2018 ISIJ North America Caster Study Tour

by Amanda L. Blyth

In July, AIST welcomed 16 representatives of the Japanese steel industry to the United States. The visit was a study tour of casting facilities at eight North American steel mills. The delegates are all members of the Iron and Steel Institute of Japan (ISIJ). Also in attendance, to lend his expertise, was Ronald J. O'Malley, AIST vice president and F. Kenneth Iverson Chair, professor and director, Peaslee Steel Manufacturing Research Center at Missouri University of Science and Technology.

The Japanese delegates represented five steel companies: Aichi Steel, Daido Steel Co. Ltd., JFE Steel Corp., Kobe Steel Ltd., and Nippon Steel & Sumitomo Metal Corp.

This tour was organized as a reciprocal tour to one held by AIST and the ISIJ in Japan last November.

The event opened on 15 July with a welcome dinner in Cleveland, Ohio, USA. Over dinner the delegates introduced themselves and offered their reasons for attending the study tour. All were interested in learning about the technologies used in the United States, specifically in mini-mills. For many, it was their first time in the United States.

The study tour visited Nucor Steel–Indiana on 18 July.

The study tour visited TimkenSteel Corp. – Faircrest Plant on 16 July.

TimkenSteel Corp. – Faircrest Plant

The tour officially kicked off on Monday, 16 July, in Canton, Ohio, at TimkenSteel's Faircrest Plant. The facility has 469 employees and is one of three that make up Timken's Steel business segment. The company was founded in Canton more than 100 years ago by H.H. Timken.

The group was met by manager Tom Zorc, who gave a brief introduction on the 2-million-tons-per-year facility, highlighting the jumbo bloom vertical caster.

The US$200 million vertical caster produced its first heat in October 2014. It stands nearly 300 feet tall, making it the largest continuous vertical bloom caster in North America.

The delegates also visited the Faircrest Plant's meltshop, which features a 170-ton EAF.

North Star BlueScope

The delegates then boarded the bus for Delta, Ohio, where they toured North Star BlueScope Steel (NSBS). The company is owned by BlueScope, a leading steel producer based in Melbourne, Australia. Jeff Joldrichsen, vice president, operations, met the group and spoke about North Star BlueScope Steel and its operations.

The facility, which started up in 1997, has twin 180-ton EAFs with a 102-mm single-strand continuous caster. With 385 employees, its annual production is 2.3 million tons, comprised of high-strength, low-alloy; medium-carbon; and low-carbon steels. NSBS serves the automotive, construction, agriculture and manufacturing industries.

The study tour visited North Star BlueScope on 16 July.

The study tour visited Steel Dynamics Inc. – Flat Roll Group Butler Division on 17 July.

The delegates were interested to hear that the facility employed only 385. Manpower was a topic of some discussion at each of the plants visited during the week.

Steel Dynamics Inc. – Flat Roll Group Butler Division

The next morning, the delegates arrived in Butler, Ind., to visit Steel Dynamics Inc. (SDI)'s 3-million-ton flat roll operation there. Yury Krotov, casting manager, and Chase Ault, LMF/caster metallurgist and mold and segment shop supervisor, met the attendees and gave them an overview on the facility and its safety requirements.

The meltshop at SDI's Butler facility has two 168-ton, single-charge, twin-shell EAFs; three ladle metallurgy furnaces (LMFs); and two continuous casters.

Unique to this facility is the paint line, which is integrated into the operation, making it the only facility in North America to do so.

The group visited the EAF, LMF and caster. One highlight of the tour was seeing 15 tons of liquid hot metal from Iron Dynamics Inc. being charged into the EAF.

Technical discussions were held throughout the tour, regarding process particulars such as heel size, heat size, tap-to-tap time, etc.

"I found [the tour] very informative, with technical exchanges with different steel plants [and their] different processes, different safety cultures and different safety environmental policies. I do recommend all of my colleagues to attend this kind of informal technical exchange/study tour in the future, and if I have some opportunity to attend another, I would really love to."

— Yuki Kuwauchi, director, technology, Nippon Steel & Sumitomo Metal USA Inc.

Steel Dynamics Inc. – Structural and Rail Division

A short drive away is Steel Dynamics' Structural and Rail facility, which was the fourth stop on the tour. Meltshop manager Stephan Ferenczy greeted the delegates. Lunch

The study tour visited Steel Dynamics Inc. – Structural and Rail Division on 17 July.

was provided prior to the tour, which included the meltshop, caster and hot mill.

