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European Steel Forum 2019: A Recap

A new decade has begun, and so too has a new era in steelmaking. Thanks to advances in metallurgy, steel has achieved strength-to-weight ratios once thought improbable. And new digital tools are providing fresh insights into operating processes, allowing for ever-greater yields and ever-fewer defects.

Indeed, our machines have never been smarter, our computers have never been faster and our production has never been more efficient. Yet for all of the promise of this new era, there is one characteristic that stubbornly persists: steel remains a difficult industry in which to earn a return on investment.

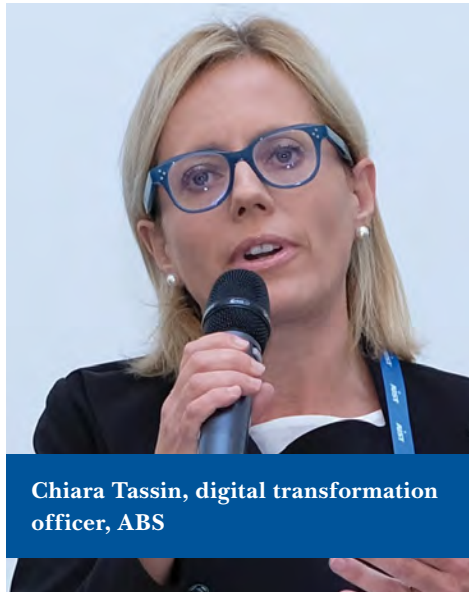
And at the moment, the commercial challenges before the steel industry are especially evident in Europe.

Consider: The Middle East remains in turmoil and political unrest abounds throughout the rest of the world. Trade tensions among the world's largest economies are only hindering growth and investment. At the same time, differing climate change policies — or a lack of policy altogether — are tilting the playing field in favor of some steelmakers and in disservice to others.

It is, as ArcelorMittal chief technology officer **Carl De Maré** put it, “a perfect storm.” And one that is enveloping the world.



Carl De Maré, chief technology officer, ArcelorMittal



Chiara Tassin, digital transformation officer, ABS



David Corsini, chief executive, Danieli Telerobot Labs

“It’s not just a regional crisis. We see this political storm in the rest of the world,” he said recently, speaking during AIST’s European Steel Forum, the Association’s signature European event.

The annual forum is organized by AIST’s European Member Chapter, which this year teamed up with respected New Jersey-based steel consultancy World Steel Dynamics to organize an independent-yet-matching set of conferences, one focused on technological innovations in European steelmaking and the other on the business dynamics that will no doubt influence the investments to come.

Together, they juxtaposed the optimism arising from digital advancements and the pessimism arising from market impediments.

Between the two conferences, participants had a week-long opportunity to compare notes with their peers, learn more about the latest industry developments and technological innovations, and make some new acquaintances.

As for AIST’s conference, the Member Chapter and host company INTECO invited attendees to the Austrian steel town of Leoben, where more than 150 gained new insights into Europe’s carbon-free steelmaking initiatives, alternative iron inputs robotics and innovations in plant design, among others.

Although the industry, from a commercial perspective, is weighed upon by global events, the technological side of the business is evolving. And one of the broadest developments has been the adoption of Industry 4.0 tools and technologies.

Chiara Tassin, the digital transformation officer at Italian steelmaker ABS and a participant in the forum’s annual Industry Leader Panel discussion, told attendees that while European manufacturing is beginning to embrace Industry 4.0, the rate of adoption has been uneven. European steel is, however, probably ahead of many other sectors, the exception being refining and petrochemical, she said.

One challenge is to incorporate new technologies into the day-to-day routine, which sometimes gives rise to new tensions.

Tassin said her company is adopting a white-box model through EAF adaptive control, which adapts in real time with process fingerprints and a prediction of any deviations.

But the application of technology extends well beyond process. Producers are bringing to bear technology-based solutions to a number of other arenas: research, marketing, sales, human resources and what is perhaps steel’s most important issue: safety.

