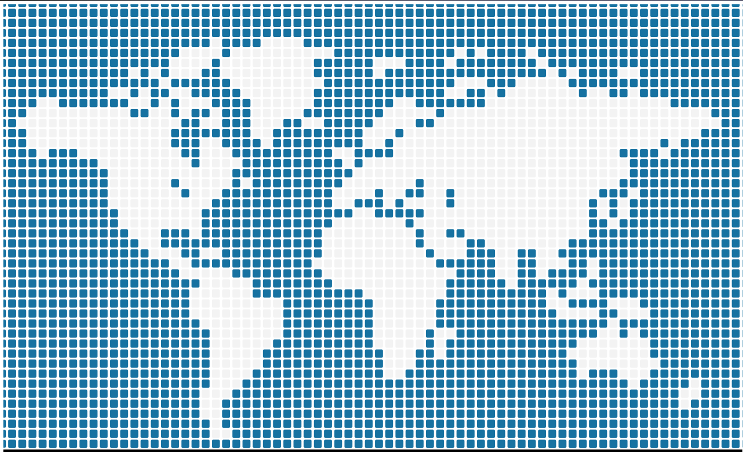


1ST QUARTER 2010

DIRECT FROM MIDREX

CONTENTS

www.midrex.com

COMMENTARY

5 Questions with... James D. McClaskey

James D. (Jim) McClaskey, President and CEO of Midrex Technologies, sat down recently for a chat about direct reduction, the past and the future of Midrex and the direct reduction industry.

McClaskey began his career at Midrex decades ago, longer than he'd like to admit, but his history and experiences parallel the growth of the industry. He has seen the evolution of DR and Midrex from multiple viewpoints, providing an interesting perspective on the future.

How did you start with Midrex?

I first started as a Mechanical Design Engineer at Midrex. It was quite an intensive start. I became a project engineer and soon after got my first (of many) passports so that I could be a project manager for Ispat Industries in Trinidad in the early 1980s. From there things kept rolling and I went on to work on the Sabah Gas MIDREX® Plant (now Antara Steel) in Malaysia. That was an interesting project. At first we were sent to Austria to work with our new construction licensee VAI, but midway through the initial project the scope had changed and then we were working on the first ever MIDREX HBI Plant – a new concept for the industry and a new technology to commercialize.

That was a lot to process in a short time. Here I was a fresh new engineer from a humble small town in West Virginia who moved to the "big city" to work for an international technology company and within a few years I was traveling the world and fine tuning evolutionary technology like hot briquetting.

Before you became president of Midrex you were president of PSI (Procurement Services International). How did you leave and how did you return?

Actually, I never truly left Midrex. PSI was spun off from Midrex in 1990-91 and relocated to Pittsburgh, PA. PSI was first created to help Kobe Steel [Midrex's parent company] with procurement on projects beyond Midrex's scope in the 1990s, but as a new wave of MIDREX® Plant sales and start-ups emerged, including CIL and IMEXSA , Kobe decided to move PSI offices back to Charlotte in 1995. With the direct reduction industry continuing to grow at a steady rate and consolidation of the steel industry as a whole, by 2004 we streamlined PSI's operation by integrating it back into Midrex Technologies, Inc.

Based on your extensive history with the leading DR technology provider, what are the most important developments that have occurred in the past few decades?

There are several advancements/ developments:

First, hot briquetted Iron (HBI), a process and product that helped expand the industry by making it easier and safer to store and ship the metallic overseas. Midrex set the benchmark standard.

Larger scale plants. This is a continuing evolution. The first MIDREX Plant was a 200,000 tpy module. The capacity had increased to 400,000 tpy when I first started and soon after that 600,000 tpy modules were developed. By the 1990s we were at one million tpy. We now have plants producing near two million tpy with plans for even larger modules. These larger plants fill a need within the industry to be more efficient and competitive. Economies of scale are the answer for competitive steelmaking.

Hot transport systems. Based on the hot discharging systems we first implemented for production of HBI in the 1980s, we along with our colleagues at Siemens VAI and

James D. McClaskey
President and CEO of Midrex Technologies

2006 Press tour in Gubkin, Russia for start-up of LGOK 2.

COMMENTARY

Continued from page 2

Aumund jointly developed the best systems for hot transport of DRI to EAFs. The goal was to improve efficiency and reduce tap-to-tap times and we've seen firsthand from our clients that the systems implemented have truly aided the steelmakers.

And...Coal gasification/MIDREX. Not a new idea, but in many ways it represents a new frontier of steelmaking and markets for those who need technology independent of natural gas. This is what we are working on in India currently and we see it as a growing market.

What are the pressing issues for the DR industry today?

In a word, "Improvement." Improving overall operations and reducing environmental emissions is important now for our industry and steelmaking in general. Our ultimate goal is to help clients focus on optimum usage, efficiency and best utilization of their resources, whether that is through larger facilities or streamlining current operations.

Each step we make brings our clients closer to a more fluid, seamless steelmaking operation.

We're lucky in having one of the most environmentally friendly processes to make iron in the industry, but we're not content with that alone.

