Ispat Industries Limited: Operation with High Percentages of Lump Ore

Market Forces in the Direct Reduction Industry: A Closer Look at the Perfect Storm

MIDREX® Direct Reduction Plants 2002 Operations Summary

India’s Growing Direct Reduction Industry

www.midrex.com
Commentary

Planning for Tomorrow Today and Exceeding Expectations:

“Small advances and improvements can lead to great results often exceeding original expectations.”

The 4th quarter commentary in Direct From Midrex focussed on “Evolution over revolution” within the scope of ironmaking technologies. At the beginning of this year Midrex took its next evolutionary step. As many of you may already know, Midrex has restructured (see Page 14) to position Midrex for both the immediate and long-term future.

Essentially these changes are not radical and, in fact, have been in motion for some time now to position us for upcoming recovery in the iron and steel industry. This restructuring is an evolution in our business and services as many of these changes will be seamless but overall will improve quality of service to our ever-increasing client base.

Midrex is no longer simply a direct reduction company. Direct reduction is our specialty and we are proud to continue to be the leader and innovator of coal and gas-based technology. However, we now have broadened capabilities to serve the commercial needs of plants by executing small capital projects involving engineering, new equipment designs and other improvements.

Over the past few years, Midrex has also taken the time to advance R&D on technology for our traditional gas-based MIDREX® Direct Reduction Process as well as our coal-based RHF technologies firmly based in the commercially proven FASTMELT® model. By continuing to develop technologies and solve problems during the past few years in a slow market, we help to position our clients to be even more competitive in a recovering market.

On the gas-based side, we continue to keep the MIDREX Process the leading direct reduction process through innovations such as the SIMPAX™ advanced control system co-developed with Siemens, HOTLINK®/hot-transport and Midrex Solutions® oxygen injection projects to increase productivity within plants.

Our coal-based technologies are continuing to take shape. Currently we are partnering with Techint to create FASTEEL™, a combination of CONSTEEL® with FASTMELT® to provide complete steelmaking solution for steelmakers. Also an ITmk3® pilot plant operation is on schedule for 2003. ITmk3 is a Kobe Steel rotary hearth-based ironmaking process that holds great potential for the industry.

Based on current trends, the DR plant market shows further improvement. Worldwide iron and steel prices recovered significantly during 2002 due to a variety of factors including a general recovery in world economies, the weaker dollar and heavy Chinese buying. Continued consolidation of steel mills worldwide will assist the industry and there is hope for sustained recovery in 2004.

The time to innovate and develop is now because once full recovery is here the competitive advantage is gone. Now is the time to act.

With our new organization Midrex will continue in its rich tradition in direct reduction ironmaking to develop new technologies, procure and execute projects internationally as well as promote new business development. As always, we will use Direct From Midrex to bring you credible facts and figures and articles.

We are being proactive, looking towards the future, planning for tomorrow today.

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.
Ispat Industries Limited: Operation with High Percentages of Lump Ore

By: P.M. Nair & J.K. Kundoo
Ispat Industries' Ltd., Mumbai, India

Economics typically dictate the selection of lump ores and pellets as well as the portion of lump ore used in the DR Plant feed mix. The “optimum” feed mix is one that will maximize profits. This optimum feed mix becomes a constantly changing target because oxide prices fluctuate, oxide quality varies, market conditions change, etc. The challenge for the DR Plant Manager is to recognize these changes and adapt to the new conditions. This is possible provided the DR Plant has the flexibility to operate with a wide range of feed mixes. Ispat Industries is a prime example of how the flexibility of the MIDREX® Process is being used to achieve this goal.

Introduction
Located in the Maharashtra state of India, near Mumbai, ISPAT Industries’ MIDREX MEGAMOD® was commissioned in 1994. The plant was MIDREX’s first MEGAMOD, designed to produce 133t/h of DRI. This productivity level was successfully demonstrated within 15 days of commissioning. The single day record production at ISPAT Industries is 4448 t (185t/h) at 95 percent metallization while using 59 percent lump ore in the feed mix. No major modifications have been made to increase capacity.