Digital technologies clearly are helping to improve the accident and injury rate, and a few of the successes were highlighted during a panel discussion titled “Making Steel Safer: Achieving an Accident-Free Workplace Through Robotics.”

Among the panelists was **David Corsini**, chief executive of Danieli Telerobot Labs, who pointed to his company’s Q-Robot suite of products. Q-Robots are being used successfully to perform any number of operational tasks.

As he explained, Q-Robots can take samples and scan active furnaces; manipulate caster shrouds and sample hot strip steel; and skim, de-dross and load ingots at a galvanizing line. Q-Robot can also provide inspections via drones and robots in situations where a human may be in harm's way.

The use of robots on the mill floor is only set to expand, said **Michele Vezzola**, vice president robotics, BM Group. He said that eventually manufacturing robotics and machine learning will merge, such that the robots will teach themselves and improve accuracy and precision.

In fact, **Martin Hirschmanner**, vice president mechatronics, Primetals Technologies Austria GmbH, told attendees that solutions are available now to remove humans from hazardous environments, such as completely automating the continuous casting process.

“China is leading the way for robotic utilization and, in fact, some facilities such as Baosteel have moved to completely robotic casting operations where no human is on the casting floor during operation.”

But for all the promise of new digital tools, steelmakers shouldn't deploy those tools simply for the sake of digitalizing, cautioned **Barry Schneider**, senior vice president of Steel Dynamics Inc.'s Flat Roll Steel Group.

“We're not science projects. We exploit technology,” he said, adding that steelmaking is a lean-operating industry.

“We have to be low cost. I need solutions that come out of machines. Data is great, but at the end of the day, if I can't get something good out of it, what good is it to me?”

Apart from digitalization, another issue that remains on the minds of European steelmakers is sustainability. A number of them have launched initiatives aimed at decarbonizing the process, and those initiatives were explored during a panel discussion titled “CO₂-Free Steelmaking: Status and Further Developments.”

Among the companies represented on the panel was SSAB, which has formed a partnership with two other Swedish companies that, together, aim to replace coke with hydrogen. To that end, the partnership, called HYBRIT, envisions a steel production route that derives sponge iron from a hydrogen-based reduction process, which with scrap is melted in an EAF powered by renewable energy.

Martin Pei, executive vice president and chief technical officer for SSAB, said that by utilizing this route, SSAB believes they can reduce their CO₂ emissions to 1.5% of their current levels. Sweden and SSAB seek to be a fossil-free society by 2045.

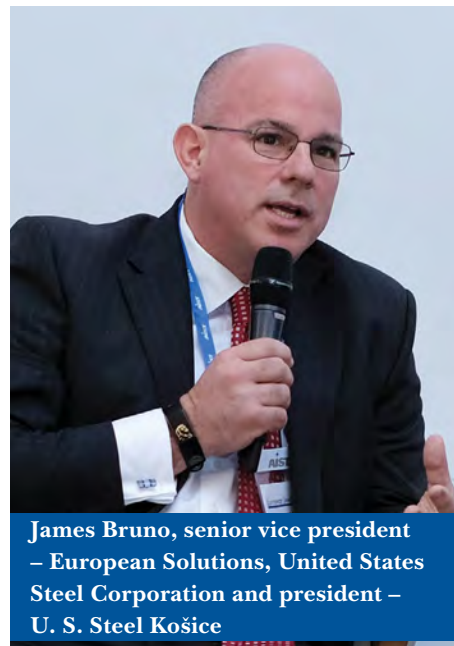
Similarly, Salzgitter AG has partnered with Danieli to use the ENERGIRON process as part of their Salzgitter Low CO₂ Steelmaking (SALCOS) process as a direct avoidance of carbon in steelmaking. Salzgitter will also be undertaking calculated phases to reduce their



