DIRECT FROM MIDREX

3rd Quarter 1998

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Derek M. Sheedy
Editor

John T. Kopfle
Research/Statistics

Nancy W. Griffin
Circulation

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Graphic Design/Production

AN ISO 9001 CERTIFIED COMPANY

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

Commentary

Symbol of Quality

Bruce Kelley
Vice President
Technology & Engineering
ISO Management Representative

After many months of hard work by all of our employees, I am pleased to announce that Midrex Direct Reduction Corporation (Midrex) and Professional Services International, Inc. (PSI) have achieved ISO 9001 International Standard registration.

In late 1996, Midrex and PSI decided to seek registration to the ISO 9001 International Standard. Although a decision such as this seems simple, a great deal of thought was involved on the part of both companies. Midrex and PSI first had to figure out what we hoped to achieve from ISO registration.

With many other companies the answer is simple: to improve their market share or because their customers require it. While most of our customers are ISO 9000 registered, none of them has required us to be ISO registered before they would purchase from us.

UL REGISTERED FIRM

MIDREX CORPORATION
REGISTERED TO ISO 9001
FILE NUMBER A6299

It is not our goal to gain market share because of our ISO 9001 registration, rather, we want our market share to increase because of what we gain from becoming ISO registered — improved performance. It is our hope that by providing high-quality plants and completely fulfilling our customers' requirements in supplying those plants, there will be no reason to look elsewhere when it is time to build another module, purchase replacement parts, or perform an expansion study.

Once we decided to seek ISO 9001 registration, the next step was to choose a company with which to register. Like choosing a vendor for any product — quality is a primary issue. Since we want to be the best in our respective industries and get the most out of our efforts, it only makes sense to work with the best in the ISO 9000 registration industry. With this philosophy in mind we scouted around, performed some research, and decided to place our registration in the capable hands of Underwriters Laboratories, Inc.

A unique consideration for us was the decision to seek joint registration. Since PSI does all of the purchasing for Midrex and contracts many of the personnel used for start-up of MIDREX™ Plants, we execute projects like a single company; however, we remain two distinct and different companies. By obtaining joint registration, we have developed fully integrated procedures which ensure our two companies work together seamlessly. Both companies have the same Quality Manual and the same book of procedures to guarantee that we are always on the same page.

We approached the challenge of establishing a Quality System conforming to the ISO 9001 Standard by forming a Quality System Implementation Committee consisting of the managers of the project execution departments of PSI and Midrex.

(Commentary continued on page 5)

QUALITY POLICY

We, the employees of Midrex Direct Reduction Corporation and Professional Services International, Inc. are responsible for providing quality work and continuous improvement within the framework of our Quality System, which is based on the following principles: We will meet our customers' expectations of reliable, durable, cost-effective ironmaking facilities that start up quickly and meet or exceed design capacity. We will provide quality parts, materials, and technical support on a competitive basis to help customers maintain or enhance the performance of their plants. We will meet or exceed the requirements of the ISO 9001 International Standard.

Hot Transport – Midrex Style

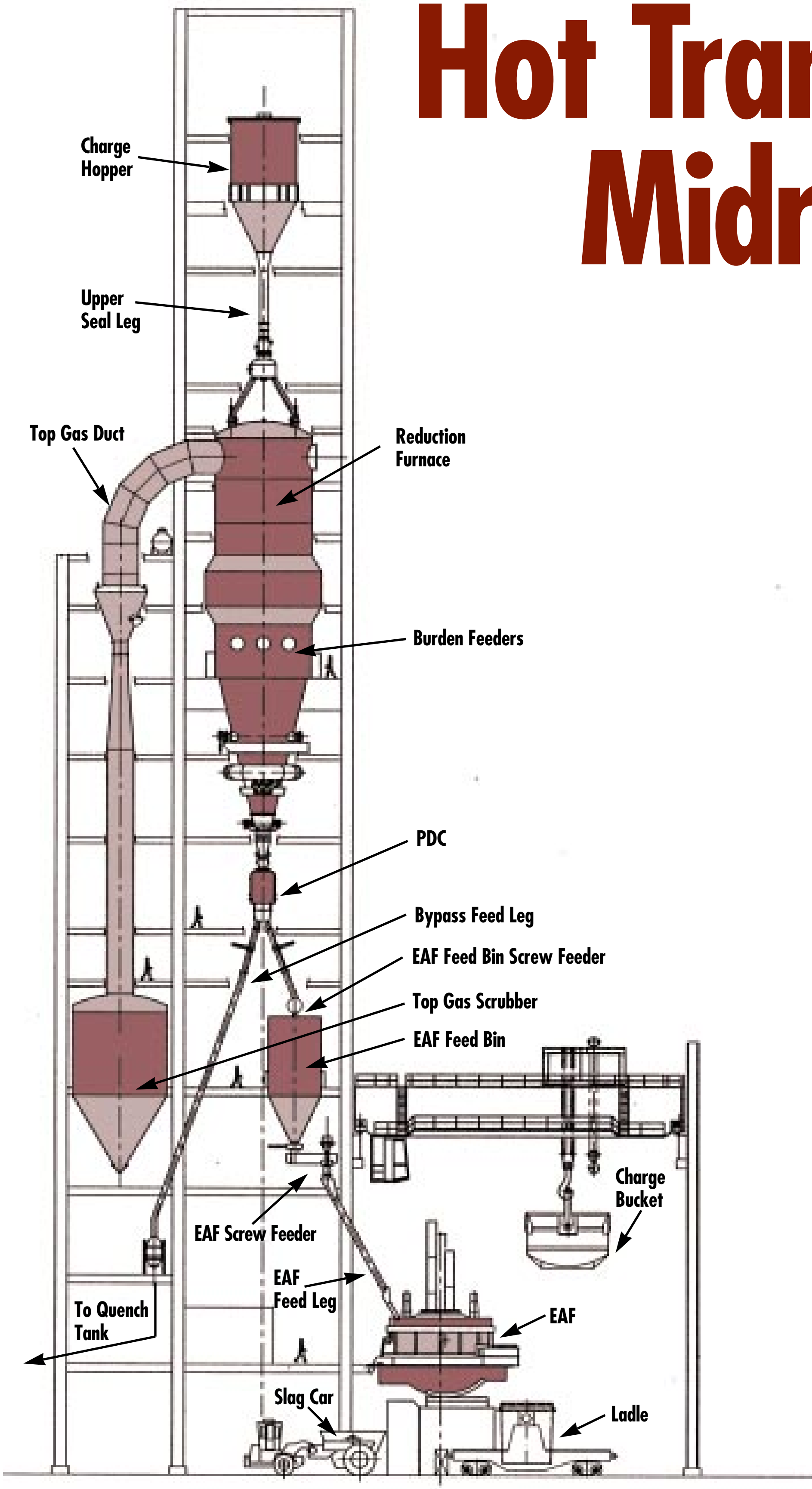


Figure 1 MIDREX Hot Charging System installed and connected to EAF Meltshop. This is an ideal situation because shorter travel time means less heat loss.