ISPAT’s MIDREX® Direct Reduction Plant has operated with high percentages of lump ore (> 60 percent) for many years. This article discusses our experience and various factors that influence operations when using high percentages of lump ore.

Operating Data
The following figures show the effect that high lump usage has on plant operation. The data represented in these figures are monthly averages plotted with the corresponding monthly average lump ore in the feed mix for:
- Production rate (Figure 1)
- Product metallization (Figure 2)
- Product fines [-6mm fraction] (Figure 3)

Figure 1 shows the average monthly production rate and the percentage of lump ore in the feed mix over a 28-month period. In some months, the average production rate was comparatively lower because of scheduled shutdowns or limited availability of natural gas.

Even though the maximum percentage of lump used on a monthly basis was 80 percent, ISPAT Industries has operated with 95 percent lump with a maximum daily production rate of 135t/h. Near maximum production rates have also been achieved (182t/hr) with 68 percent lump ore in the feed mix.

Figure 1  Production Rate (t/h) and Percent Lump Ore in the Feed Mix
The ISPAT MEGAMOD® has consistently maintained high product quality regardless of the changes made to the feed mix. Figure 2 shows the metallization of the DRI produced during this same 28-month period.

In general, the amount of product fines increases as higher percentages of lump ore are used in the feed mix. Figure 3 shows the average monthly product fines and percentage of lump ore in the feed mix. The highest average monthly fines (~6mm) measured at the furnace discharge was approximately 16 percent.

With 60-65 percent lump in the feed mix, the typical natural gas consumption is about 2.3 Gcal/t and the power consumption is about 90 kWh/t. These values will tend to slightly increase as more lump ore is used.

**Key Factors for Operating with High Percentage of Lump Ore**

ISPAT Industries has identified several key factors that affect plant operation when using high percentages of lump ore in the feed mix. Some of these key factors are:

- Quality of Oxide
- Size Distribution of Oxide
- Furnace Operating Parameters
Quality of Oxide
The physical and chemical properties of lump ore are very important when using high percentages in the feed mix. Of specific concern are the physical strength and thermal degradation characteristics of the lump ore being used.

Lump ores with low physical strength typically generate more fines in the furnace. Large quantities of fines in the furnace can result in non-uniform material and gas flow, which may cause fluctuations in product quality (e.g. low metallization of some product).

Some lump ores have a natural tendency to degrade more than others during reduction. If thermal degradation is high, then the amount of fines will increase and may lead to non-uniform material and gas flow as noted above. High amounts of product fines may also result in high temperature DRI discharged from furnace and even cluster formation if the bed temperature is not controlled properly.

ISPAT Industries has used several types of lump ore. The preferred lump ore is NMDC (Bailadila) and it is used as the primary feed stock. Banaspani (Orissa) lump ore is also used, but not to the extent of NMDC because it has higher thermal degradation and a higher abrasion index. The following chart provides some basic data for comparison of NMDC and Banaspani lump ores.

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>NMDC</th>
<th>Banaspani</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Tumbler index</td>
<td>93%</td>
<td>90%</td>
</tr>
<tr>
<td>b) Abrasion index</td>
<td>2.7%</td>
<td>5.7%</td>
</tr>
<tr>
<td>c) Linder Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Metallization (760 C)</td>
<td>97%</td>
<td>96%</td>
</tr>
<tr>
<td>- 6mm degradation</td>
<td>15%</td>
<td>42%</td>
</tr>
</tbody>
</table>

Furnace Operating Parameters
Some problems that may be encountered when using high percentages of lump ore are non-uniform material and gas flow. This may be observed as erratic furnace bed temperatures, high top gas temperature and lower utilization of reducing gas. If these abnormal conditions arise, they can be corrected by adjusting the flow rate of reductant, lowering the hustle gas temperature, or in extreme cases reducing the amount of lump ore in the feed mix.

