DIRECT FROM MIDREX

2ND QUARTER 2007

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Commentary

GOING GREEN

Todd Ames
Plant Sales Manager -
Commercial Department

These days, with more emphasis on environmental issues, it seems everybody's "going green." Although industry often is criticized for polluting the atmosphere, in reality a tremendous amount has been done to reduce emissions. USA Environmental Protection Agency documents show that from 1970-2006, USA air emissions (NOx, SOx, particulates, etc.) declined a remarkable 53 percent. This reduction occurred during a time when the GDP was up 95 percent, energy use increased 48 percent and population grew 42 percent.

Midrex and Kobe Steel continue to evaluate and take steps to reduce the environmental impact of our iron making and iron using processes. The MIDREX® Direct Reduction Process is very energy efficient and air emissions rates meet World Bank standards. Emissions of CO_2 are a growing concern and iron making accounts for about five percent of the world total. The standard MIDREX Process provides a low CO_2 means for producing iron and steel. A natural gas-fired MIDREX Plant paired with an electric arc furnace (EAF) emits just one-half the CO_2 as a blast furnace/BOF facility. This is described in the article "Green Steemaking with the MIDREX Process." Additional options are possible that would provide further reductions, all the way to a facility with zero carbon emissions.

If it is necessary to use coal, the use of a coal gasifier paired with a MIDREX Shaft Furnace can help. The process has lower SOx and NOx emissions than a blast furnace and produces a nearly pure CO_2 stream that could be injected underground.

Improved energy efficiency is an excellent way to reduce emissions while decreasing operating cost. Using less energy can reduce emissions at the steel mill and in the case of electricity, at the power plant. With the use of hot DRI (HDRI) in an EAF, energy efficiency is improved. Midrex now has three options for hot charging DRI to the EAF, as described in the article "Heating Up the Bottom Line." All three solutions are being implemented in new projects starting up this year and next.

Solid wastes are an environmental concern as well. Government authorities are putting pressure on steel companies to recycle iron-bearing wastes such as electric furnace dust, mill scale and iron ore fines. Midrex and Kobe Steel offer an excellent solution with the FASTMET® Process. Employing a rotary hearth furnace and using coal as the reductant, FASTMET provides steelmakers and others the means to recover iron and other metals, such as zinc, and reduce the volume of waste to be disposed. There are three commercial FASTMET Plants operating in Japan that have successfully recycled over one and one-half million tons of wastes since 2000.

As the world increasingly goes green, Midrex will continue developing iron making and iron using technologies that minimize the impact on the environment.

MISSION STATEMENT

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

Green Steelmaking with the MIDREX® Direct Reduction Process

By John Kopfle
James McClelland
Gary Metius
Midrex Technologies, Inc.

INTRODUCTION

Worldwide, there is an increasing emphasis on environmental issues. In the area of gaseous emissions, the Kyoto Protocol has put great pressure on the industrialized countries. Under the Protocol, those countries pledged to reduce their collective emissions of "greenhouse gases" by five percent compared to 1990 levels. When compared to the emissions expected with normal economic growth, the level represents a 29 percent cut. There are six gases of interest, with carbon dioxide (CO_2) the most significant. The agreement came into force on February 16, 2005. Almost all industrialized nations have ratified the agreement, except the United States and Australia.

The steel industry is now under intense scrutiny because it accounts for five percent of worldwide carbon dioxide emissions. Ironmaking and steelmaking are energy intensive and essentially all the carbon entering a steel complex leaves as CO_2. Although the steel industry has reduced energy consumption and the concomitant emissions significantly, much more will be required.

An active market in emissions trading has developed in Europe, with $30 billion worth of CO_2 trading in 2006. Under the European Union scheme, companies in energy intensive industries, such as steel, are allowed a certain amount of CO_2 emissions. For companies over the limit or considering expansions, there are two options: purchasing credits from other producers with excess or installing production technologies with lower emissions. Since the purchase of credits involves significant financial penalties, the great promise is to incorporate "cleaner" processes, which is the focus of this paper.

LOWERING IRON AND STEELMAKING CARBON EMISSIONS

Worldwide, about 90 percent of the energy used to make steel comes from coal. Sixty-five percent of the world's steel is made by the blast furnace/basic oxygen furnace (BF/BOF) route. A schematic of the blast furnace is shown in Figure 1. This process is very coal intensive, since coke (devolatilized coal) is used in the BF, and usually the electricity for the facility is generated from coal. Even electric arc furnace (EAF) steelmaking often relies on coal to produce the electricity required.

On a macro basis, there are three ways to lower CO_2 emissions from iron and steelmaking production: 1) reduce energy consumption so that less energy (and carbon) is required per ton of steel produced, 2) sequester the CO_2 produced underground, either in storage or for enhanced oil recovery and 3) use an energy source with less carbon than coal. Option 1) has been a serious focus for many years. Since 1980, the USA steel industry has reduced energy consumption per ton of steel 45 percent. However, further gains are increasingly difficult as the processes become more and more efficient. Option 2) is being