By Gilbert Whitten
Principal Engineer — Proprietary Equipment

Building a Bridge to the EAF Century

Like most engineers, those at Midrex are never satisfied with the status quo. Today, direct reduced iron is an efficient charge material for steelmaking, but can we make it even more cost-effective tomorrow?

In all existing "captive" MIDREX“ Direct Reduction Plants, a considerable amount of energy is used to cool DRI to ambient temperature before it can be transferred on rubber conveyor belts and stored in product silos. From there it travels by conveyor to the meltshop, where it is charged to the EAF, where it is then reheated and melted. This system can be compared to swimming across a river — not necessarily a bad idea, and you do get from one side of the river to the other. However, why would you swim across the river if there were a bridge? The result is the same, but swimming requires much more energy. The same can be said about charging DRI to an EAF; there is nothing wrong with charging DRI cold, but by "building a bridge" to transfer hot DRI, considerable energy is saved. Shorter tap-to-tap time leads to higher EAF productivity and reduced environmental emissions.

During the reduction of iron oxide in the MIDREX“ Shaft Furnace, the furnace burden reaches a temperature of 800 — 900 C. Using hot transfer, heat is retained and DRI is charged to the EAF at 650 C or greater. This saves energy because less electricity is required to reach the melting temperature. EAF productivity is increased by reducing the time required to heat the furnace charge, thereby shortening tap-to-tap time.

Cutting Out the Middleman

From the beginning, Midrex's philosophy has been to keep the design as simple as possible. This concept has continued with the design of the MIDREX Hot Link System. This article will cover the design for a greenfield plant to be installed adjacent to the EAF. Midrex also has designs for retrofitting existing DRI and HBI plants for hot charging, which will be featured in upcoming issues of *Direct From Midrex*.

Hot charging is best accomplished by elevating the shaft furnace above the EAF, allowing gravity to transfer the hot DRI to the EAF. Any other means of transfer requires an energy input and introduces more complications. Devices such as bucket elevators, horizontal pan conveyors, screw feeders, pneumatic conveyors, and enclosed drag chains are all acceptable ways of transferring product. However, gravity is 100 percent reliable, requires no maintenance, and is free of charge. By use of gravity, the need for energy-consuming and maintenance-intensive design features is eliminated.

Process Description

A typical MIDREX“ Shaft Furnace is used in the design of the MIDREX“ Hot Link System as shown in Figure 1 on the previous page. The furnace feed system and the reduction furnace are the same as in any MIDREX Plant. Because the product will remain hot, the cooling zone is removed and the resulting design is similar to the MIDREX“ Hot Discharge Flowsheet.

Once the DRI has been discharged from the shaft furnace at a temperature of approximately 800 C, it goes to the product discharge chamber (PDC). The PDC routes DRI to the EAF or the quench system. If the EAF is down for maintenance, the DRI will be diverted to a cooling conveyor. Once it is cooled, it is stored until the EAF is operating once again. Figure 2 details the entire MIDREX Hot Link System.

When the EAF is operating, the DRI is sent to the EAF feed bin. A screw feeder, which is located in the EAF feedleg, controls the rate of DRI discharge. This screw feeder runs at a rate based on the discharge rate of the shaft furnace.

The EAF feed bin is similar to the charge hopper found at the top of the shaft furnace; however, special insulation features have