There isn't one simple way to solve the industry's problems, but by making overall operations better we can help reduce emissions while improving profitability for our clients.

We also look to fill the void of metallics loss from the future shuttering of older blast furnaces. As time passes we believe emissions will become an even larger social issue, especially for future generations. We feel a responsibility to make better solutions available now because we should, not later when it will be dictated by laws and public opinion. Many of our clients are already of this same mind.

Also, we spend a great deal of time and effort in continuing our research and technology development. Within the last decade, we took the idea "improvement" even further with the "rebirth" of our Research & Technology Development Center in the USA. The center has undergone massive renovations and houses one of the most advanced testing facilities for the metallics industry. Our most recent addition now houses a fully operating Koeppern briquetter as well as elaborate pilot scale furnace testing capabilities.

With Shohei Manabe of KSL's Iron Unit Division commemorating 25th Anniversary of KSL's purchase of Midrex.

What's next for Midrex?

Further Globalization. We are on the correct path, which is to solve the metallics needs of various steelmakers on a global level. Basically everything we have done and will continue to do is to help steelmakers achieve better results and better economics. We could have continued producing just DRI plants, but our goal has been to provide the best technology solutions to make the industry more competitive and better position it for the next generation of steelmakers and consumers. This has led us to new markets and revisiting old ones. Our offices have recently expanded to Europe with Midrex UK, Ltd. and we may continue our expansion in the near future.

The DR industry is still growing and we will continue to grow with it. We are committed to do whatever it takes to provide the best solutions for the industry. ■

With Mr. Naveen Jindal, Executive Vice Chairman and Managing Director of Jindal Steel & Power Ltd (JSPL) at the 2009 signing ceremony for the JSPL contract.

MIDREX® Direct Reduction Plants
2009 OPERATIONS SUMMARY

Despite continued poor market demand due to the prolonged recession, MIDREX® Plants produced 38.3 million tons in 2009, only 3.8% less than in 2008. In the 40th anniversary year since the start-up of the first demonstration industrial MIDREX Plant located in Portland, Oregon, USA, MIDREX Plants accounted for more than 80% of the worldwide production of natural gas based DRI. Regardless of the crisis, some plants established new production records (10 annual and 6 monthly production records), and five plants came within 5% of their record annual production values. At least 18 MIDREX® Modules operated in excess of 8000 hours.

Iron ore raw material prices decreased in 2009 due to the low demand worldwide, but at the end of the year there were again upward price pressures and shortages of pellets. There was also reduced availability of lump ore on the open market due to diminished availability of lump ore from Brazil. ArcelorMittal's Module 2 in Canada and Module 1 in Trinidad remained shut down the whole year, and MIDREX Plant start-ups projected for 2009 were delayed by the plant owners. MIDREX Plants went from producing at an annualized rate of less that 31 million tons in January to a significantly improved annualized rate of 43 million tons in December. MIDREX Plants have produced more than 599 million tons of DRI/HBI through the end of 2009, surpassing the 600 million ton mark in January 2010.

Acindar
Acindar operated below rated capacity with the 90-tube parallel reformer off-line for most of the year due to the crisis. This provided an opportunity to study the performance of their Shaft Furnace in depth and implement measures to improve its operation.

Antara Steel Mills
In its 25th year of operation, the first MIDREX Plant designed to make HBI produced below rated capacity in 2009 due to the pronounced market collapse for HBI at the end of 2008.

ArcelorMittal Canada
Module 1 was restarted in December 2008 and operated below rated capacity throughout 2009, but surpassed the 25 million ton produced by the complex since initial startup.

ArcelorMittal Lazaro Cardenas

ArcelorMittal Hamburg
AM Hamburg's MIDREX Plant almost achieved annual rated capacity in 2009 after restarting production in June.

ArcelorMittal Lazaro Cardenas
AMLC operated below its rated capacity for the year after a slow start at the beginning of the year.

ArcelorMittal Point Lisas
In its 10th year of operation since startup in July 1999, after a slow start to the year, AMPL's Module 3 operated below rated capacity for most of the year. AMPL's Module 2 surpassed the milestone of 10 million tons produced since startup.

ArcelorMittal South Africa (Saldanha Works)
Saldanha's COREX Export Gas-based DR Plant operated at reduced capacity throughout the year, and averaged 69% lump ore usage for the year.

COMSIGUA
COMSIGUA operated at 92% of their annual rated capacity of one million tons per year due to a shortage of locally produced pellets in Venezuela, difficulties to sell their HBI product, and in the latter part of the year electric power restrictions.

Delta Steel
The two Delta Steel modules did not operate in 2009.

DRIC
DRIC's two modules located in Dammam, Saudi Arabia, operated below capacity due to lack of available oxide feed. In their second full year of operation the two modules have produced over one million tons of DRI since startup.

Essar Steel

Essar Steel Module V

Despite reduced demand, Essar's Module V set a new annual production record, exceeding 1.5 million tons with over 8000 hours of operation, as well as a new monthly production record in May with hourly production rates approaching 210 tons per hour. In 2009, Essar Steel's five modules produced almost 4 million tons, of which 67% was charged hot to Essar Steel's EAFs, and the five modules combined surpassed the 40 million ton mark.