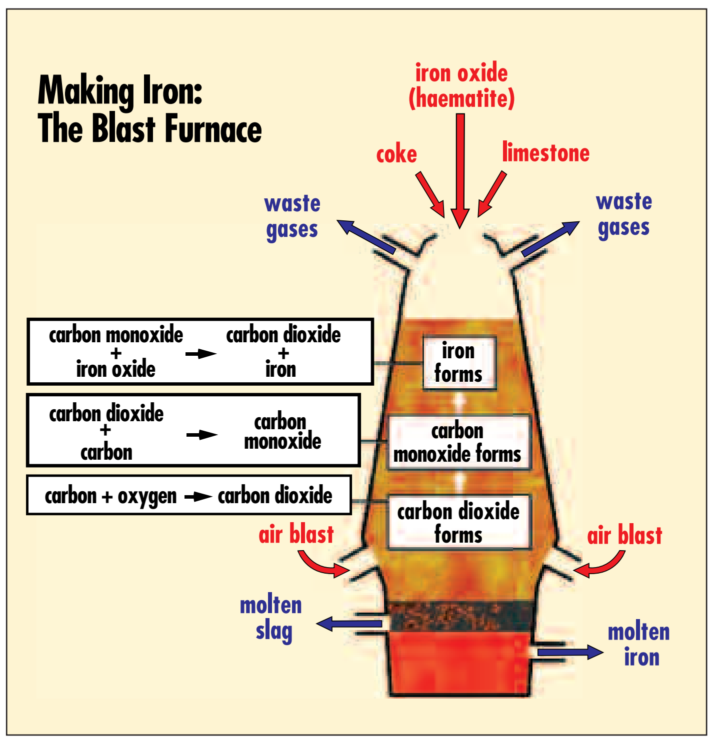

Figure 1 - Blast Furnace

Source: www.bbc.co.uk

Energy Source	CO_2 Emissions (t/TJ)	(lbs/MMBtu)
Natural gas (CH_4)	49	115
Bituminous metallurgical coal	90	212
Bituminous steam coal	94	220

Table I - CO_2 Emissions for Iron and Steelmaking Energy Sources

studied and there is promise, but it does nothing to reduce emissions from the iron and steelmaking processes; it just reduces the CO_2 emitted to the atmosphere. Also, there are significant practical limitations that must be overcome for this approach to have a major impact. Option 3) may hold the most promise for significantly reducing carbon emissions. An attractive energy source is natural gas.

Natural gas is primarily methane, with a chemical formula of CH_4. Thus, there are four hydrogen atoms for each carbon atom. Coal is a diverse mixture of compounds, but it has a higher proportion of carbon to hydrogen than does natural gas. Since almost all the carbon and hydrogen used in an iron and steelmaking facility are eventually converted to CO_2 and H_2O (water), natural gas produces much less carbon dioxide than does coal. Table I shows the CO_2 emission rates for combusting methane versus two types of coal.

As the table shows, natural gas emits only about one-half the CO_2 per unit of energy as does coal. This characteristic makes natural gas an ideal energy source for steelmaking. One proven method for producing steel using natural gas is the shaft furnace direct reduction (DR) plus EAF steelmaking route. In this case, natural gas is used in a direct reduction technology, such as the MIDREX® Process, as a reductant to remove oxygen from iron and as a fuel to provide heat. Natural gas can also be used to produce the electricity required for the EAF. The DR/EAF combination has much lower carbon emissions per ton of steel than does the BF/BOF process.

GET IT WHILE IT'S HOT

In the DR/EAF route, carbon emissions can be further reduced by hot charging the DRI to the EAF. Traditionally, almost all MIDREX® Plants with an adjacent meltshop have