Some important operating parameters for high lump operation are:
- Reductant flow rate
- Bustle gas temperature
- Bustle gas methane content
- Burdenfeeder operation

Conclusion
ISPAT Industries Ltd. has routinely demonstrated that its MIDREX DR Plant can be safely operated with high percentages of lump ore (>60 percent) in the feed mix while maintaining consistent product quality and high productivity. The quality of the lump ore is of utmost importance. On a case-by-case basis, plant owners must perform a detailed cost/benefit analysis to determine the optimum percentage of lump ore to use in the feed mix.

With the ready supply of low-cost Indian lump ores available to the ISPAT plant, DRI costs can be greatly improved. The flexibility of the MIDREX plant with regards to furnace design, reducing gas composition and numerous other features has resulted in plant economics which are low-cost, reliable and profitable in any metallics market.
This is the second in a series of articles dedicated to the forces that cause the direct reduction industry to expand or contract. Since December 2002 major market changes have occurred and today the price of iron is remarkably higher than it was three months ago. This article focuses on the sudden shift in pricing.

In mid December of 2002 the price of scrap steel, DRI/HBI, and pig iron began a sudden upward surge worldwide. Within 35 days, the cif New Orleans price of pig iron as reported by “Ryan’s Notes” jumped by 31 percent, from $133.5 on 31 Dec 02 to $174.5 on 31 Jan 03. For purposes of comparison, a review of the monthly #1 HMS 3-city composite price reported by “American Table of Contents”.

![Figure 1 World Ferrous Prices](chart.png)

**Figure 1 World Ferrous Prices**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Shipping terms</th>
<th>Location</th>
<th>Reported by…</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Hms</td>
<td>cif</td>
<td>Korea</td>
<td>CRU</td>
</tr>
<tr>
<td>Pig iron</td>
<td>cif</td>
<td>Italy</td>
<td>CRU</td>
</tr>
<tr>
<td>Shredded scrap</td>
<td>fob</td>
<td>Rotterdam</td>
<td>Metal Bulletin</td>
</tr>
<tr>
<td>Pig iron</td>
<td>cif &amp; in barge</td>
<td>New Orleans</td>
<td>Ryan’s notes</td>
</tr>
<tr>
<td>HBI</td>
<td>cif</td>
<td>Korea</td>
<td>CRU</td>
</tr>
<tr>
<td>Shredded scrap</td>
<td>fob</td>
<td>North East U.S.</td>
<td>CRU</td>
</tr>
<tr>
<td>Pig iron</td>
<td>cif</td>
<td>Korea</td>
<td>CRU</td>
</tr>
</tbody>
</table>

Note: The lower two lines on this graph are fob prices. The upper five are cif. The gap in between representing freight costs.
Metal Market shows that scrap prices have not moved so rapidly, either upward or downward, in the past 50 years. This sudden change has been referred to by many as 'the perfect storm' where the ideal circumstances came together all at once. The ingredients for this 'perfect storm': included demand from China, a Ukrainian tariff, a precipitous plunge in value of the U.S. dollar, restriction of transportation due to weather in areas crucial to supply (northern U.S., Baltic, Brazil) and the cut off of Venezuelan HBI for two months.

Figure 1 shows pricing trends for some of the world's more widely reported, and larger sales volume, ferrous raw materials. Pig iron may have been the first ferrous commodity to leap, but it certainly wasn't the only one. Across the board, from lathe turnings up to re-rolling grades, and around the world, from Shanghai to Chicago, the price of iron jumped.

Clearly, all markets have felt the change. What caused it?

**Conditions for the Storm**

The general consensus is that intense pressure to raise pricing had gradually built over a period of some months (or years) but had not come to fruition until specific events triggered the change. Most importantly, on the demand side of the equation is the unprecedented growth being experienced in Eastern and Southern Asia, especially in China.

Looking at the steel industry specifically, according to IISI data, the Chinese industry has added more capacity in the past 24 months than the total steel production of the Netherlands, Belgium, Luxembourg, the United Kingdom and all of the Scandinavian countries combined! Stating this in North American terms, the past two years of Chinese growth were greater than the entire operating integrated capacity of the United States!

