

# The Future of Ironmaking

## New Technologies and Feedstocks Explored at AIST's Scrap Supplements and Alternative Ironmaking 8

By Amanda L. Blyth

Attendees of AIST's Scrap Supplements and Alternative Ironmaking 8 had the opportunity to hear from experts from around the world and were presented with a glimpse of what's possible in the realm of ironmaking today and into the future.

One word comes to mind when trying to summarize the seminar: diversity.

Seventy-five international ironmakers, students and researchers convened in Orlando, Fla., USA, on 2–4 March 2020 from as far as South Korea and Russia. They also represented a variety of age groups and experience levels — young professionals in the audience had the opportunity to learn from global experts and vice versa. About 14% of the attendees were women.

Brittany MacKinnon, process engineer in training, pyrometallurgy at Hatch Ltd., said, "As a Young Professional, I am incredibly grateful for this special opportunity to learn from global experts in ironmaking about the challenges facing the industry and the emerging technologies to tackle these challenges."

Diversity refers to not only the makeup of the attendees, but also to the variety of processes, methods, and raw materials used to power blast furnaces and electric arc furnaces that were discussed over the two-day event.

Among the innovative technologies and projects presented to the group were:

- » HIsmelt, which has the potential to use hydrogen-based pre-reduction and pre-reduction of biomass.
- » Finesmelt, a process that uses superfine iron ore that is processed without agglomeration or pelletization.
- » The E-Nugget process, which utilizes biomass as a reducing agent for more carbon-neutral operations.
- » HIsarna, which produces hot metal from fine iron ore and coal in a single furnace, eliminating the need for agglomeration. This single-step process lowers CO<sub>2</sub> emissions and steelmaking costs and increases energy efficiency.
- » Tecnoled, a process that combines an iron smelting process with a low-cost source of sustainable biomass to produce pig iron.



Presenters at Scrap Supplements and Alternative Ironmaking 8 came from 14 countries.

- » FINEX®, which utilizes pure oxygen instead of air. This lays the foundation for a future shift to hydrogen reduction technology.
- » Molten oxide electrolysis, an emissions-free steelmaking process that only uses iron ore and electricity as its feedstocks. It is currently being scaled up for industrial use.
- » COURSE50, a project launched in 2008 to reduce emissions from steel works by capturing and storing CO<sub>2</sub> and developing hydrogen reduction technologies.

“There are still developments in technologies to make iron (including some that have been around for a while), but there is a definite shift toward more environmentally friendly technologies, including hydrogen. I find this very encouraging,” Vincent Chevrier of Midrex said. Additionally, Chevrier provided an overview of the MIDREX® process for direct reduced iron production.

Hydrogen, it seems, is the next frontier in steelmaking. The use of hydrogen instead of coke is an attractive avenue to curtail carbon emissions and move toward a greener steel industry. However, the amount of hydrogen required and the energy needed to produce it are staggering.

Joe Poveromo of RMI Global Consulting addressed the question of hydrogen during his presentation. He said that while there is no single correct answer, there are “exciting times ahead” with regard to the introduction of hydrogen into the steelmaking process.

Poveromo’s presentation kicked off the seminar and included an overview of alternative ironmaking processes and products, as well as a broad history of the conference itself. The seminar has an enthusiastic



and engaged core group of participants over the years.

Jeremy Jones of CIX Inc. gave a detailed analysis of the factors that are currently impacting the global steelmaking metallics market. Angelo Manenti of Metal Consulting explained that the shift from blast furnace to electric arc furnace over the last 20 years has created a demand for ore-based metallics to dilute scrap residuals.

The seminar was organized by a committee that included Jan van der Stel, Tata Research IJmuiden; Joe Poveromo, RMI Global Consulting; Angelo Manenti, Metal Consulting LLC; Romain Frieden, Vulcanus Consulting; Thomas Battle, consultant; José Noldin, Lhoist/ABM; Frank Griscom, International Iron Metallics Association; Koji Saito, Nippon Steel Corp.; and Chris Ravenscroft.

AIST wishes to the attendees and organizers of the conference, as well as Midrex and Sicon for sponsoring the event. ♦