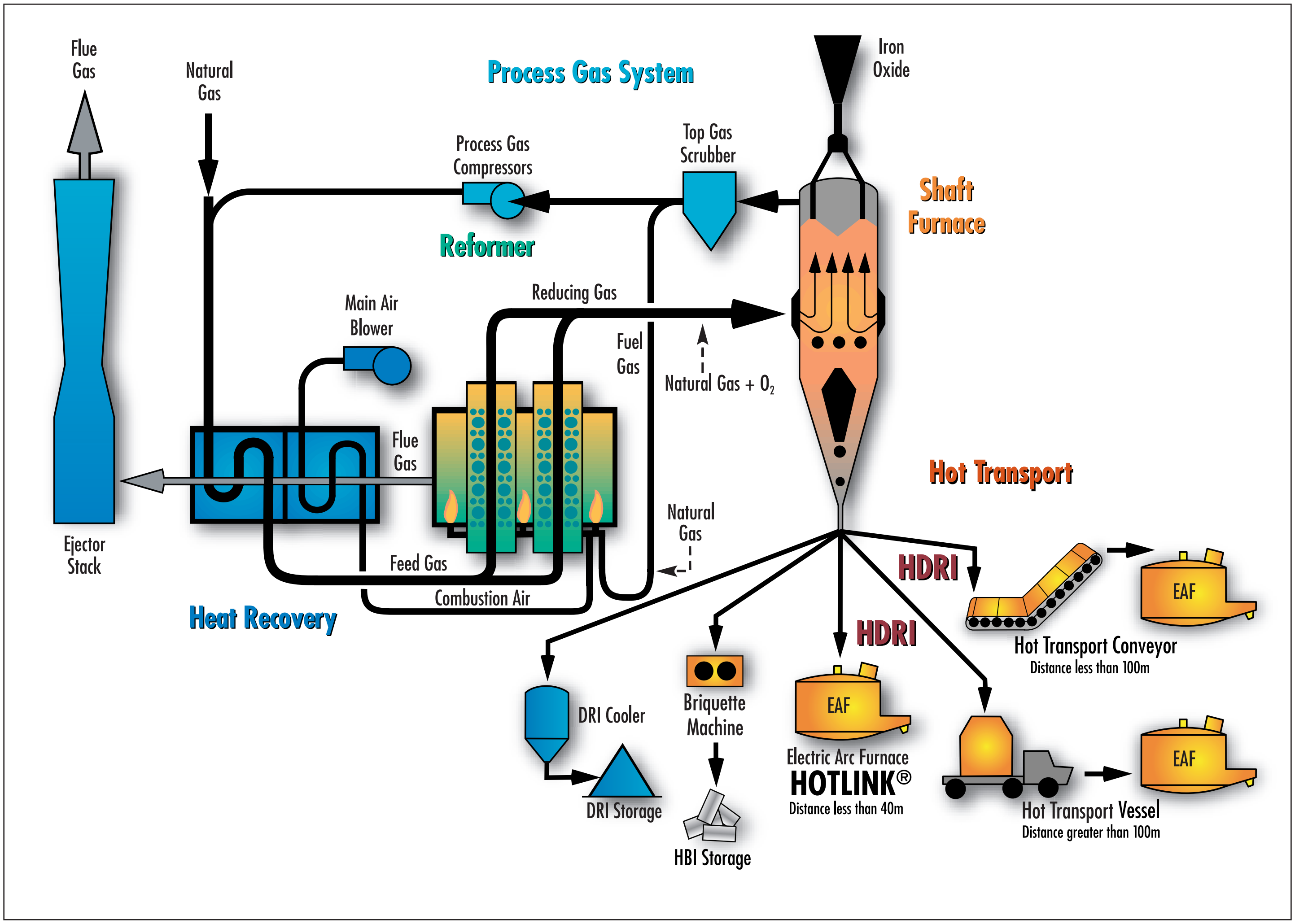

Figure 2 - Hot Discharge/Transport/Charging Options

cooled the DRI and stored it for later charging to the EAF. Now, Midrex has developed three methods for discharging the DRI at elevated temperature, transporting it hot to the melt-shop, and charging it to the EAF at 600-700° C (see Figure 2 on the previous page). These methods lower the electricity required per ton of steel produced, which also reduces CO_2 emissions from the power plant.

The electricity savings occur because less energy is required in the EAF to heat the DRI to melting temperature. The rule-of-thumb is that electricity consumption can be reduced about 20 kWh/t liquid steel for each 100° C increase in DRI charging temperature. Thus, the savings when charging at over 600° C are 120 kWh/t or more. With the use of hot charging, the DR/EAF route becomes even more attractive with respect to CO_2 emissions.

SHOW ME THE NUMBERS

To highlight the significant emissions advantage of the DR/EAF steelmaking route versus the BF/BOF route, Midrex performed a detailed analysis of various steelmaking methods, including the blast furnace/BOF and the EAF fed with various mixes of scrap plus alternate iron (DRI, HBI and pig iron). The EAF options included 80% cold DRI/20% scrap, 80% hot DRI/20% scrap, 30% cold DRI/70% scrap, 30% HBI/70% scrap, 30% pig iron/70% scrap and 100% scrap.

The calculations determined the CO_2 emissions for the entire processes, from iron ore and coke preparation through the production of liquid steel. Midrex originally performed these calculations in 2002, and details of the procedure are given in reference (1). For this paper, the hot DRI case was added. The results are shown in Figure 3 and are presented per ton of liquid steel produced.

As the graph shows, the lowest carbon emissions result from the use of 100 percent scrap steel in an EAF. This occurs because scrap is a valuable "natural resource" that should be used when possible. All the energy used to produce that steel has been spent, and thus the energy required to recycle it is low, as are the carbon emissions. However, there is a limit to the amount of scrap that can be collected and used, so it is necessary to process iron ore to satisfy the world's steel needs. Also, it is often not possible to produce "clean" steels with good processing characteristics from many grades of scrap, and a source of nearly pure iron is required. Thus, process technologies using iron ore, such as the BF/BOF and DR/EAF combinations, are necessary.

The DR/EAF route using 80 percent DRI and 20 percent scrap, which is a typical ratio in natural gas-rich areas, has significantly lower carbon emissions than does the BF/BOF method. If the DRI is allowed to cool and then charged to the EAF (CDRI), the emissions are 42 percent less. The use of hot DRI (HDRI) provides even greater savings of 46 percent.

In the case of a steel mill without a captive DR plant, the use of 70 percent scrap plus 30 percent alternate iron enables it to produce clean steel. Carbon emissions in those cases are much lower than for the BF/BOF option.

THE GREEN SOLUTION

Regions such as the Middle East, South America and Russia have already discovered the benefits of the natural gas-based DR/EAF steelmaking route. In 2006, world DRI production was about 60 million tons. Because of the flexibility and attractive