EZDK

EZDK's three modules comfortably exceeded rated capacity, produced over 2.9 million tons of DRI, and averaged over 8200 hours of operation for the year. Module 3 set a new annual production record.

Ferrominera Orinoco

Ferrominera Orinoco's HBI producing facility in Puerto Ordaz, Venezuela was restrained by market conditions and oxide pellet availability, and surpassed the 15 million ton mark in 2009.

Hadeed

Hadeed exceeded rated capacity for the 25th consecutive year in Modules A and B, and for the 17th consecutive year in Module C, and all three modules operated over 8600 hours. Module E, with a capacity to produce 1.76 million tons per year, again set a new annual production record in its second full year of operation, and reached record monthly production levels exceeding 240 tons per hour. Towards the beginning of the second quarter of 2009 Hadeed produced its 50 millionth ton from its four MIDREX® Plants. Average carbon content in the product for the year from all four modules ranged from 2.4 to 2.9%.

Ispat Industries, Ltd

Despite the market conditions, IIL of India set new annual and monthly production records with increased use of pellets in the feed mix in its 15th year from beginning of operations. Lump ore usage dropped from over 90% at the beginning of the year to average 55% for the year. Ispat Industries has averaged over 8000 hours of operation per year over the last 15 years.

EZDK

Hadeed

Khouzestan Steel

Khouzestan Steel's fifth module established annual and monthly production records in its first full year of production. The other four modules exceeded rated capacity again in 2009 for the seventh consecutive year. Twenty years after the startup of their first plant, Khouzestan Steel has produced almost 30 million tons of DRI.

Lebedinsky GOK

Lebedinsky GOK's second DR module, capable of producing 1.4 million tons of HBI, in its second full year of operation fell just 2.1% short of their previous year's production record due to lower demand for HBI at the beginning of the year.

Lion DRI
In its first full year of production, the Lion DRI plant established a new annual production record despite the poor level of demand at the beginning of the year. The plant is located in Banting, Malaysia, and is designed to produce 1.54 million tons per year, ranging from 100% hot DRI to 65% HBI, with a 6.65 meter diameter Shaft Furnace. In 2009 the production of HDRI was 85% of the tons produced, with the balance being HBI.

LISCO
On the 20th anniversary of the startup of their first MIDREX Plant LISCO's three modules operated below their rated capacity due to market conditions.

Mobarakeh Steel
All six of Mobarakeh's modules operated over rated capacity, averaging over 8300 hours of operational availability, and produced a total of over 5.0 million tons of DRI in 2009. Module F (in its third full year of production) and Module B established new annual and monthly production records. Module C's production for the year was within 1% of its existing record value. Since 1992 Mobarakeh has produced over 54 million tons of DRI from their six modules.

Nu-Iron
In its third full year of operation, Nucor Corporation's MIDREX Plant in Trinidad operated below rated capacity due to the world economic slowdown.

OEMK
With its four modules operating on average over 8360 hours in the year, OEMK again produced over 2.4 million tons in 2009. Module 3 set a new annual production record exceeding its previous record by 1 % after the introduction of oxygen injection in September 2008, while Modules 2 and 4 operated within 1% of their annual production records. Module 4 has produced over 10 million tons since its start-up in December 1987.

Qatar Steel
In its second full year of operation, Qatar Steel's dual product (CDRI and HBI) Module 2 set a new annual production record and broke their previous monthly production record in October 2009, reaching an average 205 t/h for the month. Qatar Steel produced over 2.0 million tons in 2009 with its two modules, and has produced over 20 million tons of DRI since startup of its first module in August 1978.

Sidor
On the 30th anniversary year since the startup of Sidor's three Midrex II modules, production from all four of Sidor's MIDREX Modules was 2.8 million tons in 2009, mainly due to the poor market conditions. Sidor's four MIDREX Modules have produced over 60 million tons since initial startup.

TenarisSiderca
TenarisSiderca's production for the year was below rated capacity due to the poor market conditions.

VENPRECAR
VENPRECAR's production was significantly restricted by the limited availability of iron ore pellets in Venezuela.

OEMK

Qatar Steel

Sidor

Massive CO_2 Savings by use of HBI made with natural gas. Where are the loci?

By Robert Hunter,
Midrex Technologies, Inc.

> 1. lo·cus (lok'əs) MATH.
> a. any system of points, lines, etc. which satisfies one or more given conditions
> noun pl. loci lo'ci' (lo'si')

INTRODUCTION

This is the second of a series of articles discussing the consumption of HBI in blast furnaces as a means of greatly decreasing the amount of CO_2 generated by ironmaking. The prior article was published in the 3rd/4th quarter 2009 'Direct From Midrex' as "Massive Savings in CO_2 Generation by Use of HBI."

The previous article discussed the means by which generation of CO_2 is prevented, namely by employing natural gas instead of coke as the source of reductant for transforming iron oxide into metallic iron. This article will describe potential logistics for how this might be done. Specifically, iron ores are in one location, the natural gas deposits are in others, and the blast furnace customers are in yet others. How might the flow of materials occur in order to make this concept a successful and profitable enterprise?