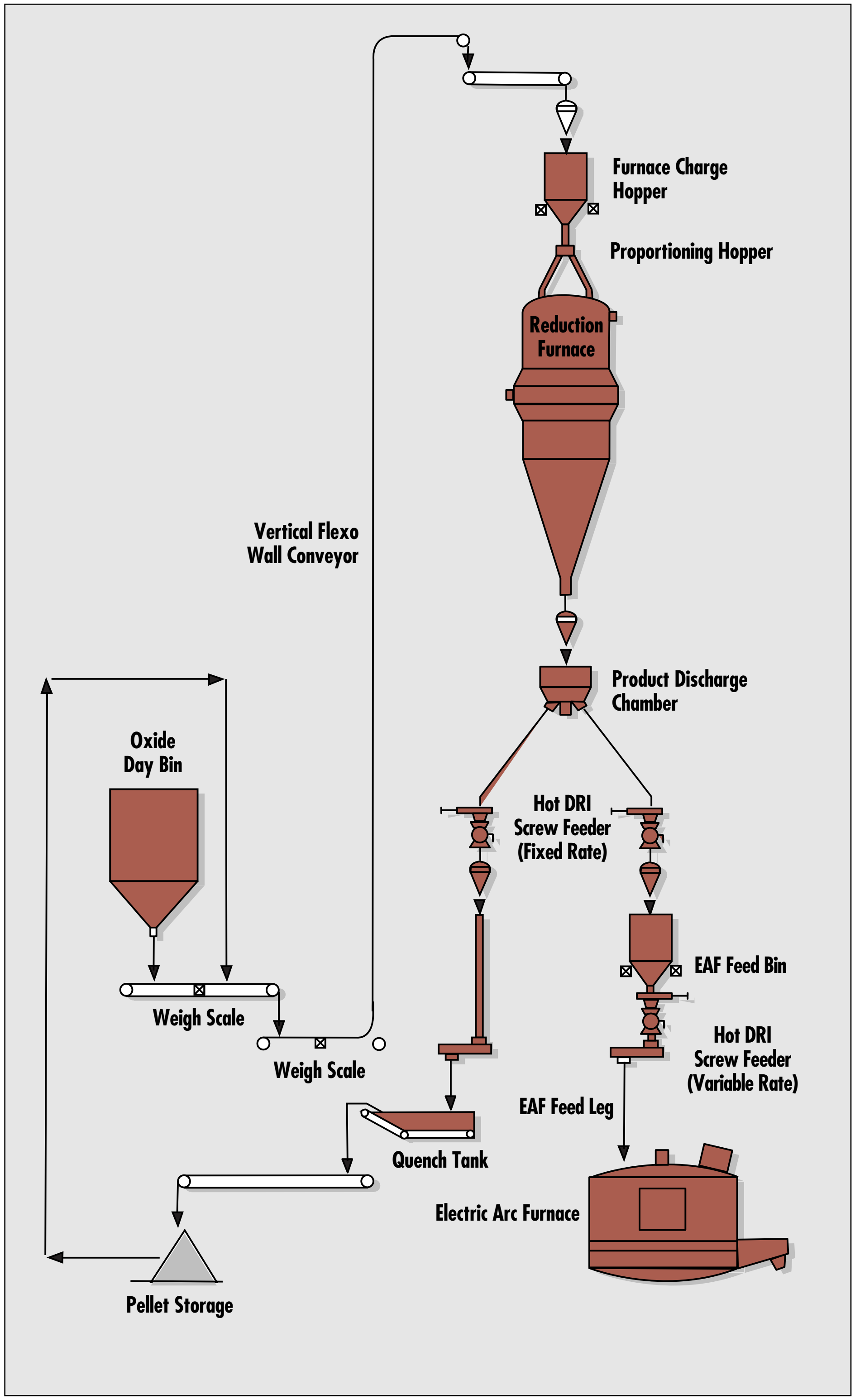


Figure 2 Hot Charging System flowchart

been added for handling hot material. Strain gauges are used to monitor the weight of the EAF feed bin. A device is installed to monitor the maximum capacity of the EAF feed bin so that a bypass chute will be opened automatically and the DRI will be diverted to the water quench system. The feed bin must be large enough to hold a full charge to the EAF, which can range from 110 to 250 tons.

The flow from the EAF feed bin is controlled by a screw feeder. Similar in design to the shaft furnace discharge screw feeder, it runs at variable speeds dependent upon the charging cycle. A charge rate of between 165 and 375 t/h will be necessary to charge from 110 to 250 tons of hot DRI during the 40 minute charge time. While the EAF is being tapped, the shaft furnace discharge screw feeder will continue to fill the EAF feed bin at its preset rate while the EAF screw feeder comes to a complete stop. This allows the shaft furnace to continuously charge the EAF feed bin instead of switching to cold discharge mode each time the furnace is tapped. Once the DRI passes through the slide gate and hot valve, it is fed by screw feeder to the EAF, where it is melted quickly.

Hot Potato

Special handling is required when handling hot DRI at temperatures up to 800 C. The product must be sealed to prevent reoxidation and the transfer device must be well insulated so the DRI is delivered to the EAF at the highest temperature possible. The feed legs of the MIDREX Hot Link System are insulated and sealed to minimize temperature loss of the DRI, as well as exposure to oxidants. Midrex has had a great deal of success with this system, and it has been used in MIDREX HBI Plants for the past 14 years.

The more heat the product loses, the smaller the benefits of hot charging. The reverse is also true: the more heat retained from discharge to charge, the greater the benefits to the producer. Lining the inside of the system with insulating material ensures that heat loss during transfer is kept to a minimum and the benefits maximized. This results in higher charging temperature, less energy required in the EAF, and shorter tap-to-tap times; all conditions which benefit the producer.

It is especially important to reduce the production of fines in order to minimize yield loss. With the use of gravity feed and elimination of most moving parts, fines are not a major issue. Midrex has kept this issue at the forefront of the design of its Hot Link System. This type and style of the feedlegs have been successful in reducing fines in previous hot discharge system plants.

Matching DRI to EAF

The EAF requires periodic shutdowns for refractory work and general maintenance. The economics of hot charging disappear if the shaft furnace must be shut down every time the EAF is worked on, or if the EAF must stop when the shaft furnace maintenance is performed. Although the two systems are linked, they must be able to function independently.

This problem is solved in the shaft furnace by installing a separate system to divert product when the EAF feed bin is full. Hot DRI is diverted to a quench system or a briquetter, thus allowing charging to the EAF at a later time or merchant sale, whichever the particular situation and market conditions warrants.

If the cold product will be charged to the EAF, it may be recharged into the shaft furnace and given a "free ride" to be reheated along the way. Since the majority of the oxygen has been removed, the recycled product will not react with the reducing gas, leaving a greater concentration of reducing gas to iron oxide feed and therefore speeding up the reaction rate.

The Bottom Line

All improvements to an iron or steelmaking operation must be evaluated with regard to their impact on profitability. The benefits will depend greatly on the mills specific characteristics and economics. A prospective buyer of a MIDREX Plant or EAF facility must assess whether hot charging of DRI makes sense. An article in the 4th Quarter 1993 issue of *Direct From Midrex* entitled "Benefits of Hot Charging DRI" describes in detail the savings associated with hot charging DRI. Based on the savings and estimated cost of the system, Midrex calculates a payback of four years under typical conditions.

For further information or for a copy of the above mentioned article, contact Derek M. Sheedy - Editor, Direct From Midrex

(Commentary continued from page 2)

Symbol of Quality

This committee reviewed and supervised all aspects of the establishment of our Quality System. Its first task was to develop the Quality Policy which is shown in the box at the bottom of page 2. This Quality Policy served as a reminder of what the Quality System Implementation Committee hoped to achieve. As procedures were developed, the acid test was to check it against the Quality Policy and make sure that the procedure was a step toward achieving our quality objectives.

We felt that we had a solid foundation to work from. Our practices already included the application of many of the elements of ISO 9001, and detailed procedures had been established many years ago. But there was room for improvement. While we utilized all the positive features from our old procedures and retained all of our beneficial practices, we ended up rewriting all of our procedures. This gave us the opportunity to rebuild and customize the procedures without reinventing them. However, several of the elements, such as internal auditing, and formal, documented corrective action had to be developed from scratch. We expect that by establishing our Quality Policy and by implementing our new procedures there will be a positive impact on what our companies do and what we have to offer to our clients.

Midrex and PSI take great pride in our reputations. By achieving ISO 9001 registration, we feel that we have ensured that our performance will continue to enhance our reputation. As each and every one of our employees deserves the credit for their efforts and the hours, days and months they spent working towards developing our new Quality System, it is not yet over. Establishing the system is only half the battle, now we must continue to live up to the new standards that we have set. By displaying our "symbol of quality," we remind ourselves that the tasks we perform to meet our clients needs each day are not just individual solitary actions, but instead are links in a larger chain which reinforces the Midrex and PSI tradition for quality.