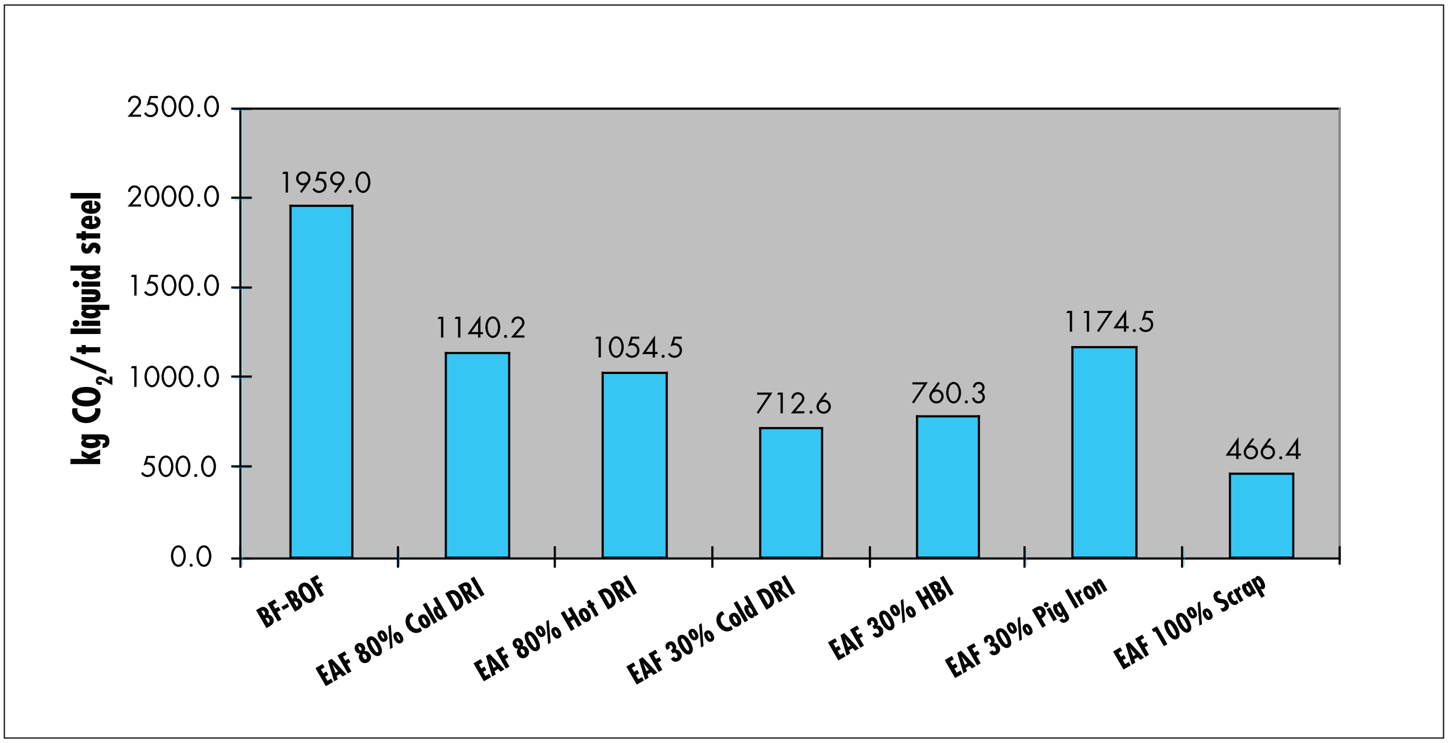

Figure 3 - Carbon Emissions for Steelmaking Routes

PLANT	Country	Start-Up	Capacity (tpy)	Product
Nu-Iron	Trinidad	2006	1,600,000	Cold DRI
Acindar Expansion	Argentina	2007	250,000	Cold DRI
Al-Tuwairqi	Saudi Arabia	2007	1,000,000	Cold DRI
Essar Module V	India	2007	1,500,000	Hot DRI & HBI
Hadeed Module E	Saudi Arabia	2007	1,760,000	Hot & Cold DRI
LGOK Module 2	Russia	2007	1,400,000	HBI
Lion Group	Malaysia	2007	1,540,000	Hot DRI & HBI
Qatar Steel Module 2	Qatar	2007	1,500,000	Cold DRI & HBI
Shadeed	Oman	2008	1,500,000	HOTLINK & HBI
Tuwairqi Steel Mills	Pakistan	2008	1,280,000	Hot & Cold DRI
ESISCO	Egypt	2010	1,760,000	Hot & Cold DRI
TOTAL			**15,090,000**	

Table II - New MIDREX Projects

economics in areas with abundant, low cost gas, much more capacity is on the way. Table II shows MIDREX Plants recently started up and those under construction. Midrex expects to sign additional contracts in 2007.

With increasing focus on carbon emissions, there is now a compelling environmental reason to choose the natural gas-based DR/EAF route. A recent report prepared for Environment Canada noted the environmental benefits of the MIDREX Process:

> "DRI plants using natural gas as the reduction material have lower CO_2 emissions than coal-based plants… It was estimated that the BAT plant [MIDREX Plant] would emit 24 percent less CO_2 and at least 24 percent less TPM, NOx, SOx, and VOCs than a conventional integrated [BF/BOF] plant." (2)

As steel companies become increasingly globalized, they will have many opportunities to incorporate this technology option into their CO_2 management plans by installing direct reduction plants in regions with low cost gas. It should even be possible to apply the carbon credits generated in those facilities to carbon restricted regions such as Europe and North America.

THINKING OUTSIDE THE BOX

Midrex continues to be proactive in reducing the environmental impact of its ironmaking processes and associated steelmaking technologies. There are several ways to reduce carbon emissions to lower levels than shown in Figure 3. One possibility is to employ natural gas-fired compressors rather than the standard ones powered by electricity.

If the electricity required for the MIDREX Process and for the EAF is generated by a non-hydrocarbon source, this would cut emissions even further. Possibilities are power generated from nuclear, solar, wind and hydro sources.

It is even possible to build a MIDREX Plant with zero carbon emissions to the atmosphere. An amine type or PSA CO_2 removal system would strip CO_2 from the top gas to create a high purity stream. That stream could be injected underground for enhanced oil recovery or sequestration. Use for enhanced oil recovery is an excellent approach. Many producers are now injecting CO_2 or steam in old oil fields, which can increase production two to three-fold. This should be a good possibility for MIDREX Plants, since they are located in gas-rich areas that often have oil as well.