Annual production of steel in China is depicted in Figure 2 (data from IISI) in comparison to annual steel production by the

---

**Figure 2  Trend of Crude Steel Production – China vs. the Rest of the world**
remainder of the world. Last year, China passed the 20 percent mark. Even more remarkably, for the steel making step that requires the lion’s share of energy expenditure, namely iron making, China is now producing more than 28 percent of the world’s iron! It is expected that China will produce more iron and steel in 2003 than the entire world produced as recently as 1950.

Another interesting point about Figure 2, is that if the comparison were made instead as “Rest of the World” vs. “Rising South and East Asian Economies”, that is including India, Korea, Taiwan, and so forth, the “Rest of the World” portion actually declines post 1974.

Chinese steel imports have grown at an equally astounding rate. As Figure 3 shows, Chinese imports of steel are now running at approximately 30 million tons per year.

The flow of raw materials has been strongly affected by the economic boom. Traditionally, China has been a net exporter of pig iron. Over the past few years though, Chinese exports of pig iron shrunk to almost zero. As the pig iron stopped being exported from China, scrap steel started flowing into China. These both are also shown in Figure 3. For the past two years China has imported from 500,000 to 1,000,000 tons of scrap steel per month.

A second force, acting to raise prices, at least in US dollar terms, has been the sudden loss in value of the US currency. In less than 9 months, early-April 2002 to late-January 2003, the dollar declined by nearly 20 percent relative to the Euro.

Over a slightly longer period of time, the decline in the dollar has been even greater. (Please refer to Figure 4.) Since most international trading of scrap steel and scrap substitutes is done in US dollars, the recent leap in scrap prices is far less pronounced once converted to the local currency. For instance, although the

![Figure 3 Monthly Import/Export of Iron Units and Steel Products; To/From China](image3)

![Figure 4 Euros Per Dollar](image4)
price of Brazilian pig iron delivered to a southern U.S. port is up by almost 70 percent over its low point experienced late in 2001, for European steel companies, it is up by only just over 30 percent, in Euro terms, delivered to a southern European port.

With these very strong forces in place, a number of supply constraints suddenly occurred, almost simultaneously. Routine seasonal problems with gathering of scrap steel in northern industrial regions appeared, as they do almost every year. These were particularly noted in the industrial belt of the U.S. and in the Baltic countries. Annual rains in Brazil were above average, as they often are in El Nino years, making transportation of ore, charcoal and iron difficult. Also, a nationwide strike in Venezuela interrupted production of HBI for export for two months and resultant difficulties in getting gas supplies back to normal, as well as in restarting plants, are exacerbating the problem.

But perhaps most importantly, one of the major world exporters of scrap steel, and possibly the “lowest cost supplier”, Ukraine, added a 30 Euro per ton export tariff on all scrap steel. This was done on January 1, but had been announced months in advance. Scrap purchasers aggressively built inventories in advance but the effect was profound nonetheless.

The Ukrainian tariff was in imitation of a similar Russian 15 Euro tariff implemented four years earlier. Both tariffs were imposed to protect the domestic steel industries, operating in local currencies, and unable to compete with overseas bidding in hard, international currencies. Recently, Russian steel companies have petitioned for their protective tariff to be raised to equal the Ukrainian one.

Outlook for the Future
The combination of these events, provided the sudden change, but how long is this expected to last?

There are some who say that the Chinese growth, which is the largest force in the storm, is just a bubble. The growth seen in the past two years may have been at excessive speed, but the overall trend of Chinese growth is unchanged and not expected to change. Referring to the graph (Figure 2), it barely flinched in response to the Asian crisis; it hardly even showed any response to the Red Guard revolution. There is no reason why such a strong trend that has progressed for over half a century should suddenly end.

The second strongest force, the Ukrainian tariff, until the Ukrainian Parliament says otherwise, is permanent. In fact, it may be reinforced by an increase in the Russian export tariff.

The monetary shift is much more difficult to predict, but even if it does shift back in the other direction, it is very unlikely to return to where it was. The U.S. manufacturing industry was swiftly shrinking with the old currency values and a devaluation of the dollar was absolutely necessary for a healthy industry to survive in the States.