1998 DRI MARKET REPORT

Pumping Iron

Year	Total	Year	Total	Year	Total
1970	0.79	'80	7.14	'90	17.68
'71	0.95	'81	7.92	'91	19.32
'72	1.39	'82	7.28	'92	20.51
'73	1.90	'83	7.90	'93	23.65
'74	2.72	'84	9.34	'94	27.37
'75	2.81	'85	11.17	'95	30.67
'76	3.02	'86	12.53	'96	33.25
'77	3.52	'87	13.52	'97	36.18
'78	5.00	'88	14.09		
'79	6.64	'89	15.63		

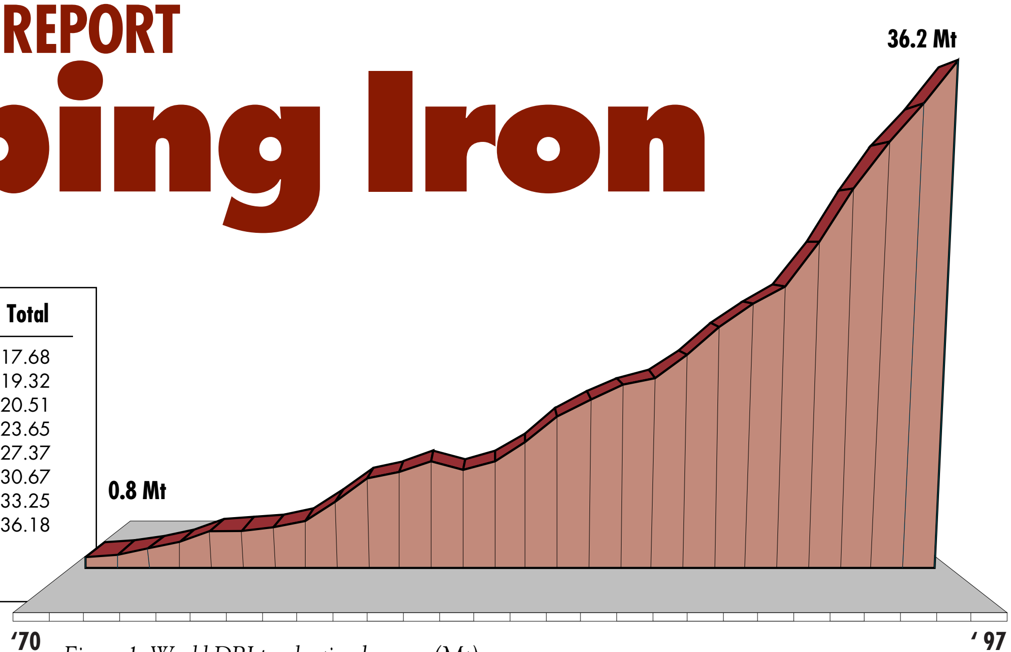


Figure 1 World DRI production by year (Mt)

By John T. Kopfle
Manager - Marketing & Planning

Since 1970, the growth in production of direct reduced iron has been tremendous, as shown in Figure 1. In 1997, world DRI production reached an all-time high of 36 Mt, and as of August 1998, 16 Mt of DR capacity was under construction. Mini-mills are the primary users of DRI and HBI and other forms of virgin metallics such as pig iron. Why are so many of them now "pumping iron"? One reason is shown in Figure 2. In the past, EAF steelmakers were not concerned about scrap prices. When they were high, steel product prices were even higher, and mills were very profitable. This is clear in the top graph, which shows how scrap and steel prices tracked closely until late 1993.

However, that relationship has changed, and scrap and steel prices now often move independently, as the bottom graph shows. Thus, mini-mills can be squeezed if scrap prices remain constant or increase while steel prices drop. This has happened two times in the last four years.

To provide some protection against this situation, many mini-mills are taking control of their charge material situation by building DRI plants, off-taking DRI or HBI, buying pig iron, or purchasing scrap processing facilities. These steps allow them to have some price

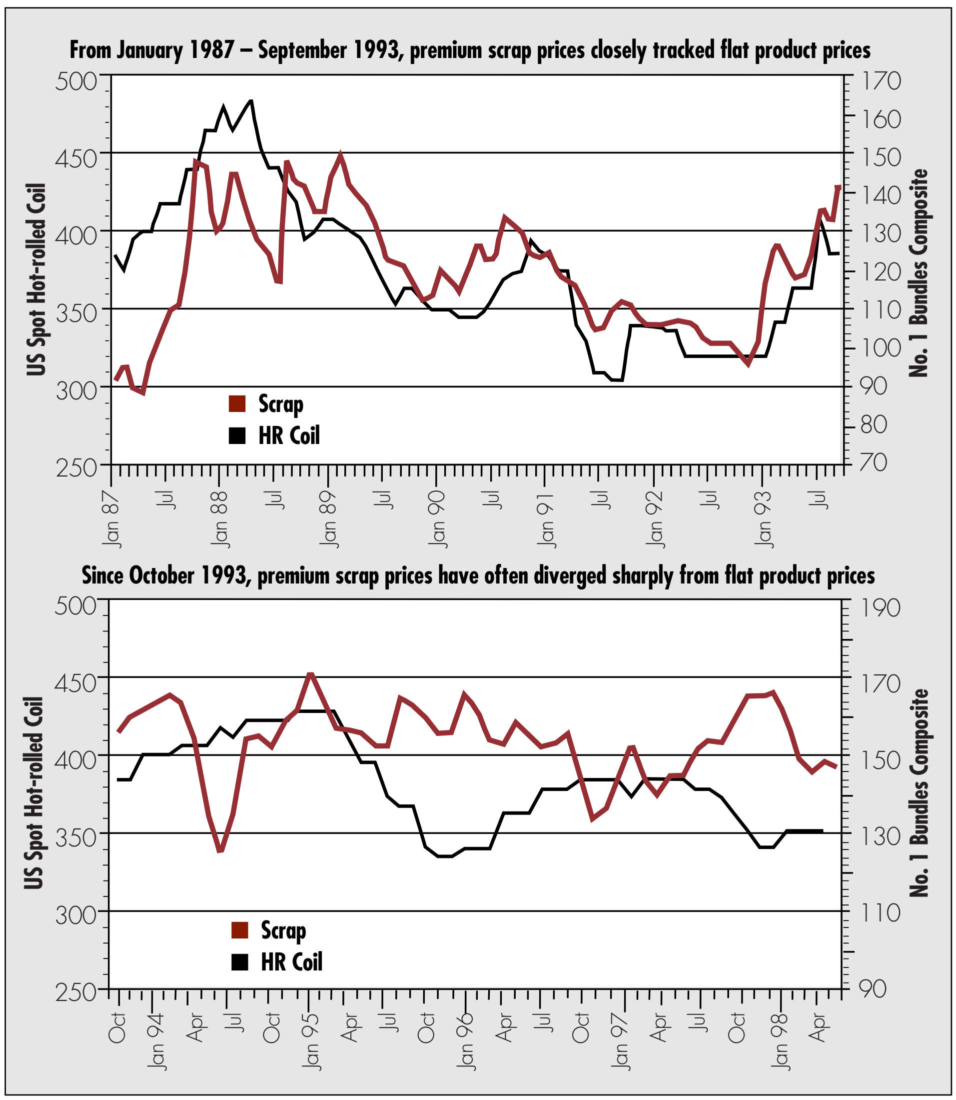


Figure 2 US scrap and steel prices ($/t)

security for a part of their feed mix.