Michele Vezzola, vice president robotics, BM Group



Martin Hirschmanner, vice president mechatronics, Primetals Technologies Austria GmbH



James Bruno, senior vice president – European Solutions, United States Steel Corporation and president – U. S. Steel Košice



Martin Pei, executive vice president and chief technical officer, SSAB

production of BF iron to being a complete EAF steel producer by 2050. They envision their production to have 95% less CO₂ emissions once the transition is made.

thyssenkrupp is also using a step-by-step process to achieve climate neutrality by 2050. They are beginning with hydrogen injection into the blast furnace but will eventually transition to complete hydrogen-based iron production to feed EAF-based steel production. It was again noted that political support and increased infrastructure for the production of hydrogen would be absolutely necessary for these projects to succeed.

In Europe, the interest in hydrogen is being driven in part by policy — the EU intends to be climate neutral by 2050. One of the ways it plans to achieve that goal is through its emissions cap-and-trade program. But producers in other parts of the world operate under no such restrictions, and industry leader panelists were asked whether they thought the program was fair.



Barry Schneider, senior vice president, Flat Roll Steel Group, Steel Dynamics Inc.

“Life in general isn’t fair, so I wouldn’t try to characterize anything as fair,” quipped **James Bruno**, United States Steel Corporation’s senior vice president — European Solutions and president of the company’s integrated mill in the Czech Republic.

Bruno said he thought that the intent of the system was right — to help industry transition and innovate into alternative forms of power generation. But in effect, it has raised the base price of all energy, he said, and it’s put European steel producers at a disadvantage to imports that don’t have a carbon penalty baked into their pricing.

De Maré, too, said the program is right in intent. But it was initially designed for the energy and power sector — only later were the big energy consumers included. Steel and cement are being heavily impacted, he said. A “green” border tax would make things more equal, he said.



Intertwined with the effort to adopt carbon-free processes is the expanding use of ore-based metalics, such as direct reduced iron. Attendees had an opportunity to learn more about the growing variety of iron units being used in both the integrated and mini-mill routes during a panel discussion titled “Iron Feedstock for Efficient Steelmaking: Comparing Ore-Based Metalics and Scrap.”

Ludmila Nascimento, chief executive officer of Tecnored Desenvolvimento Tecnológico S.A., told attendees that finding iron alternatives is becoming increasingly critical as production facilities age, becoming inefficient or overly reliant on carbon. At the same time, scrap availability is becoming a concern, she said.

Baris Çiftçi, head, Raw Materials Markets for the World Steel Association, said that China’s EAF-based steel production is beginning to grow, giving rise to concerns that it could sop up global scrap supplies.

He said that the world’s annual scrap supply amounts to around 780 million metric tons, which is enough to meet annual demand of about 600 million metric tons per year. But with emerging markets such as Vietnam and Bangladesh increasing their scrap imports, scrap availability could become a concern.

Therefore, scrap supplements will begin to be more critical. **John Atherton**, secretary general, International Metalics Association, said the good news is that scrap supplements offer consistent quality and low residuals, meaning that supplements can be used to dilute residuals in the bath.

This, he said, is critical for flat-roll producers looking to move up the value chain. And that’s especially so for European producers as the regionally available scrap supply tends to be high in residuals, making a transition to an EAF-dominant market a challenge.

Inputs aside, there are other factors that play into successful outcomes. One of those is having solid partnerships.

AIST president **Ronald O’Malley**, an industry researcher who now teaches at Missouri University of Science and Technology and leads the university’s Kent D. Peaslee Steel Manufacturing Research Center, discussed the importance of collaboration between industry and academia and pointed to a few examples of outcomes that can arise from such collaborations.

Prof. Dr. Sc. Leonid Sokolinsky, vice rector at South Ural State University in Russia, gave attendees another example, citing a collaboration between the university and Russian steel producer MMK.