CONCLUSION

The increasing emphasis on the environment creates a need for innovative solutions to reduce carbon emissions from iron and steelmaking facilities. One good approach is to use natural gas as a reductant and fuel source, since it results in far less CO_2 emissions than coal. A proven method is natural gas-based direct reduction, such as the MIDREX® Process, paired with an electric arc furnace. Use of 80 percent hot charged DRI in the EAF results in 46 percent lower carbon emissions per ton of steel produced than the blast furnace/BOF route. Many regions with abundant natural gas have seen major growth in DRI production and there is over 15 million tons of new MIDREX Plant capacity recently started up or under construction in the Middle East, Latin America, Asia and Russia. Several approaches hold the possibility of reducing carbon emissions even further.

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1. McClelland, James, Sara Hornby Anderson, and Gary Metius: "Future Green Steelmaking," presented to SEAISI 2002 Conference, Tokyo, Japan, April 2002

2. *Multi-pollutant Emission Reduction Analysis Foundation (MERAF) for the Iron and Steel Sector,* Charles E. Napier Co. Ltd., Canada, September 11, 2002, p. xviii

Heating Up the Bottom Line: The Economics of Hot DRI Charging

By Todd Ames
John Kopfle
Midrex Technologies, Inc.

Editor's note: a version of this paper was presented at the Arab Steel Summit in March 2007, sponsored by the Arab Iron & Steel Union.

INTRODUCTION

Electric arc furnace (EAF) steelmaking continues to expand worldwide because of its capital and operating cost advantages and flexibility. Since 1975, global EAF production has more than tripled, to 380 million tons, as shown in Figure 1.

Over this time period, EAF steelmakers implemented new technologies and operating practices to reduce energy consumption, increase yields and boost productivity. The enhancements included water-cooled panels and roofs, larger furnaces, higher power transformers, ladle furnaces, DC furnaces, use of chemical energy and foamy slag practice. These developments dramatically improved performance, with electricity consumptions down to 400 kWh/t, tap-to-tap times dropping from several hours to as low as 30 minutes, and annual outputs of the largest EAFs now approaching two million tons. Another technique that has been implemented in some shops is charge material preheating. Raising the temperature of the scrap or virgin iron feed before charging reduces the heating required in the EAF to raise the feed materials to the melting temperature and shortens the tap-to-tap time. This is not a new idea, and several articles on the use of hot DRI (HDRI) have been published in *Direct from Midrex* since 1993.

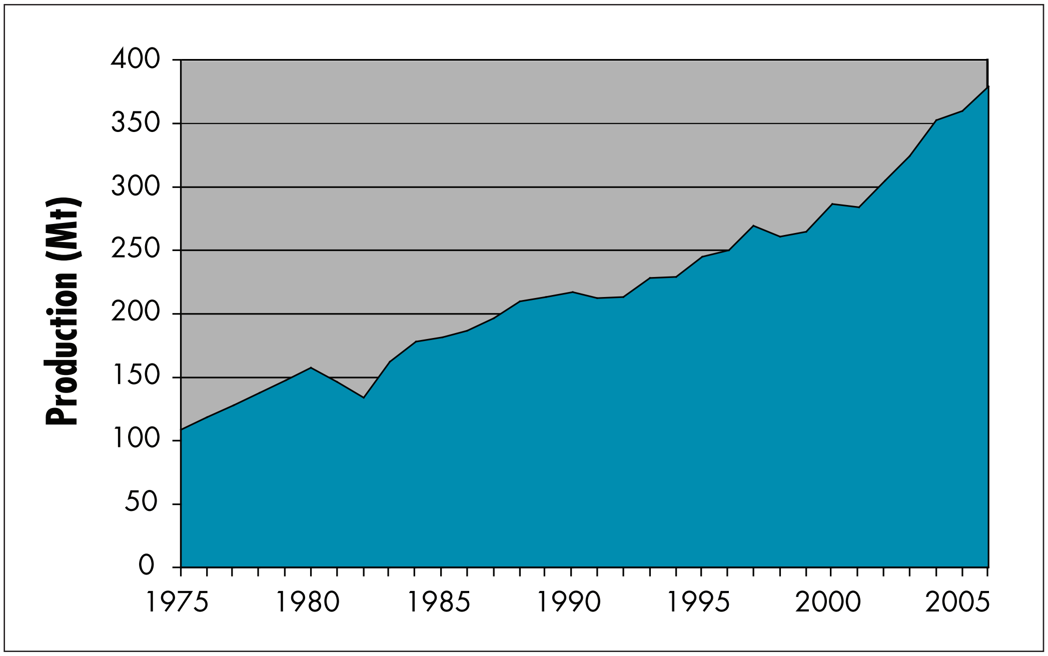

Figure 1 - World EAF Steel Production Source: IISI

GET IT WHILE IT'S HOT

Traditionally, almost all MIDREX® Plants with an adjacent meltshop have cooled the DRI and stored it for later charging to the EAF. Generally, the DRI is stored in silos and aged for several days to reduce its reactivity. Then, it is discharged and transported to surge bins, for continuous charging to the EAF.

Midrex has now developed three options for hot charging DRI to the EAF: HOTLINK®, a hot transport conveyor and hot transport vessels. The options are shown in Figure 2 on the following page. MIDREX is currently constructing plants for all three of these configurations.