US pig iron imports have increased in the last five years. In late 1993, when scrap prices rose sharply, mini-mills began buying pig iron from Brazil and Russia. Previously almost all US imports were for foundry use. This action had the desired effect and scrap prices were capped. Due to the growth of EAF capacity, pig iron imports have continued at record levels, as shown in Figure 3. Given the amount of DRI and HBI and pig iron projected to be supplied to North America during the next few years, some have expressed concerns about an "over-supply." Adding to this fear, a cyclical downturn in the industry and the "Asian Flu" are causing scrap, pig iron, and DRI/HBI prices to drop. What is the real story? To provide some answers, a review of the fundamentals of the market is in order.

The main factors affecting the growth of DRI have not changed. Demand will increase due to the following:

Growth in EAF Steelmaking

Steelmaking via the EAF route will continue to grow due to its considerable capital and operating cost advantages versus the BOF route. EAF steelmaking is less capital and labor intensive, cleaner, and has lower economies of scale. The availability of scrap and reasonably priced electricity has made this growth possible. In North America alone, mini-mill capacity will increase by 20 million tons from 1995-2000.

Expansion into Higher Quality Products

The encroachment of EAF-based steelmakers onto the turf of the integrated producers is creating a shortage of low residual charge materials. Even in the US, the world's largest scrap producer, many EAF steelmakers are finding they cannot produce high-quality products, such as rod, special bar quality, and hot rolled coil, using scrap alone. Most thin slab casting mini-mills require 70 percent prime charge materials, much of which is virgin iron such as DRI, HBI, or pig iron.

Insufficient Supply of Prime Scrap

Due to the requirements of EAF producers and increases in manufacturing efficiencies, there will be insufficient prime scrap available. Pressure will be put on the low residual scrap supply due to the ongoing expansion of mini-mills into high-quality products. In 1980, purchased scrap represented 52 percent of total US scrap use. It now exceeds 65 percent. Since late 1993, scrap prices have remained high relative to historical levels, as shown in Figure 4. This resulted from the supply/demand situation.

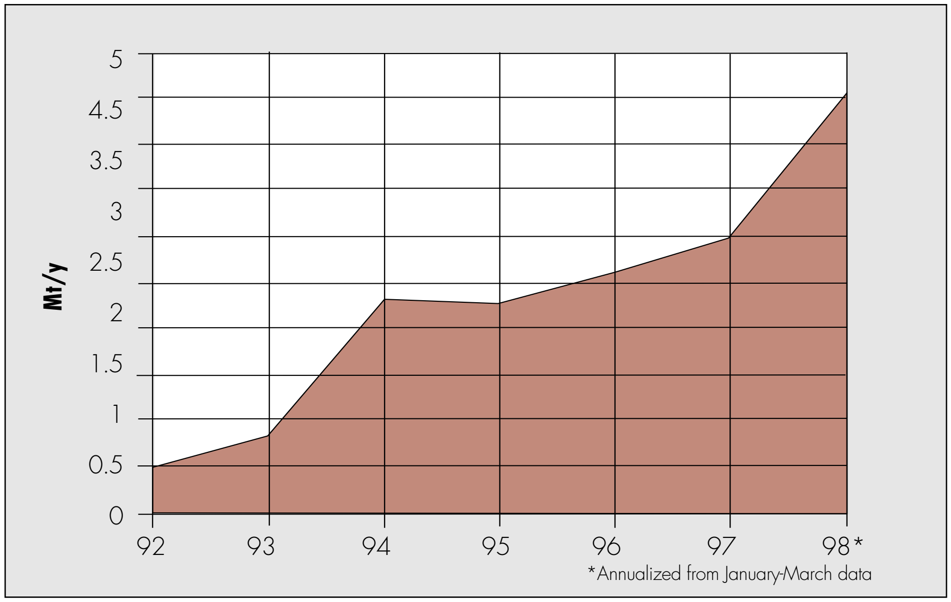


Figure 3 US pig iron imports (1992 — 1998)

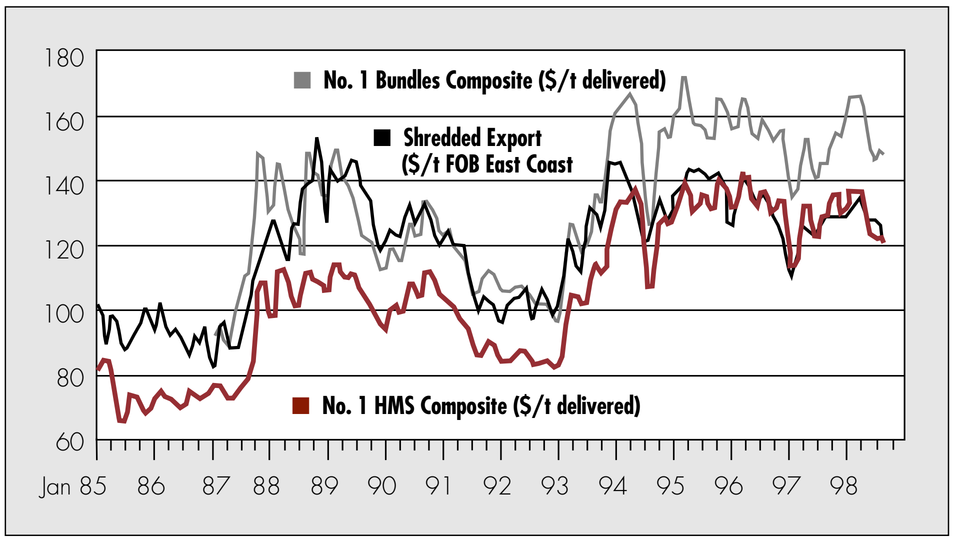


Figure 4 US scrap prices

Likely Drop in Pig Imports

Although imported pig iron has provided a major source of low residual charge material for North American mini-mills, there is a good chance imports will decrease in the future. Reasons include: 1) Environmental pressures on Brazilian charcoal pig iron producers 2) Rationalization of Russian and Ukrainian steel industries and closure of blast furnaces 3) Recovery of Asian steel demand, thus absorbing excess blast furnace hot metal production and reducing the need to produce merchant pig iron.