The Structural and Rail Division is SDI's second-largest steel operation. It started up in 2002 as a structural mill. The structural side of the works offers a variety of parallel flange sections, while the rail side produces standard and premium rail.

Currently under construction is the coiled bar line, which will allow for 240,000 tons of rebar production at the facility. It will make No. 3 to No. 8 bar in coils and in custom straight lengths, and it will also make smooth bar.

In their tour of the meltshop, the delegates were able to see the two 120-ton AC EAFs, as well as the twin-station LMF and twin-station vacuum tank degasser. They also visited the facility's two casters, one 3-strand and one 4-strand.

A technical discussion was held after the tour between the delegates and the SDI personnel on hand. A highlight of the discussion was a brief overview of the degasser extension, which allows more degassed tons per heat and reduces damage to the degassing chamber. A noteworthy point was the fact that the process time does not increase the pump-down time. Following the tour, the group boarded the bus for a two-hour drive to Indianapolis, Ind., where they enjoyed dinner and rested.

"This tour was very useful for us and perhaps also for the mills in the United States. We could increase our technical level, which is good for both companies. This kind of informal technical interaction is very, very important. I believe this tour is very useful."

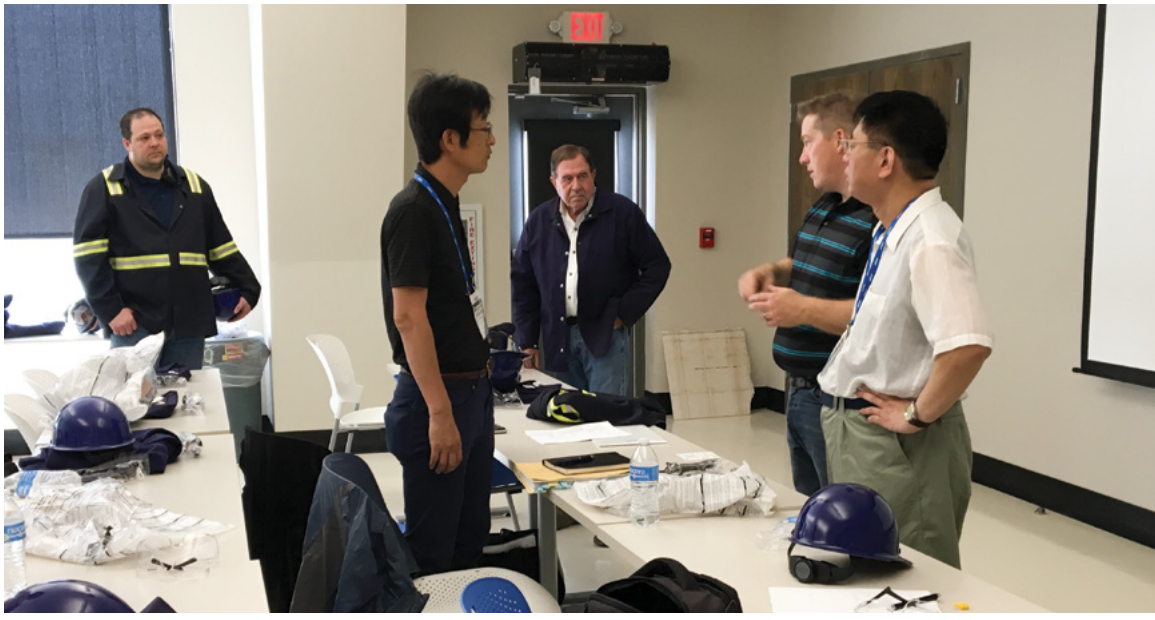
— Masato Kobayashi, general manager, head of Tobata Steelmaking Technical Department, Steelmaking Division, Nippon Steel & Sumitomo Metal Corp.

Nucor Steel–Indiana

On Wednesday, 18 July, the group toured Nucor's facility in Crawfordsville, Ind. The tour encompassed the EAFs, casters and hot strip mill. The delegates were particularly interested in seeing the first Compact Strip Production (CSP) mill, which was installed in 1988.

The tour was led by Jeff Powers, vice president and general manager. The meltshop at Nucor Steel–Indiana has two 130-ton AC EAFs and three LMFs. It has two 2-inch thin-slab casters and features the world's first Castrip

The study tour visited Big River Steel on 19 July.



facility, which was installed in 2002. The Castrip is capable of producing 490,000 metric tons/year of steel with a thickness of 0.76 to 1.8 mm.