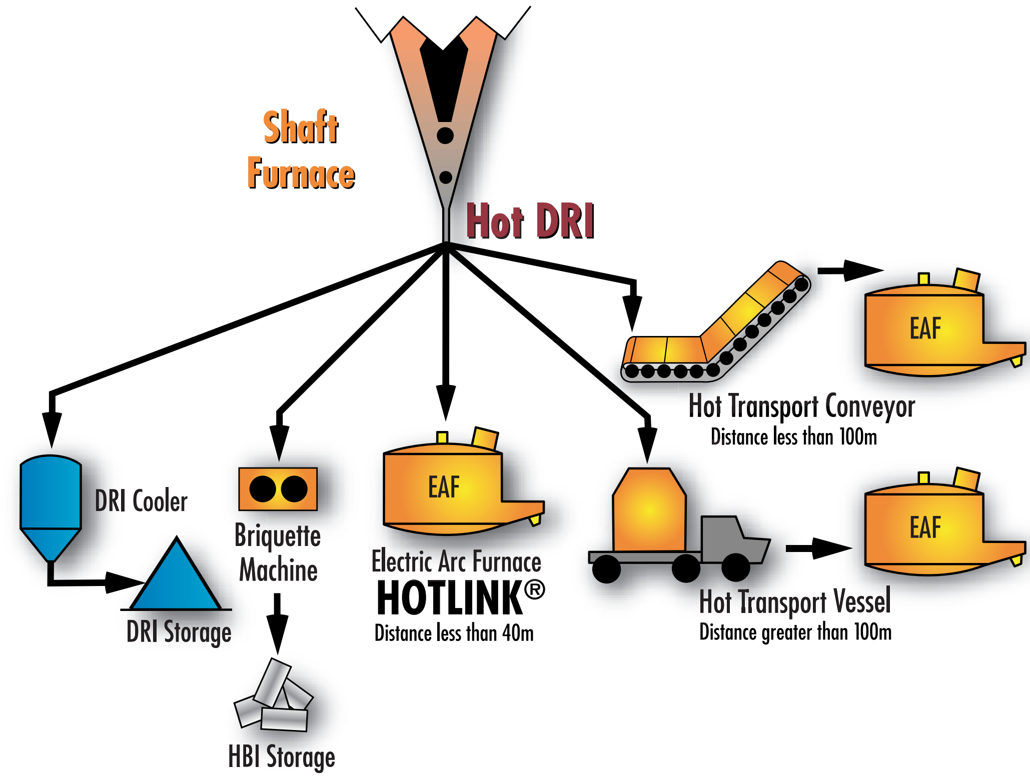

Figure 2 - Hot Charging DRI to the EAF Options

Each of these options provides the necessary flexibility for the steelmaker. For a greenfield plant in which the meltshop can be located adjacent to the MIDREX Plant, HOTLINK using predominantly gravity feed can be the best solution because of its simplicity. Midrex has now developed HOTLINK Generation 2 (HOTLINK 2G™), which is an improved version versus the original design. If the meltshop is less than 100 meters from the MIDREX® Shaft Furnace, a hot conveyor is a possibility. For locations where the meltshop is more than 100 meters from the shaft furnace, hot transport vessels are used. These vessels can be transported by rail or truck. In all three options, the DRI is charged to the EAF at 600-700° C.

Since the MIDREX® Process is continuous, while the electric furnace is a batch operation, there may be a production mismatch when closely coupling the two processes. All the hot discharge designs use a surge bin to handle variations in instantaneous output of the two operations. Also, there is a significant difference in annual availability between the MIDREX Plant and the meltshop due to operations and maintenance schedules. To deal with this discrepancy, an external cooler or hot briquetting system is installed. This allows the DR plant to maintain production, producing cold DRI (CDRI) or HBI for storage, when the EAF is down. Conversely, the EAF can maintain production using stored CDRI or HBI.

Table I lists the MIDREX Plants that include hot charging systems. The first was Essar Steel and there are now plants under construction employing the three hot charging options.

BENEFITS OF HOT DRI CHARGING

There are two main benefits of hot charging DRI to the EAF: lower electricity consumption and increased productivity. The energy savings occur because less energy is required in the EAF to heat the DRI to melting temperature. In addition to a lower energy requirement, it also takes less time, thus shortening the overall melting cycle. This allows higher production through a given size EAF.

The rule-of-thumb is that electricity consumption can be reduced about 20 kWh/t liquid steel for each 100° C increase in DRI charging temperature. Thus, the savings when charging at

Plant	Location	Start-up	System Type
Essar Steel	India	1999-2004	Vessels
Hadeed	Saudi Arabia	2007	Hot Conveyor
Lion Group	Malaysia	2007	Vessels
Shadeed	Oman	2008	HOTLINK®
ESISCO	Egypt	2010	HOTLINK 2G

Table I - MIDREX Plants Employing Hot DRI Charging over 600° C are 120 kWh/t or more. An additional benefit of the electricity savings is a reduction in electrode consumption, since there is a linear relationship. Generally, electrode consumption is 0.004 kg/kWh.

The increased productivity from HDRI charging can be significant. Use of HDRI reduces the tap-to-tap time, allowing a productivity increase of up to 20 percent versus charging at ambient temperature.

There are also environmental benefits of HDRI charging. Retaining the sensible heat in the DRI rather than dissipating it to the atmosphere lowers overall emissions two ways. First, the lower electricity demand reduces power plant emissions per ton of steel produced. Second, for those mills employing carbon injection, reduced energy requirements in the EAF result in less CO_2 given off.