Along those same lines, **Dr. Jens Kempken**, executive vice president at SMS group, spoke to the importance of relationships between mills and their technology suppliers.



Ludmila Nascimento, chief executive officer, Tecnored Desenvolvimento Tecnológico S.A.



Baris Çiftçi, head, Raw Materials Markets, World Steel Association



Ronald O’Malley, AIST president



Dr. Jens Kempken, executive vice president, SMS group

During a panel discussion titled “Innovations in Plant Design,” Kempken said that through the Industry 4.0 transformation, SMS is positioning itself so that it can assist its steelmaking customers with the latest technology in green hydrogen production, additive manufacturing and digitalization.

Whether customers are ready for those technologies, though, remains to be seen. During a question-and-answer period, it was asked if steel partners were readily willing to try new technology.

“New developments do require a partnership since many of us don’t have our own steel plants, but expectations of shareholders and attention to the bottom line hampers many new developments being developed together with our partners,” Kempken said.

Paolo Argenta, executive vice president, Tenova Metals, said he thought a winning strategy for both producer and supplier is to develop products and processes incrementally.



Paolo Argenta, executive vice president, Tenova Metals

“If you try to do incremental development with little up-front investment, it is easy to find a partner. If the technology has the potential to provide significant environmental improvements, the government and society should [be encouraged to be] a partner as well,” he said.

The event was rounded out by a gala dinner at the Falkensteiner Hotel and by tours of voestalpine Stahl Donawitz, Breitenfeld Edelstahl AG and the historical Radwerk IV charcoal blast furnace.

Dr. Harald Holzgruber, managing director, INTECO, commented during the gala dinner, “It was a great pleasure for me and my team to welcome AIST to Leoben and we have to thank AIST for letting us be part of this wonderful event. The attendance number and the feedback we received show that AIST and INTECO really did a good job as a team, and that it was the right decision to be brave and spread the wings and come to the heart of the steel region in Austria.”



Prof. Peter Moser, vice rector, University of Leoben



Harald Holzgruber, managing director, INTECO

Leading into the 2019 AIST European Steel Forum, the European Member Chapter and the University of Leoben organized a university- and student-focused program on Wednesday, 23 October, held at the Falkensteiner Hotel.

Following a welcome introduction by Prof. Peter Moser, Vice Rector, University of Leoben, Dr. Lawrence Heaslip, the 2019 AIST John F. Elliott Lecturer, delivered the keynote presentation, titled “Process Metallurgy of 21st Century Steelmaking — The State of the Art and the Emerging Challenges.”

During his presentation, Heaslip reviewed the three dominant liquid steel production routes and their viability in the context of environmental restrictions, raw material availability and energy efficiency. He said each route will have to position itself properly in order to adapt to current challenges as well as the impact of new reduction processes currently under research.

AIST president Dr. Ronald O’Malley gave the AIST president’s lecture, titled “Steelmaking Research Through Industry & University Collaboration.” He argued that research and industry-university collaboration is critical to developing and promoting new steel technology.

O’Malley outlined a number of current steel-related projects under development at the Missouri University of Science and Technology. In that same vein, a special lecture was given by Dr. Leonid Sokolinsky, Vice Rector, South Ural State University (SUSU), on how digital technology is impacting the steel industry. SUSU has multiple research projects developing sensors, modeling processes for efficiencies, improving energy conservation, neural network development and implantation and researching improvements in information security.

The day concluded with a panel discussion discussing the industry’s next generation of engineers and scientists. On the panel were Dr. Harald Holzgruber, CEO, President and Managing Director, INTECO; Prof. Johannes Schenk, Head of Metallurgy, University of Leoben, and Board Member, K1-Met GmbH; Sebastian Sanberger, student, ASMET Student Chapter leader; Raphael Berger, mechanical engineering doctoral student, University of Leoben; and AIST president Ron O’Malley.

All shared ideas and programs that could help improve recruitment of industry engineers. ◆

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