The other forces are shorter term, but are also much smaller forces. The weather related phenomena happen almost yearly and often go by without effecting market prices at all. Over the period 1985-2000, total amplitude of the winter-summer cycle on #1 HMS in the U.S. has been less than $8/t.

The Venezuelan strike is already over and production is returning toward normal, but there is the necessity of re-filling the ‘pipeline’. That is, rebuilding inventory stocks at the shipper and at the consumer as well as refilling the ships-at-sea. With the Venezuelan plants sold-out for a number of months in advance, and continuing to sell, it is likely that this process will take at least until the beginning of next year.

As so often happens in economic cycles, this price surge may overshoot the new equilibrium point and then settle back down to wherever the new equilibrium will be. With the momentum of rising prices seen thus far, this would be expected. It is also likely that an additional force not mentioned above, inventory building to protect from the effects of the war in Iraq, will generate a bubble effect.

But overall, it appears that the economic cycle has swung, at least for the iron making industry. After the longest trough in over sixty years, and the deepest trough in history, iron making looks to again be a profitable pastime. How long will it last. Historically, peaks last from about 18 months to about three years. But then, historically the troughs were shorter than the peaks; the last trough though, originally precipitated by the Asian crisis, lasted for over five years.

Perhaps a better answer can be seen in analyzing the period between 1982 and 1997; a time that was relatively stable in the iron market. Figure 5 shows a frequency diagram of (2001 $) prices during those years, and illustrates a point from the previous article; prices tend to spend about one-third of the time in the lower range, about one-third of the time in the upper range and the remaining third moving back-and-forth. We may now expect this pattern to resume. But for right now, we’re entering into the upper domain.
Despite the extremely poor market conditions that only improved towards the end of 2002, MIDREX® Plants produced approximately 12% more than in 2001 with a total of approximately 30 million tons of HBI/DRI produced. In addition, many plants established new production records in 2002.

**ACINDAR**

During the past calendar year, ACINDAR operated above rated capacity for the eleventh consecutive year. Their constraint due to poor market demand lifted early in the year thanks mainly to a change in the local currency exchange rate that improved their competitiveness. As ACINDAR approaches its 25th anniversary in 2003 total production to date has exceeded 16.5 million tons.

**Amsteel**

Amsteel established a new monthly production record in the middle of the year, after the market conditions recovered and they were able to increase production to maximum capacity. Amsteel has surpassed the 10 million ton production mark (at the end of 2001, actually).

**ANSDK**

ANSDK’s modules II and III broke annual production records, while Module I handily exceeded its rated capacity. All three modules broke their previous monthly production records. Oxygen use commenced in Module III this year.

**Caribbean Ispat Ltd**

Module III broke its previous monthly production record achieving an average productivity of 195t/h for the month, and broke its previous annual production record by 6 percent through increased plant productivity. Oxygen use commenced in 2002.

**Comsigna**

Comsigna again set a new annual production record that is 1.2 percent higher than their previous record through improvements in availability, notwithstanding the Venezuelan national crisis which curtailed the local natural gas supply at year-end. A new monthly production record was also set. Max single module HBI production. Comsigna reached the 5,000,000 ton produced mark in early 2003, about four and a half years after start-up.
Essar Steel
Essar's modules II and III established new annual production records, exceeding the previous records by 12 percent and 9 percent respectively, mainly through improved operational availability that exceeded 8000 hours per year. Mod III also established a new monthly production record.

Georgetown Steel
GSC's MIDREX Plant is rapidly approaching the 10,000,000 tons produced mark and should reach it in 2003. In 2002 they were able to produce in excess of their rated capacity despite the high natural gas prices in the U.S.

Hadeed
Hadeed exceeded rated capacity for the 18th consecutive year in Modules A and B (almost achieving record production levels) after 20 years in operation, and for the 10th consecutive year in Module C (essentially since startup) while setting a new annual production record for Mod C.

IMEXSA
IMEXSA exceeded rated capacity this year (their 5th anniversary year), but was affected by increased natural gas prices.