SOURCES OF IRON ORE

The international trade in iron ore has grown dramatically over the past few decades. It is now approaching one billion tons per year. Approximately 90% of this trade is carried in ocean going vessels; the so-called seaborne trade. Of this seaborne trade, between three-fourths and four-fifths originate in Australia, Brazil, or India, with Australia and Brazil each accounting for about one-third of the total and India supplying slightly more than one-tenth. Please refer to Figures I-3 which show the iron ore producing regions of the world (brown circles), the blast furnace ironmaking regions (red dots), and the major natural gas containing basins (green fields). First, let's focus on the iron ore exporting nations of the world.

Data from the United Nations Conference on Trade and Development (UNCTAD) for the year 2008 was used. The larger circles, in Australia, Brazil and India, represent 309, 282 and 101 million tons per year, respectively. The smaller circles are for Mauritania, Peru, Chile, Venezuela and Iran. The circles shown on this map represent over 98.5% of the world's total seaborne iron ore in 2008.

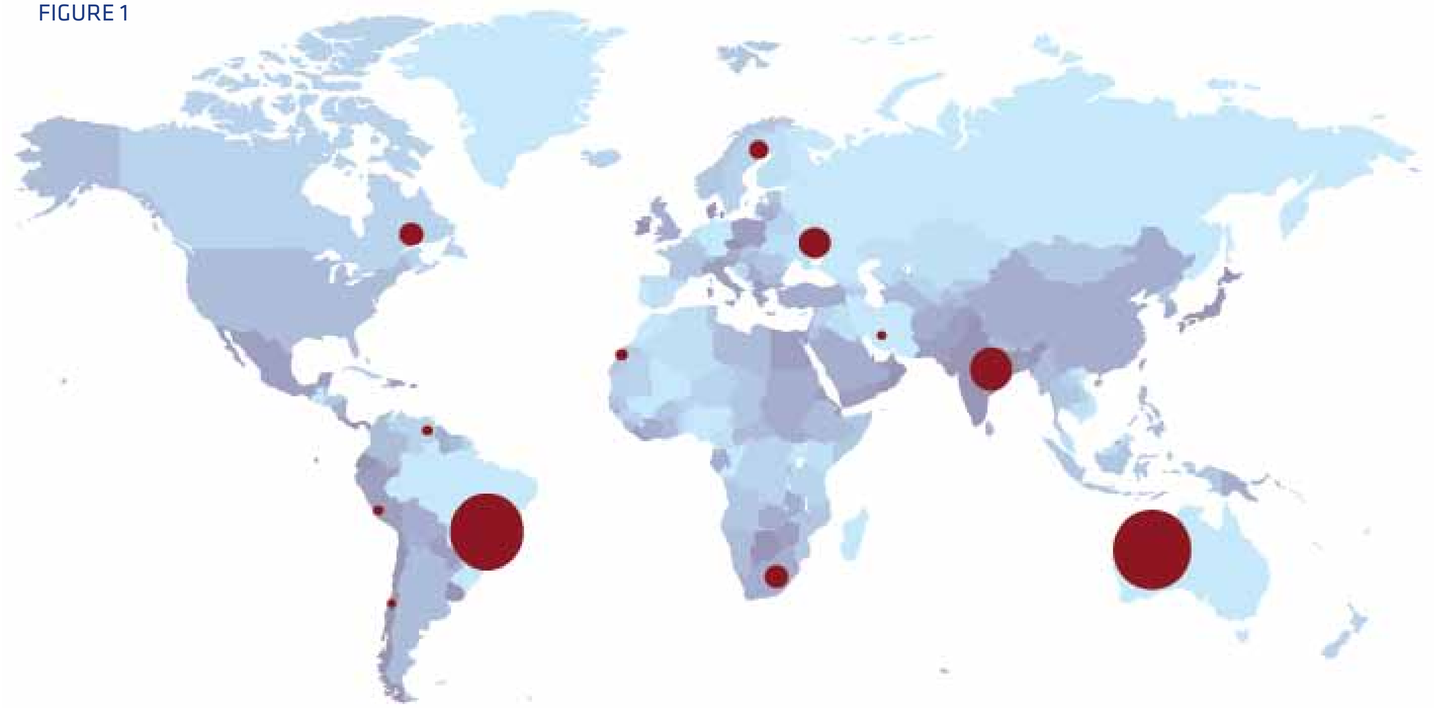
It should be noted that only 1.6% of the world's direct reduced iron is made from iron ore fines, with the remainder produced from pellets and lump. This is in sharp contrast to the shipments of iron ore, which are predominately fines and only a small portion of lump and pellets. For instance, exports from Brazil in 2008 were 17% pellets and 73% fines. Exports from Australia were even more markedly non-pellet, only 0.3%, whereas fines were 69%. Clearly, if large quantities of DRI are to be produced using natural gas, not only DR plants, but also pellet plants are needed.

