

BIG RIVER STEEL

AND ITS NEW TAKE ON

STEELMAKING



Big River Steel chief commercial officer Mark Bula on the construction site of the company's mill, January 2015.

“WHY BUILD ANOTHER STEEL MILL?”

This is the question most commonly asked of Big River Steel after it announced in 2013 that it would build a new US\$1.3 billion steel mill in Arkansas. *Iron & Steel Technology* recently sat down with Mark Bula, chief commercial officer of Big River Steel, to explore this question and how the new company plans to differentiate itself in an evolving industry.

NEW TAKE ON MILL EQUIPMENT

Big River Steel plans to set itself apart from established steelmakers by building what it has termed a “flex mill,” which utilizes the cost position and culture of a mini-mill, but takes the evolution of mini-mill steelmaking capabilities even further and yields products typical of an integrated steel mill, such as electrical steels and more advanced high-strength steels (AHSS). An RH degasser is required to develop those types of steel grades, and for a mini-mill to install an RH degasser is something “dramatically different,” according to Bula.

“While the equipment we’re putting in looks similar in general format or structure to other mini-mills built over the past 10 years or so, it’s actually the

tweaking of the equipment that will allow for very different capabilities for our steel,” he noted.

The SMS group is the main equipment supplier for Big River Steel’s mill, including the EAF, RH degasser, tunnel furnace, hot mill, runout tables, pickle line and tandem cold mill, and galvanizing lines.

The 150-ton EAF supplied by SMS will have the capability to use scrap, hot briquetted iron (HBI) or direct reduced iron (DRI). The range of scrap versus scrap substitutes used will depend on the grades and campaigns required by customers.

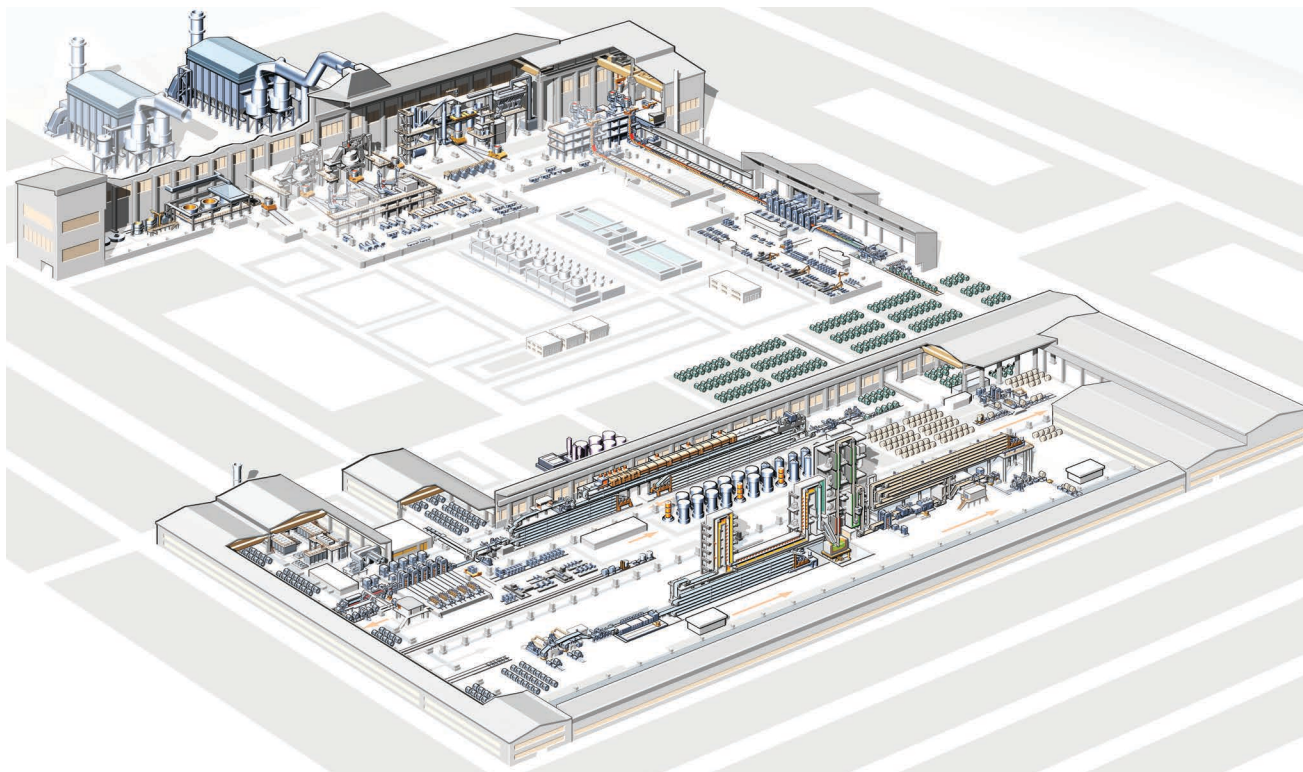


Figure 1 — Layout of the Big River Steel mill in Osceola, Ark., USA. Shaded areas are part of the mill's future expansions.

Big River Steel's RH degasser will be the only one in the U.S. connected to an EAF and compact strip production (CSP®) mill, Bula affirmed. The degasser will lower nitrogen levels in the steel mix and provide for faster and more efficient removal of carbon compared to the traditional vacuum tank degassers used in other mini-mills. It will play a critical role in allowing the company to make electrical steels and other AHSS grades — grades beyond simply dual-phase steels, such as multi-phase steels, martensitic grades and potentially the next generation of AHSS steels used by the automotive industry.