Ispat HSW
Ispat HSW continued operating at full capacity throughout the year, breaking their previous annual production record set in 1979, and coming close to breaking their monthly production record. Oxygen injection was used throughout 2002.

Ispat Sidbec
Module II (with its 25th anniversary coming up in 2003) was restarted in September at reduced capacity due to improved demand.

Khouzestan Steel
KSC's Module 1 established a new monthly production record in September, and a fourth module completed its first full year of production in 2002.
Mobarakeh

**Mobarakeh Steel**

Modules A, C and E set new annual records, exceeding 700,000 tons per year production levels. Mod E beat their previous record producing in excess of 780,000 tons with operating availability exceeding 8400 hours in the year. The 5 modules produced 3.3 million tons this past year, exceeding their previous year production mainly through increased productivity. Two modules (A and E) broke their previous monthly production records.

OEMK

OEMK’s modules I and II established new annual and monthly production records, while all four modules exceeded their rated capacity. On average the four modules exceeded 8075 hours of operation this year.

QASCO

QASCO broke their previous annual production record set in 2001 by 2.5 percent, mainly through increased productivity with very good plant availability (8345 hours in the year). In the process, they broke their monthly production record twice in the year.

SIDERCA

SIDERCA exceeded rated capacity but was affected by market conditions that improved as the year progressed.

SIDOR

Modules I and IIB set new annual production records after their recent capacity expansions. Module I also set a new monthly production record. Mod IIB had average hourly tonnages exceeding 120 t/h on a monthly basis from their 5 meter MIDREX® Shaft Furnace. Production exceeded 3.0 million tons in the year. Mods IIB and IIC reached the 10 million ton production mark, with Mods I and IIA expected to reach this mark in 2003. The three Midrex II modules achieved a joint annual production record of 2.3 million tons. Metallization levels achieved were on average 94.8 to 95.0 percent.
In December of 2002 S.S. Bhatnagar, Director of the Sponge Iron Manufacturers' Association (SIMA) visited Midrex Technologies, Inc. to discuss developments in the Indian direct reduction market and future business prospects.

Direct reduction has grown more rapidly in India than in other parts of the world. According to SIMA India produced about 6.5 Mt of DRI in 2002, about 50 percent of that is merchant. (Ed. Note: Complete world DRI Statistics will be published on www.midrex.com shortly). SIMA is the trade group for all the Indian DR producers.

Only a few years ago, 70 percent of India's DRI was produced in the three gas-based facilities, but now the ratio is 50/50 because of all the small (15,000-30,000 t/y) coal-based plants built recently. These plants were built in the east, near iron ore and coal fields. The DRI has 0.5 percent carbon and is melted in induction furnaces to produce ingots that are sold to steel mills for rolling.

India was largest DRI producing country last year, and production grew by 16 percent.

Bhatnagar's visit was to bring SIMA's reach to the U.S. and was a first step towards exploring business and technological development prospects with Midrex for the direct reduction industry in India.

Sponge Iron Manufacturers' Association (SIMA)

In 1991, India took its first tentative step towards economic liberalization. With the economy in the midst of a radical change, the Sponge Iron Manufacturers Association (SIMA) was formed to facilitate growth with its fundamental premise behind the formation of the Association being to promote and protect the interest of the Indian Sponge Iron Industry.

SIMA has come a long way since inception to bring all sponge iron manufacturers together. Now in a multi-dimensional role, it represents the Indian DRI Industry and provides a common platform for regular interface with the Government of India and other regulatory authorities. The Association is a common forum for its members to share and exchange each other's experience, views and problems. The Association concentrates on market development, compilation and dissemination of industrial data and technical and commercial information, essential for decision making in the current fast changing business environment.

Besides its traditional role of keeping members updated with development and data, both at national and international levels, SIMA also takes up image building exercise at regular intervals. These are to project and ensure the continued development and growth of the sponge iron industry in India. In the current economic scenario, the role of SIMA is significantly enhanced to maintain a coherent plan, which represents in totality, the requirements and hardships faced by the industry.

