2000, Midrex Direct Reduction Corporation and Professional Services International, Inc. (PSI) officially opened their new offices at Lake Point Plaza in Charlotte, North Carolina. The move, which brought the two companies together in the same location, allowed them to consolidate many administrative and corporate functions, as well as increasing inter-company communications and enhancing service to our clients.

The first floor of the new building will house Midrex Enterprises Inc. (MEI) and PSI. The second floor will house Midrex Engineering, Marketing & Sales, Projects and Technical Services departments.

Phone numbers will remain the same, and a new number has been added for the Engineering and Technical Services Department (see below). The Marketing & Sales and the Projects Departments will retain the existing fax number.

The new mailing address for Midrex and PSI is:

Midrex Direct Reduction Corporation/
Professional Services International, Inc.
2725 Water Ridge Parkway, Suite 100
Charlotte, NC 28217, USA

MIDREX Contact Information:
Phone: 704/373-1600
Fax: 704/373-1611
(Marketing & Sales/Projects)
704/373-0804
(Engineering/Technical Services)
E-mail: info@midrex.com
Website: www.midrex.com

PSI Contact Information
Phone: 704/357-3311
Fax: 704/357-3318
E-mail: moreinfo@psiworldlink.com
Website: www.psiworldlink.com

Midrex's new headquarters

MIDREX Announces Organizational Changes

Winston Tennies, President - Midrex Enterprises, Inc. (MEI), announces the following changes to the Midrex Direct Reduction Corporation (MDRC), Professional Services International, Inc. (PSI), and MEI organizations, effective April 1, 2000. The following changes are designed to improve the overall efficiency of the Charlotte operations of MEI and focus on developing new business opportunities.

Midrex Adds Business Development Group to Marketing & Sales Department

One of the most important responsibilities of our company is developing new business opportunities. To create greater focus on the identification and pursuit of new business opportunities, a Business Development Group will be created under the leadership of *Greg Hughes, Director of Business Development*. Since this group will have a strong commercial emphasis, Greg will report to *Frank Griscom, Vice President Marketing & Sales*.

Reporting to Greg will be the following Product Managers:

Sara Hornby Anderson,
Product Manager - Steelmaking/Melting

Glenn Hoffman,
Product Manager - New Melting Technology & Alternate Iron Applications

James McClelland,
Product Manager - FASTMET/FASTMELT

Stephen Montague,
Product Manager - Gas-Based DR and HOTLINK

The Product Managers are responsible for identifying new markets and/or applications, preparing business plans for entry into new markets, and managing the implementation of the business plans.

Organizational Changes in Marketing and Sales Department

Frank Griscom announces the promotion of *John Kopfle to Director, Marketing and Planning*. In this position John will assume responsibility for business and strategic planning for Midrex Direct Reduction Corporation and the entire MEI family of companies.

Shared Services to be Consolidated Under MEI

The accounting, human resources, information technology and administration functions of MDRC and PSI will be combined into a shared functions department, reporting to *John Lowe, Vice President-Administration* in MEI, who will transfer to MEI from Midrex. *Bill Dagit* will continue in his assignment as MEI *Vice President-Finance*. This shared-functions department will provide services to all Midrex Group companies in Charlotte.

Midrex Introduces HOTLINK™ System for Hot Charging of DRI to EAF's

Reliable, Low Maintenance, Gravity-Based System

Midrex Direct Reduction Corporation has completed the development and is actively marketing HOTLINK, the latest performance-enhancing option available for the MIDREX® Direct Reduction Process. This new system allows for hot direct reduced iron (HDRI) to be gravity fed from a MIDREX™ Shaft Furnace to an adjacent EAF at temperatures exceeding 700°C. Several industry consultants as well as EAF plant suppliers have received presentations from Midrex on the new system. As a result, the HOTLINK System has been included in specifications and/or proposals for projects in the U.S., Mozambique, Australia, and Trinidad.

This simple, reliable system, based on gravity for transportation, enables the steelmaker to benefit from the sensible heat of DRI, thereby lowering EAF energy consumption and increasing productivity. The large energy boost provided by HOTLINK has allowed steel plant suppliers to design facilities with DRI melting capacities in excess of 1.50 million tons per year. Steelmakers can utilize the adjustable carbon content of the HDRI (between 1.0 and 3.5 percent) to take full advantage of the available chemical energy in the DRI.