BLAST FURNACE HBI USER LOCATIONS

The next question is, where must the DRI be shipped for blast furnace use, thereby greatly lowering the CO_2 production of the blast furnace and indeed, greatly lowering the global CO_2 generation of the ironmaking process? Again, refer to Figure 2 which shows an approximation of the locations of the blast furnaces of the world. Information is from the World Steel Association (WSA) 2009 data that has been plotted so that each

Location of merchant supplies of iron ore

FIGURE 1

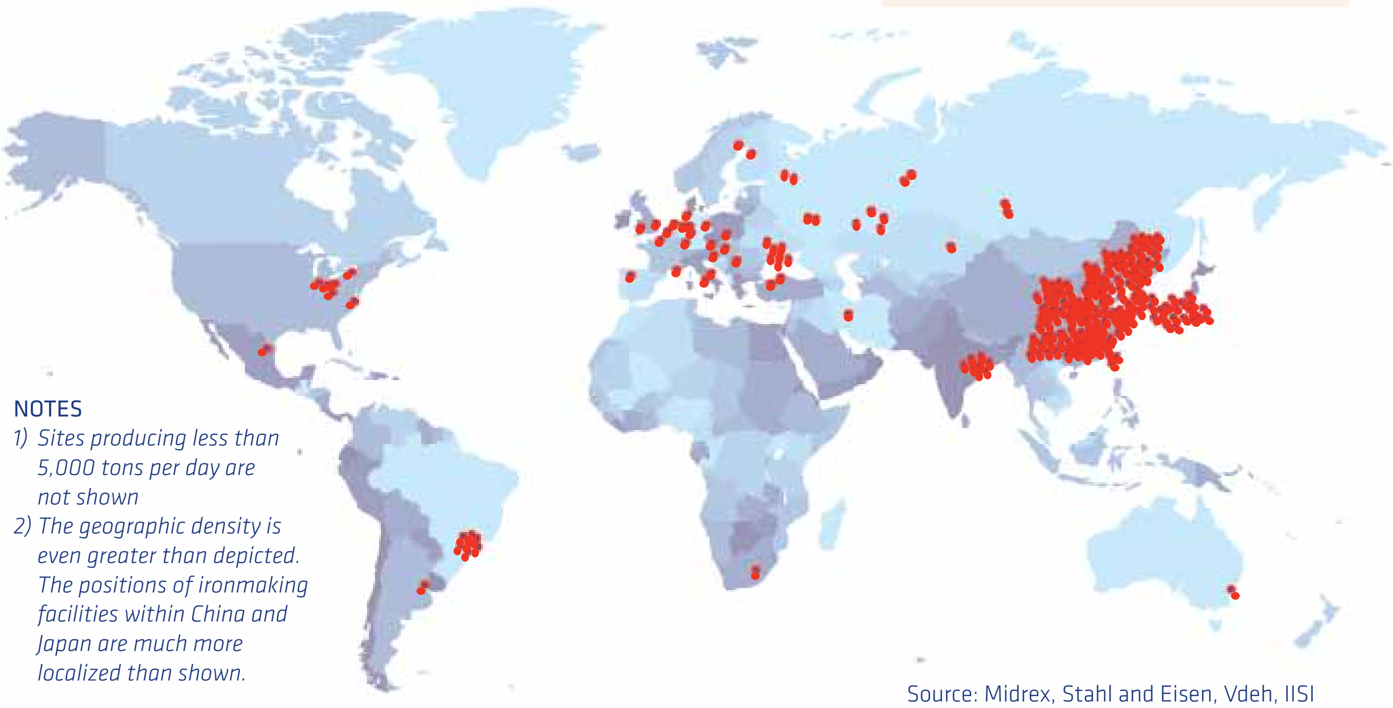


Location of world blast furnace hot metal production (in 2009)

FIGURE 2

WHERE THE IRONMAKING IS LOCATED

Each dot represents 10,000 tons/day of hot metal produced



NOTES

1) *Sites producing less than 5,000 tons per day are not shown*
2) *The geographic density is even greater than depicted. The positions of ironmaking facilities within China and Japan are much more localized than shown.*