The facility also includes a pickle line, reversing and tempering line, batch annealing, and a galvanizing line. It produces hot-rolled and pickled carbon steel sheet as well as cold-rolled and galvanized coils.

A technical exchange was omitted from the schedule, as the delegates had to catch a flight from Indianapolis to Memphis, Tenn. A special thanks to Nucor Steel–Indiana for providing a "to-go" lunch for the group.

Big River Steel

Big River Steel was the first of two tours in Arkansas on Thursday, 19 July. The group boarded the bus in Memphis and rode to Osceola, Ark., for a morning tour of the facility.

Denis Hennessy, director of product development, greeted the delegates and showed them a brief informational video on the facility prior to the tour. The group was able to see the EAF, RH degasser, LMF, caster, tunnel furnace and hot strip mill.

The study tour visited Nucor-Yamato Steel Co. on 19 July.

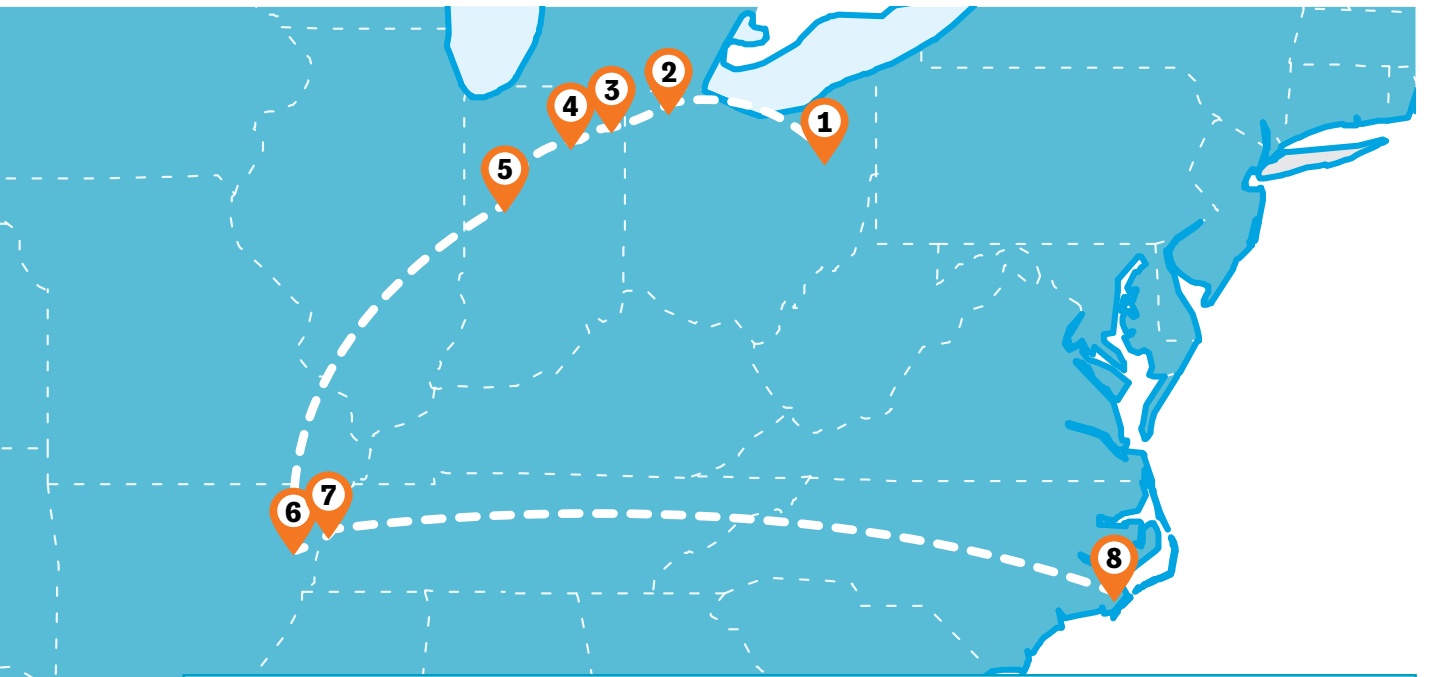
One of the interesting aspects of Big River's steelmaking process is the RH degasser. It is the only RH degasser connected to an EAF in a slab mill in North America. This allows for an enhanced product line by lowering hydrogen and nitrogen and removing carbon faster, more efficiently and to the lowest levels possible.