Midrex pioneered the continuous gravity-flow direct reduction plant design, as well as the hot discharge furnace feature. MIDREX™ Plants that produce HBI routinely charge HDRI (>700°C) by gravity to briquetting machines. Currently there are eight MIDREX™ HBI Plants in operation around the world, which produced over 5 million tons of HBI in 1999.

First Commercial Application of OXY+™

The first commercial application of Midrex's new partial oxidation technology, OXY+, is scheduled to start-up in July/August of this year. OXY+ can be easily added to any gas-based DR process in order to increase production and product quality. Plant operators can achieve greater flexibility and higher production levels through the generation of additional reductants (H_2 + CO) and increasing bustle gas temperatures.

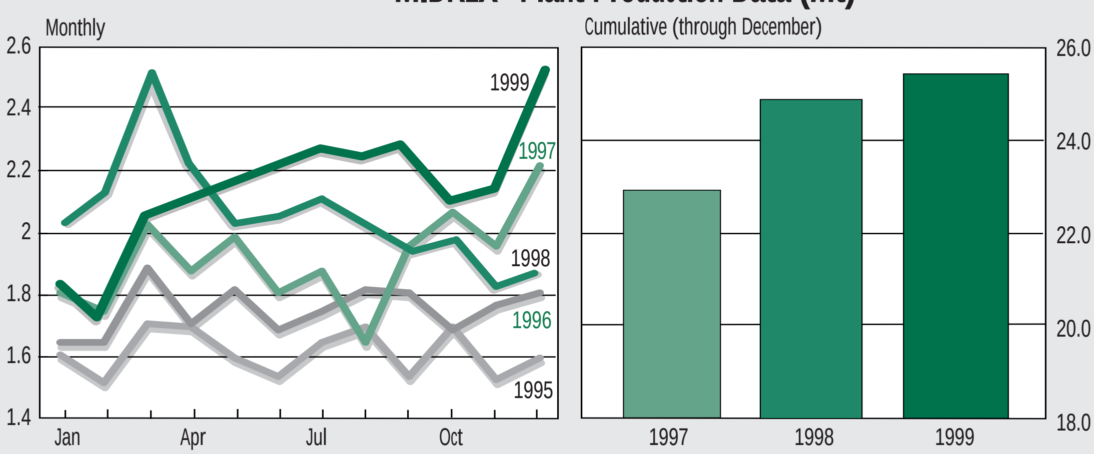
The advent of oxide coating has enabled MIDREX™ Plants to operate at higher temperatures, up to and possibly exceeding 1000°C, greatly increasing furnace capacity. OXY+ uses oxygen and a gaseous hydrocarbon to produce a synthesis gas at higher temperatures than conventional reforming. This gas is combined with the gas produced in a MIDREX™ Reformer before it is introduced to the MIDREX™ Shaft Furnace. The oxygen required for the OXY+ System is often available on-site since many direct reduction plants are captive to a steel plant with an air separation unit installed.

First Commercial FASTMET® Plant Nears Completion at Hirohata

In the last issue of *Direct From Midrex* Kobe Steel announced the sale of the first commercial FASTMET™ Plant to Nippon Steel. Construction work on the Nippon Steel's FASTMET Plant in Hirohata, Japan, was completed one month ahead of the original schedule. Commissioning and start-up activities are under way for the 192,000 t/y facility, which will process steel wastes into a highly metallized form of DRI. This will be the world's first commercial-scale FASTMET Plant. DRI produced by the plant will be used in Nippon Steel's SMP (Scrap Melting Process).

Midrex and Kobe Steel are actively developing additional FASTMET and FASTMELT™ projects around the world.

MIDREX™ Plant Production Data (Mt)



Note:
1999 data contains estimates for plants whose data is unavailable at time of publication

DIRECT FROM MIDREX

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Midrex Direct Reduction Corporation
2725 Water Ridge Parkway, Suite 100
Charlotte, NC 28217
USA

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