Over the last 14 years, significant quantities of DRI and HBI have been sold from the MIDREX Plants of Amsteel, OPCO, VENPRECAR, Essar Steel, OEMK, Ispat Industries and Caribbean Ispat to steel mills and foundries in North America, Europe, the Middle East/North Africa, and Asia/Oceania. These sales have demonstrated that HBI, because of its low residuals content and other factors, has a value equivalent to premium-grade scrap

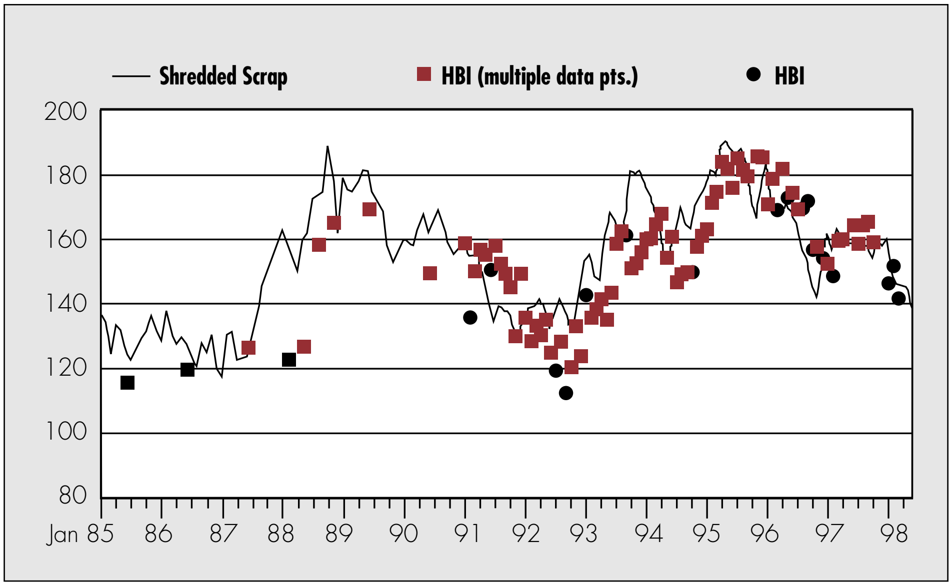


Figure 5 Asia scrap and HBI prices ($/t CIF East Asia)

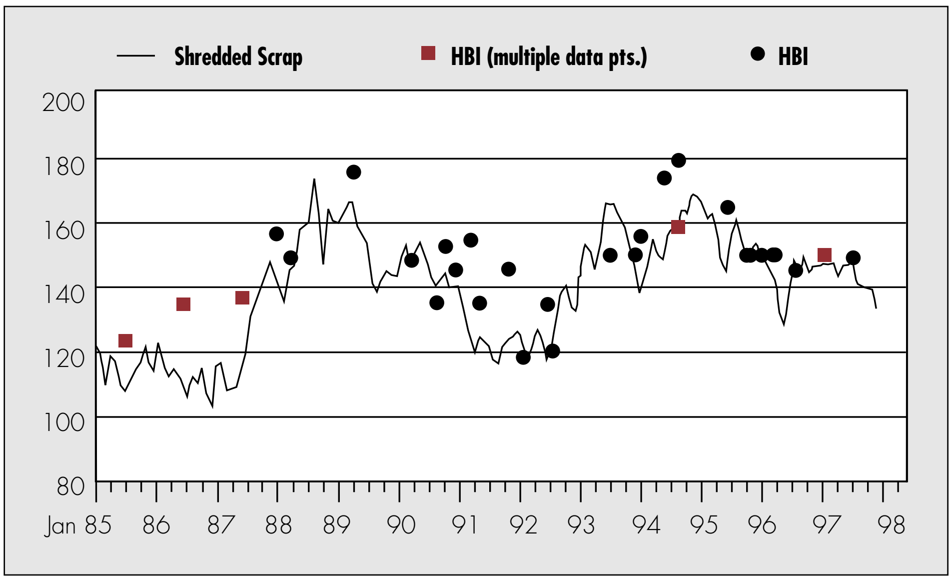


Figure 6 Middle East/Europe scrap and HBI prices ($/t CIF Mediterranean)

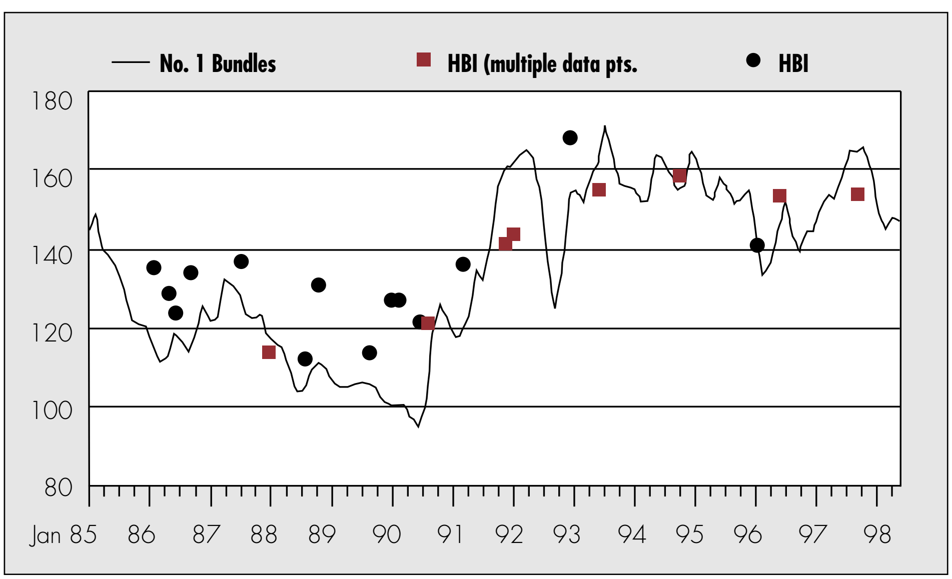


Figure 7 North America scrap, HBI and pig iron prices ($/t delivered)

for mills making low residual products such as wire rod, seamless tube, SBQ, and flat products. For mills making more common products such as rebar, the value is slightly less than premium scrap. In North America, the value is measured against No. 1 bundles/busheling. In Europe/Middle East and Asia, shredded scrap imported from the US or Europe is used for the value comparison.