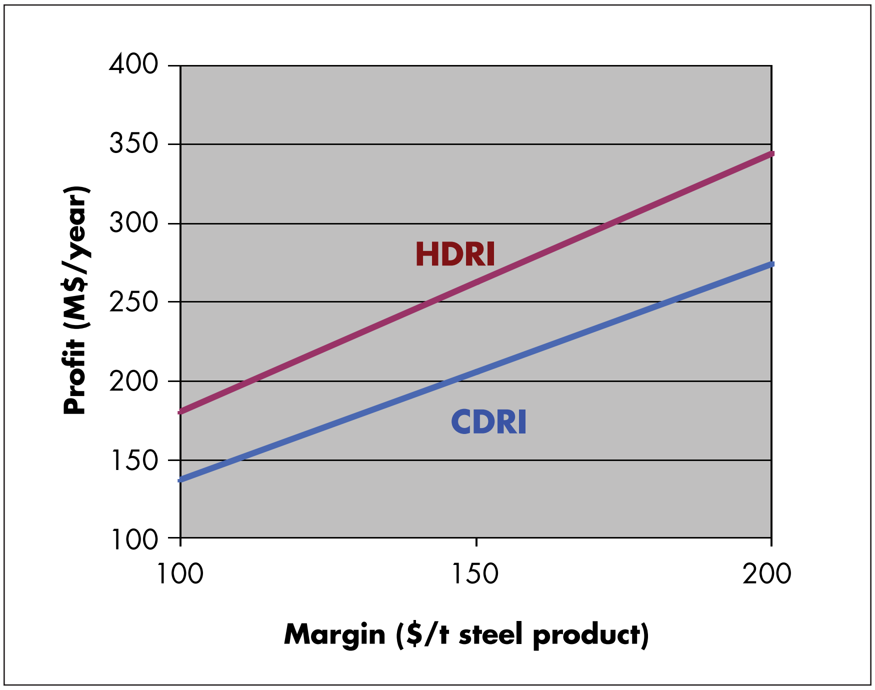

Figure 3 - Steel Mill Profitability vs. Profit Margin for CDRI and HDRI

SHOW ME THE MONEY

Ultimately, the most important consideration for the steelmaker is that HDRI charging can enhance profitability. An example shows the magnitude of the benefits. Table II is a calculation of the economics for an Arabian Gulf meltshop, comparing the use of CDRI vs. HDRI. The assumption is that the limiting factor is the size of the EAF at 200 tons, and the associated electrical system. Use of DRI at 600° C enables an increase of 20 percent in liquid steel throughput, plus a $10/t savings in operating cost. The table assumes a steel profit margin of $150/t, which is a typical figure for the last few years. Using the assumptions shown in the table, the combination of the two benefits provides an increased steel mill profit of $56.9 million per year.

Type of DRI Feed	CDRI	HDRI
DRI volume (Mtpy)	1.40	1.68
EAF heat size (t)	200	200
Feed mix (DRI/scrap)	90/10	90/10
DRI charge temp (°C)	25	600
Tap-to-tap time (min)	65	54
Steelmaking capacity (Mtpy)	1.37	1.64
Liquid steel cash cost ($/t)	227	217
Profit margin ($/t)	150 (assumed)	160
Yearly profit (M$)	205.5	262.4
Increased profit (M$)	-	56.9

(Basis: Arabian Gulf location, 2007 costs)

Table II - Economics of Hot DRI Charging

Figure 3 shows yearly profit versus profit margin per ton of steel, for a range of margins. Over this range, the increased profit by the use of HDRI is $43-70 million per year.

Since the HDRI case with a larger MIDREX Plant has a higher capital cost than the CDRI case, the key factor is the payback on that additional investment. For the base case with an additional yearly profit of $56.9 million, the payback is less than one year.

CONCLUSION

Electric arc furnace steelmaking continues to grow worldwide because of its capital and operating cost advantages and flexibility. New technologies and operating practices are advancing the state of the art. Hot charging of DRI is one such improvement that reduces operating cost and increases productivity. Midrex is now executing projects with three different techniques for hot discharge of DRI, hot transport to the meltshop and hot charging to the EAF. These are HOTLINK, a hot transport conveyor and hot transport vessels. Calculations show that for a typical Arabian Gulf case, hot charging DRI at 600° C lowers operating cost $10/t liquid steel and enables a 20 percent productivity increase. The combination of these two benefits results in a profit increase of $57 million per year and a payback on the additional investment of less than one year. Undoubtedly, hot DRI charging can help steelmakers "heat up" the bottom line.

Midrex News & Views

Beshay Steel Announces Contract for 1.76 MTPY HOTLINK® Plant
Egypt's Largest DRI Plant to be Located in Sadat City

Egyptian Sponge Iron & Steel Company (ESISCO), a wholly owned corporation of Beshay Steel of Cairo, Egypt, has announced that it has signed a contract with Midrex Technologies, Inc. to build Egypt's largest MIDREX® Plant, utilizing second generation HOTLINK® technology.

The new HOTLINK 2G™ DR plant is to be constructed at Beshay's Sadat City, Egypt Steel Complex. With a rated capacity of 1.76 million tonnes per year, ESISCO will produce simultaneous hot direct reduced iron (HDRI)and cold direct reduced iron (CDRI).

ESISCO is expected to be commissioned in 2010. It will be the first MIDREX HOTLINK 2G design configured to allow transport of HDRI by the HOTLINK® technology at temperatures in excess of 600° C to an adjacent EAF.