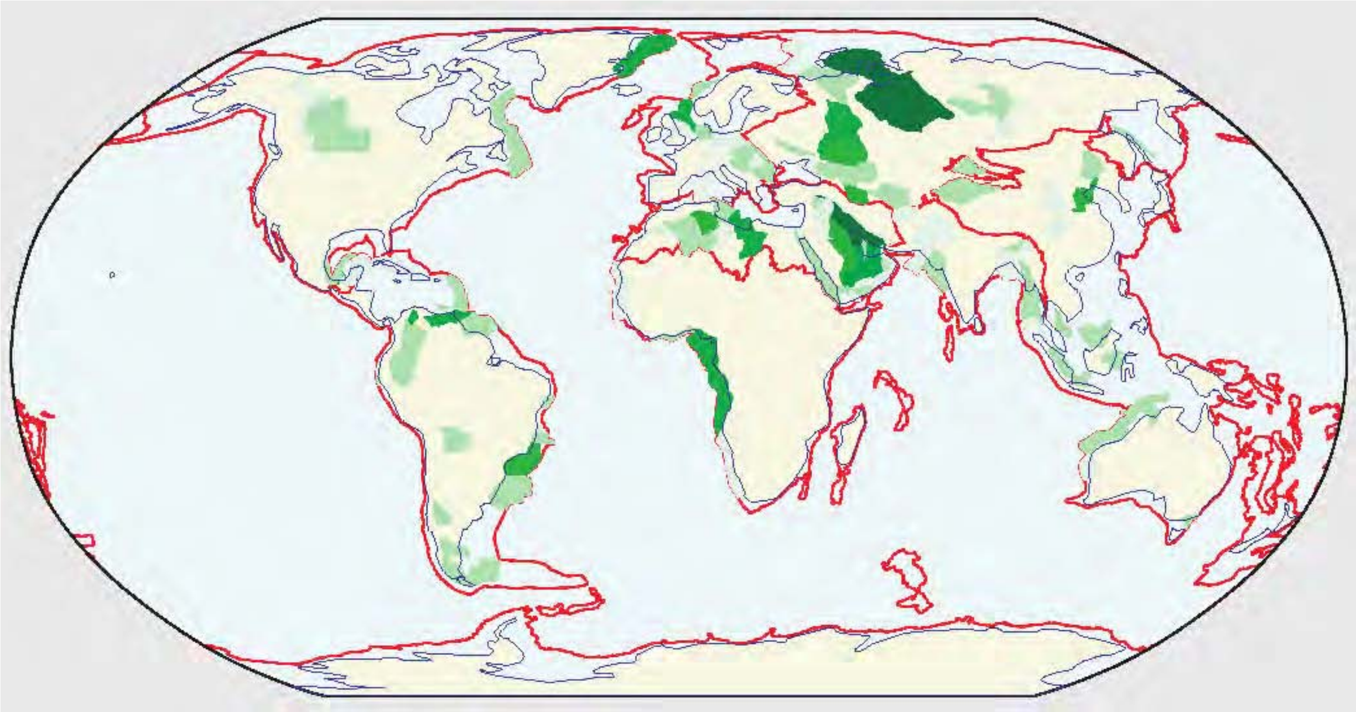
Source: Midrex, Stahl and Eisen, Vdeh, IISI

Location of natural gas

FIGURE 3

WHERE NATURAL GAS IS CONCENTRATED

Darker shaded regions show more concentrated areas of natural gas



Source: US Geological Survey

10,000 tons per day of hot metal production equals one red dot. There has been only a minor effort made to properly locate each dot within the country, so some of them might seem to be slightly out of place. Also, since everything is averaged to the nearest 10,000 tons per day, those countries producing less than half of this (5,000 tons per day) do not show. In addition, in many cases, a dot will represent two different locations within one country, each producing about 5,000 tons per day. In such a case, there has been an attempt to place the dot closer to the larger of these two sites.

One question that might be asked is, "Why choose 2009 data, rather than 2010, since 2009 was such a down year for the world steel industry?" For much of the western world in 2009, hot metal production declined to only about one-half of the norm as the financial crisis closed numerous blast furnaces. Meanwhile, the effect of the crisis on the Chinese steel industry was far less and relatively brief. The year 2009 is probably more indicative of the long-term future of ironmaking. Undeniably, for the next few years, most of the blast furnaces that were shuttered on the North Atlantic Basin will return to operation. But, as time progresses, it is almost certain the older and less efficient of these blast furnaces will again be permanently shut down. There is a long term trend of manufacturing semi-finished steels in other countries and shipping the billets and slabs to the US, Canada and Western Europe. It is expected that this trend will continue as it enjoys many economies.

The first thing that one sees when looking at the location of the blast furnaces is that the industry is utterly dominated by China and the surrounding nations. The total map represents 900 million tons of hot metal made in 2009. East Asia produced over 640 million tons, 72% of the total. India made almost 30 million tons, slightly more than 3%, so the Asian total was three-quarters of the entire world. But, most remarkably, China alone produced over 60% of the world's hot metal. Therefore, without question, in order to strongly effect the world's CO_2 generation from ironmaking, China must participate. Measures incorporated by European and North American nations may save millions of tons of CO_2, but only China can save hundreds of millions of tons.

To further stress this point, hot metal production within China was over 28 times the hot metal production of the United States. And, thus, CO_2 generation from ironmaking was over 28 times greater.

PUTTING IT ALL TOGETHER

Even a quick glance at the map shows that the great majority of the seaborne iron ore originates in the southern hemisphere, primarily Australia and Brazil, and it is consumed in the northern hemisphere, primarily China, but also Europe, North America and others. As established in the prior article on this subject, the most powerful means of lowering CO_2 generation by the steel industry is to reduce iron ore with natural gas. So the important question is, where can the iron ore meet with the natural gas for processing to iron (HBI), and then be shipped to the blast furnaces?

One point to bear in mind about natural gas is that it is inconvenient (expensive) to transport. There are only two methods of transporting large quantities of natural gas over long distances: pipelines and shipment of liquefied natural gas (LNG). Either of these methods involves billions of dollars of investment and so raise the cost of the gas substantially but LNG is the only way to move gas across open sea.