Big River Steel believes the next generation of high-strength steels is going to have a multitude of applications. For example, if a steelmaker can lightweight the hollow structural section tubing used to support a building, it will improve not only the product, but also the process of using that product. These steels will not be simply considered by other industries, but required by them, according to Bula.

A tunnel furnace will provide Big River Steel with higher temperature capability, higher property use

and higher yield, particularly for silicon (electrical) steels.

The single-strand CSP plant with a 6-stand rolling mill will be the widest of all CSP plants in operation globally, with a maximum strip width of 76 inches (1,930 mm), according to SMS. It will have an initial annual capacity of 1.6 million tons. Although the rated capacity of the hot mill will be 76 inches, the capability will actually be 78 inches “with an asterisk,” said Bula — the asterisk being that Big River Steel has every intention of using its steel expertise and technical know-how to broaden the equipment's designed capabilities. The mill will have the largest cross-section capability in the U.S., as far as an EAF/CSP mill goes, he noted. The large cross-section capability — 1 inch thick x 76 inches or 78 inches wide — will give Big River Steel a breadth of grades, gauges and widths beyond that of other mills, giving the company a huge advantage, he said.

The mill will have a runout table with some reinforced and very early, intensive cooling capabilities, providing for better mechanical properties, yield and tensile strength. The cooling bed will be a



Figure 2 — A CSP® design will be supplied to Big River Steel and will feature an SMS-developed roller hearth furnace, in which the slabs produced in two casters of the CSP plant are transported via a parallel carriage to the mill stand, enabling Big River Steel to fully utilize the high rolling capacity of the 6-stand CVC® plus mill.

little longer than typical ones, which is important for niche products such as silicon steels, American Petroleum Institute (API) and high-strength low-alloy (HSLA) grades, Bula pointed out.

TARGET: NICHE PRODUCTS

In Phase One, Big River Steel will focus its efforts on making 1.6 million tons annually of mostly carbon steels — hot rolled black, hot rolled pickled and oiled, cold rolled, and hot-dipped galvanized steels.

Making electrical steels is not easy, and getting to the point of making those difficult steel grades will be an evolution of learning, Bula commented. True silicon steels — cold rolled motor lamination (ML), grain-oriented and non-grain-oriented (NGO) — will come in the US\$500–600 million Phase Two, which will include a separate, stand-alone finishing complex.

Phase Three, likely to accompany Phase Two, will consist of a doubling of the mill, adding another

The mill will include a standard pickle line and tandem cold mill, and standard galvanizing lines.

EAF and caster, taking the mill's annual steelmaking capacity to more than 3 million tons.

Big River Steel will produce three specific niche products: electrical steels, API grades and AHSS grades. Its range of electrical steels — including motor lamination, non-grain-oriented and grain-oriented — and its large range of API products will allow it to supply products used in the exploration, transmission and generation of energy. The company will not make products for exposed automotive or appliance applications, but will concentrate on the safety side of the business, such as the cage for automobiles and construction products (Table 1).

STEEL TYPES	THICKNESS (IN.) MIN.–MAX.	WIDTH (IN.)	PLANNED CAPACITY (TONS)
Hot rolled black	0.054–1.0	36–78*	475,500
Hot rolled pickled and oiled	0.054–0.200	36–74	140,000
Cold rolled ML/ NGO	0.012–0.095	36–74	323,810/ 198,198
Galvanized	0.012–0.095	35.5–73	428,942

Table 1 — Big River Steel's basic product capabilities and capacities.

*Anticipated capability

LOCATION, LOCATION, LOCATION

The mill's location near Memphis, Tenn., USA, one of the country's top logistics hubs, will provide another advantage for Big River Steel, Bula told *Iron & Steel Technology*. "We think the highway system and the proximity to important markets are vital. But the Mississippi River is what we point to, logistically, as the most important piece of the puzzle for us," he said. The inbound supply of scrap,

alloys and other products will be an advantage, as will the outbound aspect, which will provide the mill's products easy access to big markets such as the Pittsburgh/Youngstown area, Chicago, New Orleans and Houston. Additionally, river access will help the company negotiate contracts with rail and truck carriers, he noted.

HIRING THE RIGHT PEOPLE

With plans to be fully operational by mid-2016, Big River Steel has added only about 20–25 people to its team at this point, among them a number of key operating managers. The early hiring of a technical services manager and a product development director demonstrates the company's commitment and understanding that product application and product development are critical for it to be successful, Bula said. Eventually the mill will employ more than 500 people.

Two workforce development programs are already being offered by Arkansas Northeastern College (ANC), preparing local residents to work at the mill. Working in partnership with the Arkansas Department of Workforce Services, ANC will assist Big River Steel in its hiring procedure, which is expected to begin in full force by mid-2015.

EVOLVING THE INDUSTRY

Big River Steel intends to be a different kind of steel company. It wants to rethink and redesign the way steel companies do business. "If everyone keeps doing it the same way, guess what? We never get better," Bula remarked.

"We would like to influence the industry by doing something different, by being something different — even if it's just taking a customer portal to a level that's never been done before," he said. "How neat would it be if we become more technical in how we do business, even in inside and outside sales? What

if customers could start to enter their own orders into our system? What if we start using more touch screens to do things?

"We have to evolve," continued Bula. "If we don't start innovating, beyond just the RH degasser and tunnel furnace and other equipment, we will never have young people wanting to get into this business." Big River Steel plans on paying attention to the evolution of the business to ensure there are plenty of qualified individuals able to run its new plant for years into the future. ♦