The delegates were excited to tour Big River, which had just announced the planned expansion of its facility. The expansion will reportedly double its hot-rolled steel capacity to 3.3 million tons annually. Currently the facility employees 450 team members.

Nucor-Yamato Steel Co.

The tour bus then traveled up the road to Blytheville, Ark., to visit Nucor-Yamato Steel Co. B. Thad Solomon, vice president and general manager, was on hand to greet the delegates, provide lunch and answer questions before the tour commenced.

The tour visited the meltshop and caster. The facility is equipped with two EAFs and three casters, one being a Castrip. Nucor-Yamato was formed in 1987 as a joint venture between Nucor and Yamato Kogyo, and today



Tour Route

1. TimkenSteel Corp. – Faircrest Plant, Canton, Ohio
2. North Star BlueScope Steel, Delta, Ohio
3. Steel Dynamics Inc. – Flat Roll Group Butler Division, Butler, Ind.
4. Steel Dynamics Inc. – Structural and Rail Division, Columbia City, Ind.
5. Nucor Steel–Indiana, Crawfordsville, Ind.
6. Big River Steel, Osceola, Ark.
7. Nucor-Yamato Steel Co., Blytheville, Ark.
8. Nucor Steel–Berkeley, Huger, S.C.

produces more than 2.5 million tons of wide-flange beams, channels and other shapes. Approximately 1,000 employees work at Nucor-Yamato.

One item of discussion that was brought up during the tour was training practices. The delegates were interested in the bidding process for different positions and how workers received their training and qualifications. They were also interested in the scrap mix and size of the scrap yard.

Following the tour, the group returned to Memphis for the night, where the delegates had the opportunity to try Memphis-style barbecue at Blues City Café, where they also enjoyed a live blues band.

Nucor Steel–Berkeley

The last stop on the tour was Nucor Steel–Berkeley on Friday, 20 July. The group's itinerary started with a 5:40 a.m. flight from Memphis and then a half-hour bus ride from Charleston International Airport in South Carolina.

Despite the hours of travel, the delegates were excited to visit the facility. Roddy Marraccini, meltshop manager, greeted them and showed a brief presentation on the facility and what they would be seeing on the tour.

The meltshop at Nucor Steel–Berkeley has two identical 165-ton DC EAFs with an average tap-to-tap time of approximately 40 minutes. The delegates were able to see the 4-strand continuous caster, the two slab casters and the vacuum tank degasser. They then followed the dual 600-foot tunnel furnaces down for a quick stop at the hot strip mill.

The study tour visited Nucor Steel–Berkeley on 20 July.

Following the tour, the delegates engaged in a technical discussion with Nucor Steel–Berkeley personnel. One topic of discussion was shift lengths in Japan vs. the United States. In Japan, because workers often take a train to their facilities, a typical schedule may be 7 a.m.–3 p.m./3–10 p.m./10 p.m.–7 a.m. Typically four crews work 365 days a year in Japanese facilities. The delegates and the Berkeley team also talked about differences in training and quality inspection practices.

Another aspect that had been discussed throughout the week, not just at Nucor Steel–Berkeley but at almost all of the facilities, was the teamwork between workers and engineers. While each of the plants fostered its own unique brand of teamwork and sense of community, the common element among them was the cooperation and open communication between all team members. This is typically not the case in Japanese steel producing plants.

Wrapping Up the Week

On the final night, 20 July, the group convened for dinner at 39 rue de Jean in downtown Charleston, S.C. The delegates toasted a successful week and thanked AIST and Ron O'Malley for hosting them. Many took advantage of this opportunity to ask technical questions of O'Malley, from topics such as testing methods and quality inspections to tundish practices.

AIST would like to thank each of the steel producers on the tour who so graciously welcomed the ISIJ delegates. The open technical exchange was appreciated by all.

About AIST Study Tours

AIST conducts study tours around the world to provide its producer members with opportunities to see similar processes and discuss technologies related to those processes with individuals from other countries, cultures and backgrounds. Study tours provide ample opportunity for networking not only with the host companies, but also with colleagues and other AIST members on a deeper, informal, more personal level. As the steel industry has grown internationally, these study tours have been a key activity of AIST in bringing steelmakers from Asia, Europe and South America closer together. ✦