Therefore, locations where gas is readily available near the route of the ore going to the blast furnaces are needed. Let us again look at the map to see the major gas containing deposits (information and map courtesy of the US Geological Survey).

Comparing the three sets of information on the maps, iron ore deposits, blast furnace locations and natural gas deposits, reveals that there are a number of readily available sites where the ore, while in transit from mine to steelworks, can be converted at coastal locations into iron using natural gas and thereby abating the generation of massive quantities of carbon dioxide. Partially listed, these are the southern coast of Brazil, the southern Caribbean (Venezuela and Trinidad), the bite of Africa approximately from Nigeria south to Angola, north Africa from Algeria to Egypt, in the Indian Ocean along both the Arabian Sea and the Bay of Bengal, the Northwest Coast of Australia and in the Malay-Indonesian archipelago. Other locales are also possible, for instance for ores moving to Western Europe, the North Sea gas fields are convenient. And, obviously, even though landlocked, the Siberian gas fields are quite convenient to the Russo-Ukrainian ore deposits.

Clearly, many of these sites correspond to already existing HBI plants; as examples, HBI plants in Venezuela, as well as plants in Libya, western India, Russia and Malaysia. Also, it should be noted that wherever both gas and ore are at coastal locations where large modern bulk carriers can be used for transport (necessitating deep water ports), it is possible to economically implement ironmaking. This would also include the current HBI locations within the Arabian Gulf.

MIDREX News & Views

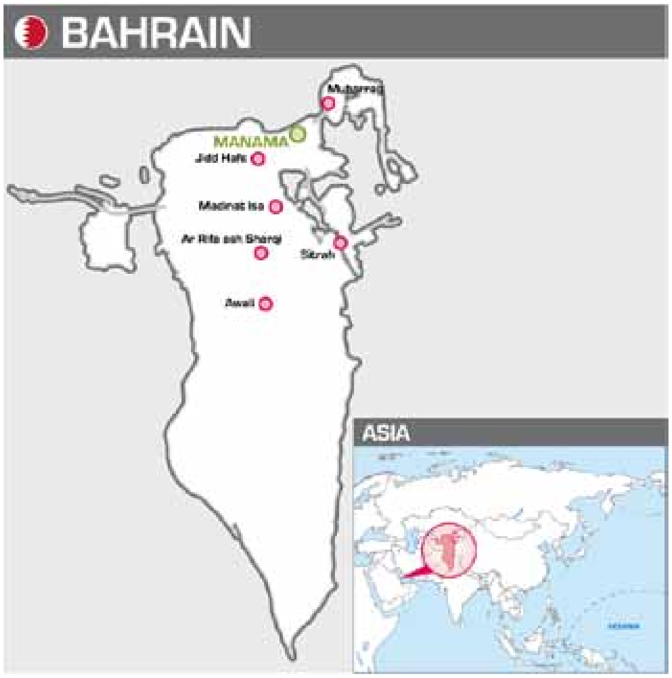
SULB orders 1.5 Mtpy MIDREX® Plant for Kingdom of Bahrain

Midrex Technologies, Inc. announces that it and Kobe Steel, Ltd. have been awarded a contract to supply a MIDREX® Direct Reduction Plant with an annual capacity of 1.5 million metric tons to Bahrain's United Steel Company (SULB). The contract was signed in Bahrain on March 30.

Under the full turnkey project, Kobe Steel is responsible for the design, equipment supply, construction, and start-up of the facility, which will make direct reduced iron. Direct reduced iron (DRI) is used as a supplement or substitute for high-quality scrap in electric steelmaking. The value of the order was not disclosed. This is the second recent order for a MIDREX Plant for the Kobe Steel Group. In December last year, Midrex Technologies, Inc., a wholly owned subsidiary of Kobe Steel, received a contract to supply MIDREX technology for a plant in India.

SULB's direct reduction plant will be constructed in the Hidd Industrial Area in Bahrain adjacent to an iron ore pellet plant that Kobe Steel constructed for Gulf Industrial Investment Co. (E.C.). With a capacity of 6 million metric tons a year, the plant went into operation in January 2010. Kobe Steel anticipates that the direct reduction plant contract will become effective in July 2010. The contract calls for the plant to be completed 30 months after the contract becomes effective. On this schedule, start up of the facility is aimed for early 2013.