Figures 5, 6, and 7 show the relationship between HBI and premium scrap prices for North America, Europe/Middle East, and Asia.

As shown in Figure 4, the No. 1 bundles composite price averaged about $155/t from 1995-97. The consensus of many knowledgeable observers is that upward pressure on scrap prices will continue and long-term the No. 1 bundles composite will remain at that level or increase. Although prices of scrap, DRI/HBI, and pig iron have dropped over the past year due to the Asian Flu, it is likely the crisis will be over within three to five years. Thus, in doing feasibility or market studies, Midrex does not assume any long-term effect on DRI/HBI demand or prices. The assumption is that a merchant supplier is in the business for the long term, i.e., 10 years or more.

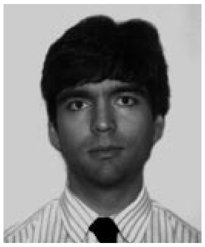
We are confident that long-term demand for DRI/HBI will remain strong, and there will be a need for more capacity. Due to the large number of plants under construction, a coming cyclical downturn in the steel industry, and the Asian financial crisis, new plant contracts and merchant HBI prices may decrease for a few years. As with any product, lower prices stimulate more demand and prices eventually recover.

Our message to merchant producers is that they are in the business for the long-term and a short-term price drop is not a reason for major concern. Given the likelihood of a market recovery in 2-3 years and the fact that it normally takes that much time from contract signing to full production, this is actually a good time to develop a direct reduction project. As with any investment, the most important question is not "how is the market now?" but rather "is the fundamental business sound and are the long-term prospects good?"

Given the growth of mini-mills and their need to continue to "pump iron," direct reduction faces a bright future.

Midrex Growth Leads to Promotions

Max Love
Manager – Process Engineering and Operations



Tony Mouer
Chief – Operations

Mike Arandas
Chief – Process Engineering

Tony Elliot
Sales Manager

Ken Joyner
Sales Development Manager

Rob Klawonn
Manager – Sales

After the busiest period in Midrex history, when there were as many as eight projects under construction at one time, many people have gained a tremendous amount of experience and knowledge of the MIDREX® Process, start-up procedures, project and process engineering.

As Midrex has always believed in rewarding its employees for a job well done we are proud to announce the promotion of the following technical personnel:

Max Love has been promoted to Manager – Process Engineering and Operations. With over 16 years experience with Midrex in Process Engineering, he has worked on field assignments at CIL I and II, Acindar, and IMEXSA. In addition, he spent four years at OPCO in R & D, Quality Assurance, and Engineering Departments. Max is a Licensed Professional Engineer in the State of North Carolina.

Tony Mouer has been promoted to Chief – Operations and will report to Max Love. Tony has worked for Midrex for eight years in Process Engineering and has worked in field assignments at Ispat Industries, IMEXSA, and American Iron Reduction (AIR). Tony was the Project Engineer for the AIR project and recently completed the QASCO debottlenecking study. Tony is a Registered Engineer in the State of North Carolina.

Mike Arandas has been promoted to Chief – Process Engineering and will report to Max Love. Mike has worked for Midrex for over two years. Prior to joining Midrex, Mike was a Process Engineer and Project Engineer for Raytheon Engineers and Constructors for six years. Since joining Midrex, Mike has worked as a Process Engineer on the American Iron Reduction and Caribbean Ispat Ltd. DR3 projects. Mike is a Registered Professional Engineer in North Carolina, Florida, and Pennsylvania.

On the commercial side of Midrex, there have been several significant changes:

Tony Elliot has joined the Sales Department as Sales Manager. Tony has over 15 years of technical experience in the operation, start-up, engineering, and construction of MIDREX™ Direct Reduction Plants. During the past four years, he has been working with the Projects Department, focusing on South American projects. Prior to joining Midrex, Tony held various technical positions at SIDERCA in Venezuela, and with Hatch Associates Ltd. in Toronto, Canada. In his new position, Tony is responsible for managing sales opportunities primarily in Mexico and South America and will report to Rob Klawonn.

Ken Joyner also joins the Sales Department in the new position, Sales Development Manager. Ken has been with Midrex for 24 years. In 1990, Ken was assigned as Project Manager for FASTMET® Process projects and development, and since then has served as Project Manager for the FASTMET™ Demonstration Plant. In his new position, Ken is responsible for locating and developing FASTMET and FASTMELT Process sales opportunities, as well as MIDREX Process projects. Ken will report to Rob Klawonn.

Rob Klawonn, Manager – Sales, has assumed overall management responsibility for FASTMET, FASTMELT, and MIDREX® Direct Reduction Process sales. Ken, Tony, and Rob Cheeley, in the position of Senior Sales Engineer, report to Rob.

Letter from the Editor

Derek Sheedy
Editor

To our readers:

I would like to take this opportunity, as the new Editor of *Direct From Midrex*, to introduce myself, for I may be a new face to many of you. Over the past five years I have worked in various marketing and sales positions, spending the last two years in the Marketing and Sales Department here at Midrex. Most of my work has been centered around various Midrex publications such as the Annual World Direct Reduction Statistics, Annual MIDREX® Plant Operations Report, and development of www.midrex.com, the Midrex website, including the on-line version of *Direct From Midrex*. I have a degree in English with a minor concentration in Business Administration from Saint Michael's College in Colchester, Vermont.

Over the years you have come to expect a lot from *Direct From Midrex*. We have set some high standards and it is my intention to maintain these high standards by providing our readers with the most accurate, up-to-date, and informative news stories and articles relating to the direct reduction industry. Covering all aspects of direct reduction is one of the distinct features of *Direct From Midrex*. In order to continue this practice, I would like to take this opportunity to solicit any comments, suggestions, or ideas for articles that you would like to see published. Input from our readers is one the characteristics that has helped *Direct From Midrex* develop to be the authoritative publication on the direct reduction industry.

I look forward to hearing from you in the future, and I hope you look forward to receiving *Direct From Midrex* every quarter of the year.