SIMA has a membership of 24 sponge iron manufacturing units. These include 3 gas based and 21 coal based units. For more information visit http://www.simaindia.org.
Midrex Announces Restructuring
New Organization Reflects Evolving Traditional & New Business

Effective January 1, 2003, Midrex Technologies, Inc. has restructured to enable it to take advantage of new opportunities and streamline the company’s operations. To enhance Midrex’s project services and after market capabilities, the industrial procurement, sales and services functions of Professional Services International, Inc. (PSI), will be merged into Midrex.

The company will continue to concentrate on its core ironmaking business but will intensify its diversification efforts. Midrex Technologies, Inc. is an international engineering and technology company that provides global process technology solutions to various industries.

According to Midrex, these changes will strengthen the company’s ability to serve its steel industry clients, provide after market services, and develop new technologies and markets.

“Our strengths have always been process design, project implementation, and after market support,” stated Winston L. Tennies, Midrex CEO. “This restructuring will enable us to better serve our traditional customers, while providing the capability to grow into other areas such as environmental and energy technologies.”

Winston L. Tennies, formerly President of Midrex, is now Chief Executive Officer. Tennies, who has spent his entire 37-year career with Midrex, will focus on developing and implementing the company’s strategy.

James D. McClaskey has been named President and Chief Operating Officer. McClaskey has spent 29 years with Midrex and affiliated companies, and served as president of PSI for the last 13 years.

Robert M. Klawonn, Vice President – Commercial, has been with Midrex and PSI more than 10 years. He will be in charge of marketing, sales, and all commercial matters.

Daniel J. Sanford, Vice President – Operations, is a veteran of 15 years with Midrex. He will be responsible for engineering, project management, and procurement/logistics.

For the latest information, visit www.midrex.com
Venezuela Recovers From Nationwide Strike

Direct Reduction Plants Resume Production

The national strike that gripped Venezuela ended in February after more than two months work stoppage. The strike impacted almost every aspect of business including DRI and HBI producers largely because natural gas supplies were shut off.

Despite the adversity, Orinoco Iron and Sidor were able to continue making small amounts of DRI/HBI during the crisis.

Comsigua was only days from achieving its 5 million ton milestone when the crisis occurred. The plant reached this milestone in mid-February shortly after the plant was restarted with a steady gas supply.

The crisis created a shortage of HBI worldwide, but especially in North America. Normally, Venezuela merchant HBI plants supply about 50 percent of the world’s internationally traded HBI and over 90 percent of the HBI used in the United States. As would be expected, the shortage generated strong upward pressure on the price of low residual iron, particularly in the United States.

By remarkable coincidence though, a number of other factors also came to bear, almost simultaneously, rapidly driving up worldwide ferrous scrap and alternate iron prices. The net effect was that the Venezuelan crisis was only one minor force acting in concert with other, larger forces to move ferrous prices to levels not seen in six years.

Venezuela’s direct reduction plants have resumed operation; however, natural gas supplies in the country as of first quarter are still quite limited and many of the plants remain curtailed in their production. As a result the HBI supply problem is expected to last for some months yet. When the crisis began, the merchant HBI plants were already sold forward for three to four months. After missing two months production, they continue to fall behind even further (because gas allotments are not sufficient to operate at full capacity). It is estimated that it will be around the end of this year before the effects of this crisis are completely gone; that is before the normal operating inventories of both the suppliers and the consumers are rebuilt.

Comsigua Reaches Milestone; 5 Million Tons Of HBI

Only months after its 4th anniversary and days after the nationwide strike that held Venezuela in production limbo, Comsigua reached its 5 million ton production milestone mid-February.

Facing a period of historically low metallics prices, Complejo Siderurgico de Guayana, C.A. (Comsigua) has produced more than 5 million metric tons of hot briquetted iron (HBI) with its MIDREX® Direct Reduction Plant since operations began in October 1998. The Comsigua plant is the world’s largest DR module for the production of HBI, and has averaged nearly 120 percent of production capacity during its first four years of operation, and achieved over 130 percent of its annual rated capacity during 2002.