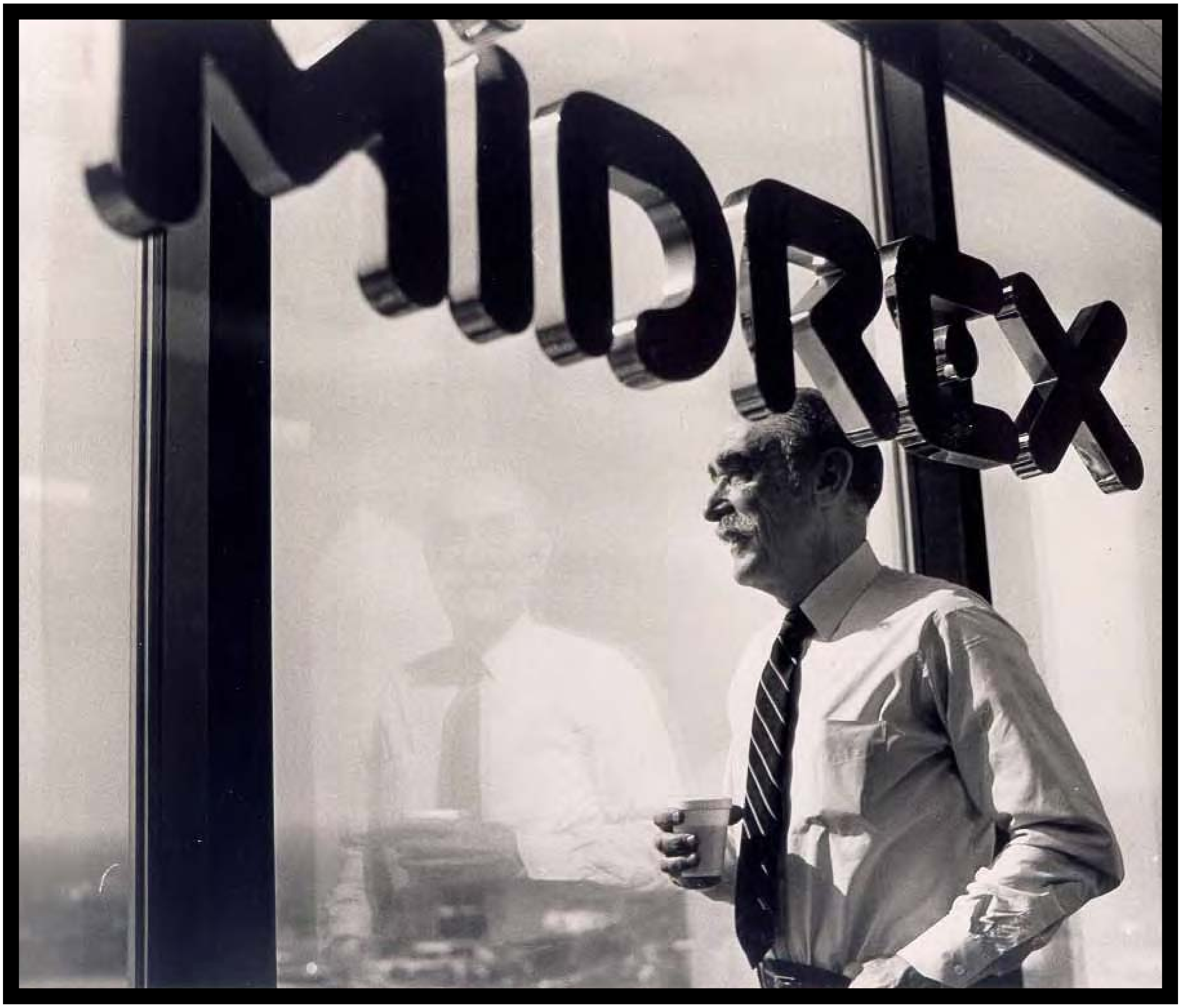
SULB is a joint venture between Foulath in Bahrain and Yamato Kogyo Co., Ltd. in Japan. The SULB steel complex will also contain a melt shop and a heavy section rolling mill to be supplied by SMS Concast AG of Switzerland, SMS Meer GmBH of Germany, and Samsung Engineering Co., Ltd. of South Korea.



"This is a very momentous occasion," Mr. James D. McClaskey, President & CEO of Midrex Technologies, Inc. said. "Not only is this the first MIDREX® Direct Reduction plant for the Kingdom of Bahrain, but it also marks a considerably strategic steelmaking project for the Middle East region. We are honored that Midrex has been chosen as the preferred direct reduction technology provider and we are proud to be working with our parent Kobe Steel, Ltd. and our partners at SMS and Samsung," McClaskey continued. "We sincerely thank SULB and its shareholders, Foulath and Yamato Kogyo, for their decision to include Midrex as part of this project, and we look forward to providing the best technology solution for this project." World direct reduced iron production reached a record high of 68 million metric tons in 2008. Although production in 2009 was lower, it is on an upward trend in 2010. Kobe Steel and Midrex are working to expand the use of the MIDREX Direct Reduction Process and the next-generation ITmk3® ironmaking process to provide steelmakers with a stable source of clean iron units.

MIDREX News & Views

In Memoriam



Mr. Marcus Davies, former President of Midrex, passed away recently in Burlington, NC, near where he resided since his retirement. Mr. Davies served in the US Navy in World War II and in the US Marines in the Korean War, receiving the Purple Heart and Silver Star medals. He had a wide-ranging career in the steel industry including positions at Korf Industries, Georgetown Steel, and Midrex Corporation (the predecessor of Midrex Technologies, Inc.). He served as Midrex President from 1986 to 1992. He is survived by his wife of 55 years, Nancy Ellsworth Davies, numerous children and grandchildren, and his sister Aubrey Jean Eberly.

Christopher M. Ravenscroft: Editor

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