

MIDREX TECHNOLOGIES DECARBONISING IRON & STEEL



MIDREX

THE IRON AND STEEL INDUSTRY IS A SIGNIFICANT CONTRIBUTOR TO CARBON EMISSIONS, BUT ONE COMPANY IS LOOKING TO CHANGE ALL THAT.

DECARBONISING IRON & STEEL

PROJECT MANAGED BY: TIM GARWOOD

Who is Midrex Technologies, and what do they do? It is important to ask both questions, as Stephen Montague, President and CEO of the company points out. “I make a big distinction between what Midrex is and what Midrex does,” he says. “What is Midrex? We are a family of professionals who really care about each other, our customers, and our community. What do we do? We are a technology services company, owned by Kobe Steel Ltd. of Japan. We provide environmentally friendly technology-based solutions for the iron and steel industry, with a particular focus on direct reduction.”

This dichotomy between Midrex’s identity and its work runs through our whole conversation with Montague. What gives Midrex Technologies the edge in the market is its cutting-edge technology, but at the same time, Montague will quickly remind us that it is the company’s people that make that technology possible.

“It’s the people behind that technology who create it, improve it, sustain it, and imagine what new technologies are on the horizon,” he says. “In one way or another, it always comes back to people.”

RECORD-BREAKING PERFORMANCE

The results those people achieve speak for themselves having been in operation for over 50

years with plants in more than 20 countries. Recently one of Midrex Technologies’ customers, Tosyali Algérie, achieved the highest annual production from a single plant of that type in the world, producing about 2.25 million tons of direct reduced iron.

“We are very proud of their achievement and that Midrex provided the technology that allowed them to reach that record,” Montague says. “We provided the engineering and all of the processing equipment along with our partner Paul Wurth as well as services for commissioning, start-up, and initial operations until the customer’s own staff were trained to do it themselves.”

However, record-breaking production is far from the greatest challenge Midrex Technologies is seeking to address.

“The biggest challenge I see facing our industry is decarbonisation,” Montague says simply. “Around 7-9% of the world’s CO₂ emissions come from the iron and steel industry, and steel and cement, are among the largest emitters of CO₂. Direct reduction, the focal point for our technology, is one of the bright lights for reducing CO₂, the best-proven technology to make a drastic reduction in the CO₂ footprint of the steel industry. Having the right solutions to reduce carbon, and do it more economically, is going to be critical. For the iron and steel industry, this is a trillion-dollar problem.”

The problem is a straightforward one: To make steel, you need iron. There are three ways to acquire iron. The first is to recycle it from scrap.

“That’s perhaps the cleanest approach because you don’t have to make iron, you’re just re-using it,” Montague points out.

But there simply is not enough scrap to meet global demands for decarbonisation.

The second, and most popularly used method, is to make it from iron ore with a blast furnace. Blast furnaces are the traditional solution and used to produce hot metal or >>

STATISTICS

- 50+ years of commercial operations.
- 20+ countries with MIDREX Plants.
- Since 1987, MIDREX Plants have produced more than 60% of the world’s annual DRI.



⬆ Tosyali Algérie’s MIDREX® HDRI/CDRI Plant located in Oran, Algeria.



Stephen Montague, President & CEO of Midrex Technologies, Inc.

pig iron, but in doing so they create a huge CO₂ footprint.

"It's high because it uses coal and coke and in rough numbers, a blast furnace and BOF will emit about two tons of CO₂ for every ton of steel that they make," says Montague.

That leaves direct reduction, the smallest segment of iron making, representing less than 10% of the iron produced globally although annual production is more than 100 million tons.

"Most direct reduced iron is produced with natural gas," Montague explains. "Although still a fossil fuel, natural gas for direct reduction is much cleaner and when combined with EAF scrap-based steel making emits about half the CO₂ of the traditional steelmaking route."



A Field Engineer Inspects an HBI briquette.

Ultimately, however, zero-emissions are the goal.

"Most importantly, as the world looks to decarbonise, we will see steady progress towards green electricity, and as that becomes more available and affordable, we'll see the world produce green hydrogen," says Montague. "The direct reduction plants we have running on natural gas today already use 50-75% hydrogen and can be easily adapted to use 100% hydrogen, reducing CO₂ emissions to zero. No one has found a way for the blast furnace to achieve those kinds of results."

THE TWO BOTTOM LINES

Once again, Montague insists that this is only possible because of the great people that Midrex is made of. Indeed, it is Midrex's people that give the company a reason to exist in the first place.

"Our operating philosophy is to manage two bottom-lines: people and profits. If you make all the money in the world and do not take care of your people there is no meaning to that, but you cannot take care of your people if you do not make a profit," Montague says. "For us that comes down to our purpose."

For Montague, that purpose is not simply trying to make as much profit as he possibly can. Instead, he talks very strongly about the concept of "service", and he does not just mean customer service.

"The purpose of our company is to love and serve others. Now that is pretty strange perhaps for someone in our space to say," he admits. "I've been told that makes us sound more like a charity than a business, but I reject that. We are a service company and our attitude is just as important as our actions. So that is where we really put our focus. That is how we are geared. People will

always be most important and we want teammates who feel the same way. Do they understand we're about loving and serving?"

Engineering direct reduction plants, to Montague, is simply his company's way of providing that love and service.

"At our core, that's what we're about. Integrity is key for us. We have to act honestly and fairly for the good of all people," he says. "Some of the other characteristics we pay attention to; Teamwork and commitment. It is absolutely critical that someone is committed and dedicated to the success and well-being of our customers and other teammates."

In many ways, Midrex Technologies may not seem like a conventional company, but the challenges the steel industry is facing may need unconventional solutions.

"Innovation is another core value. We have to think

creatively," Montague insists. "The kind of thinking that got us to this place will not get us tomorrow's solutions. We need a diverse team, a group of people with a different way of thinking. We get to better solutions because of that."

At the moment, there is one thing Montague is certain of: Change is coming.

"If you look at the driving forces in the iron and steel industry, there's really a lot of big changes underway," he says. "There is always a quest for higher-grade steels, lighter and stronger, and now the requirement for lower emissions. This has created a driving force towards electric steelmaking and green energy. Those driving forces all point our industry towards the direct reduction of iron." ☺

**MIDREX is a registered trademark of Kobe Steel, Ltd.*



HBI (Hot Briquetted Iron) is the preferred form of DRI (Direct Reduced Iron) for the merchant metallics market.

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