Coupled to a new Siemens Metal Technologies GmbH 160 ton electric arc furnace, the plant will be capable of feeding up to 100 percent HDRI to the EAF charge.

"We have spent many years building a solid foundation within the Egyptian steel industry and are looking towards the future to be an even greater steelmaking presence in the middle east through this expansion," Eng. Kamal Beshay, CEO of ESISCO and Beshay stated. "We chose MIDREX based on its documented proven reliability, ability to consistently produce high quality DRI products and its un-approached history of fast start-up periods. Midrex's long and proven history of building successful DRI projects is an excellent match for the Beshay steelmaking family."

"We are also very pleased to welcome Beshay Steel and ESISCO to the Midrex family of MIDREX® Licensees," said James D. McClaskey, President and CEO of Midrex Technologies, Inc. "We have been working with the Beshay family over the last several months to develop this new DR project in Egypt, and view this as another great milestone for both companies."

In 2002 Beshay opened one of the most advanced steel rolling mills ever in Egypt, at Sadat City, with a total annual production of 1.65 million tons of reinforced steel bars and wire rods. Beshay Steel of Cairo, Egypt is a privately held corporation.

HOTLINK® Commercial Technology

For more than two decades, the steel industry and DRI technology suppliers have sought ways to best utilize the sensible heat of freshly produced DRI – yet none have perfected the DR-EAF combination until now. Using HOTLINK® to reliably deliver high temperature DRI into an adjacent EAF is an evolutionary step forward for the technology. HOTLINK maintains 100 percent sealing of the DRI until reaching the roof of the EAF, and minimizes handling for optimum yield and temperature. EAFs using HDRI are expected to improve annual production rates by at least 20 percent when compared to conventional cold DRI. With discharge temperatures well above 600° Celsius, conservation of this sensible heat for melting is essential to maximizing throughput.

COMSIGUA Produces 10 Million Tons of HBI

COMSIGUA, the world's largest operating DR module for the production of HBI, announced that in late May, less than 10 years in operation, it had reached a production milestone: 10 million tons.

COMSIGUA DR Plant

COMSIGUA began commercial production of HBI in October 1998, shipping its first commercial product on October 22 of the same year. It continues to exceed HBI product quality targets with 93.5 percent metallization and 1.0 - 1.2 percent carbon content. COMSIGUA has steadily reported excellent performance, setting high standards for the ironmaking industry, while making a significant contribution to Venezuela's HBI export market.

SIMA Annual Meeting

Representatives of SIMA (Sponge Iron Manufacters Association) of India gathered at the annual meeting in Dehli. In 2006 Midrex was invited to join SIMA as one the organization's first international members.This year Midrex spoke to the group about the future of DRI and coal gasification in India. India has steadily grown over the past decade as a producer of DRI. Last year the country produced nearly 15 million tons of DRI or almost 25 percent of total world production.

Midrex News & Views

Relocated MIDREX® Direct Reduction Plant in Operation in Saudi Arabia
Al-Tuwairqi Group Produces First DRI Product in May

Midrex Technologies, Inc. has announced that Saudi Arabia's Al-Tuwairqi Group has successfully started-up the first of two relocated MIDREX® DR Plants in Dammam, Saudi Arabia, with first product produced in early May.

Al-Tuwairqi's Direct Reduction Iron Factory is currently making about 57 t/h at two percent carbon and 93.5 percent metallization, according to Al-Tuwairqi. The plant will ramp up production towards a target of about 88 t/h in the next few months as additional iron oxide feed material is delivered.

Al-Tuwairqi acquired two MIDREX DR Plants from Corus Group Plc. in December 2004. The two plants each had an original production capacity of 400,000 metric tons per year. The Direct Reduction Iron Factory MIDREX Plants, commonly referred to as modules, were relocated from Mobile, Alabama (USA) last year.

"Based on my past experience in operating and managing MIDREX DRI Plants, I was not surprised at the speed at which we were able to re-commission the plant," said Mr. Zulfikar Uddin, Al-Tuwairqi's DRI General Manager, who was responsible for relocation and commissioning of the plant. "I will just be happy when we can increase production after the additional feed material is received."

The newly commissioned Module now has a rated capacity of 500,000 tpy as a result of critical equipment replacement and new process engineering advancements. Al-Tuwairqi's steel plant produces steel bar from billets produced in their National Steel Company, Ltd. meltshop that began operations in 2004. The new DR plant will enable the Al-Tuwairqi Group to better manage raw material costs, as well as ensure a supply of iron units.

Al-Tuwairqi DR Plant

In May 2006 the Al-Tuwairqi Group signed a contract with Midrex Technologies, Inc. to build a new MIDREX® MEGAMOD® hot direct reduced iron (HDRI) / hot briquetted iron (HBI) / cold direct reduced iron (CDRI) Plant in Karachi, Pakistan.

This new DR plant capacity will be rated at 1.28 million tonnes per year and initial production will be 100 percent CDRI. The plant will be configured to allow the possible addition of briquette machines in the future to produce HBI. The facility will employ many of Midrex's latest innovations to minimize energy consumption and control product quality.

Christopher M. Ravenscroft: Editor

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To subscribe please register at www.midrex.com to receive our email service.

Contacting Midrex

General E-mail:
info@midrex.com
Phone: (704) 373-1600
2725 Water Ridge Parkway
Charlotte, NC 28217 USA

General Press/Media Inquiries
Christopher M. Ravenscroft
cravenscroft@midrex.com
Phone: (704) 378-3380