Midrex Around The World

More Progress at Saldanha Steel

Progress continues on the MIDREX™ Direct Reduction Module at Saldanha Steel's works at Saldanha Bay, South Africa. The MIDREX Module is the final production facility of Saldanha Steel's 1.25 million metric ton per year flat products steelworks that is being built adjacent to the Sishen ore port facilities at Saldanha Bay. The MIDREX Module of Saldanha Steel will utilize COREX® Export Gas for production of DRI. The COREX Export Gas is compressed and mixed with recycled DR top gas. After cooling, the mixture is sent through a pressure swing adsorption system, supplied by Linde AG, where CO_2 is removed. The gas is then reheated to the appropriate reduction temperature and fed to the MIDREX™ Shaft Furnace. Upon exiting the top of the shaft furnace, the dust-laden top gas is cleaned and cooled. Part of the DR top gas is then used as enrichment fuel to preheat the reducing gas, with the main portion being recycled. Any remaining gas is available as export gas for uses external to the ironmaking facility.

The project is expected to be completed by the end of the year with production beginning in early January. The MIDREX Module is expected to reach its capacity of 804,000 tons per year early in the first half of 1999.

Saldanha Steel's COREX C-2000 (left) and MIDREX Module (right)

COMSIGUA Starts Up

Complejo Siderùrgico de Guayana's (COMSIGUA) MIDREX® Plant is currently going through start-up procedures. The plant, located in Matanzas, Venezuela, was completed within one month of schedule. As of August 18, the first batch of hot briquetted iron (HBI) was produced, with comercial production expected to commence in the near future. The plant is expected to reach capacity by the end of August. Midrex currently has an advisory team at the plant site in order to assist in the start-up.

The 1 million ton per year merchant HBI plant is targeting markets in North America, Europe, and Asia. COMSIGUA is a joint venture comprised of Kobe Steel Ltd. of Japan, and trading companies Mitsui Inc., Nissho Iwai Corp, Shinsho Corp., Tomen Corp., and Marubeni.

COMSIGUA HBI Plant, Matanzas, Venezuela

Midrex Signs Expansion Deal With SIDOR

A consortium consisting of Midrex Direct Reduction Corporation and Techint S.A. has received a Letter of Intent from Siderurgica del Orinoco, Sidor C.A. (SIDOR) for the expansion of the MIDREX Modules A and B of SIDOR's Matanzas, Venezuela, Midrex II plant. Modifications to the heat recovery system, reformer and shaft furnace will increase the production rate of each of the two modules to a target rate of 120 t/h.

Midrex will lead the consortium and take the responsibility for process and equipment design, while Techint S.A. will be responsible for construction engineering and site project execution including construction labor, construction management, and material supply.

Module A will restart operations within 12 months with Module B restarting two months later.

There has been ongoing research into the expansion of SIDOR's overall steelmaking capacity since SIDOR was privatized in January 1998. SIDOR was purchased by the Amazonia Consortium for a total of $2.4 billion. Plans are to double SIDOR's steelmaking capacity to 6.0 Mt/y in the next five years.

PSI Forms Subsidiary — Forwarding Services International

Professional Services International, Inc. (PSI) has formed a subsidiary, Forwarding Services International, Inc. (FSI), after recently receiving a Federal Maritime Commission license. FSI headquarters and the initial operating branch are located at One Water Ridge Plaza, 2201 Water Ridge Parkway, Suite 500, Charlotte, NC 28217.

The long-term marketing focus of FSI is to provide forwarding services to industrial equipment manufacturers in North America and Europe, as well as to independent shippers. The initial customer base includes Professional Services International, Inc., Midrex Direct Reduction Corporation, and Kobe Steel Group companies, as well as other companies in the steel industry.

EMCI to Supply Ladle Furnace to Ellwood Quality Steels Company

EMC International, Inc. of Pittsburgh, PA, a sister company of Midrex Direct Reduction Corporation, has been awarded a contract to supply a second ladle furnace to be installed at Ellwood Quality Steels Company's manufacturing plant in New Castle, Pennsylvania. Delivery of the ladle furnace is scheduled for August 1998.

The ladle furnace will be capable of processing 45 ton heats of molten steel and will be designed for operation with an existing spare 8 MVA ladle furnace transformer. Equipment for the ladle furnace will include: a swing-bridge type gantry; 12 in. diameter electrode arms; a refractory-type, domed top ladle roof with a water-cooled, vertical sidewall; dry-type, lateral, exhaust-type fume collection hood; alloy additions chute; induction stirring coil support; high voltage switchgear; Level 1 control system; and EMCI's "EMARC" solid state, impedance balancing electrode regulating system.

The addition of the second ladle furnace will increase production of high-quality forging ingots by Ellwood Quality Steels to 350,000 tons per year from the present rate of 280,000 tons per year.

FASTMET® Process Commercialization Continues

Based on successful test results at Kobe Steel's Kakogawa Demonstration Plant in Japan and at the FASTMET Process Simulator at Midrex Direct Reduction Corporation's Technical Center near Charlotte, NC, Midrex and Kobe Steel are actively pursuing a contract for the first commercial-scale FASTMET® Plant. FASTMET uses coal or other carbon-containing reductants to treat iron oxide fines or steel mill waste materials in a rotary hearth furnace. A further extension of the process is the FASTMELT™ Process, which involves hot charging FASTMET DRI to an electric melting furnace for production of FASTIRON™, a high-quality hot metal. FASTIRON can be used as supplement to blast furnace hot metal, or it can be charged to a conventional EAF.

The strongest market interest now is for FASTMELT Plants to treat wastes from integrated steel mills. Those mills produce from 200,000–700,000 tons per year of wastes, and many of them have large stockpiles of wastes on site. A FASTMELT Plant allows the mill to treat the ongoing wastes, consume the pile, and produce an economical source of high-quality hot metal. This can be used to supplement blast furnace hot metal production, or in some cases, make it possible to replace a blast furnace as well.

Five offers have been made to integrated steel companies in North America and Asia, and the first contract is expected by the end of 1998.

Several of these offers are based on the BOO contract, in which MDRC or KSL would build, own, and operate the facility for the client. This provides a means to treat the wastes while relieving the host of financing, ownership, and operational responsibilities.

Kobe Steel and Midrex are continuing testwork in Japan and in the United States on alternate raw materials, including waste, alternate fuels, and improvements to the process technology.

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Midrex Direct Reduction Corporation
201 South College Street, Suite 2100
Charlotte, NC 28244
USA

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