

Medium-thick-slab casting and rolling offers a host of benefits for producers

Best of Both Worlds

Continuous casters producing an intermediate slab thickness between conventional and genuinely thin slabs is a highly attractive technical and economical option for the production of hot strip or plate. Especially during difficult times with unpredictable market developments, this caster solution offers a unique combination of operational flexibility, excellent product quality and high plant productivity with moderate investment costs.

In the past decade, Siemens VAI introduced medium-thick-slab casters with typical slab thicknesses between 100 mm and 170 mm to meet the requirements for a wide range of product applications. The first casters of this type were supplied to special and stainless steel producers, beginning with a caster upgrade to cast 100-mm-thick slabs at Avesta (now Outokumpu Avesta) and followed by the installation of a new caster to AK Steel Mansfield (Ohio, U.S.) capable of casting 130-mm-thick slabs. Here, the entire stainless steel product mix is produced in a directly linked casting-rolling line without intermediate slab inspection or grinding.

This casting-rolling process, of course, is also ideally suited for the production of carbon steels. When former Nova Hut (now AM Ostrava) modernized its flats production, a medium-thick-slab caster was linked with a twin-stand Steckel mill in an extremely compact plant arrangement. This configuration represents a highly economical solution for hot-strip production of up to 1.5 million tons per year. If productivity or gauge requirements exceed those attainable with a Steckel mill, slabs cast in a thickness range between 130 mm and 170 mm can be directly fed to a compact hot-strip mill consisting of a reversing rougher and, typically, six finishing stands. A key advantage of slab thicknesses in this range is that the number of required roughing passes can be reduced. This leads to a higher and more uniform transfer-bar temperature, facilitating the production of thin gauges down to 1.2 mm. Furthermore, this caster type can be backwards integrated into existing hot-strip mills.

Medium-thick-slab casters supplied to China

The first medium-thick-slab caster in China was commissioned at Anshan Iron & Steel Co. (Angang) in 2001. The monthly production of the single-strand machine soon reached 120,000 tons. On the basis of the excellent results, a second machine was installed in 2003. Roughly 50 percent of the hot-rolled strips

have a thickness below 2.5 mm. It could be shown that practically all steel grades can be cast as medium-thickness slabs, including high-value products such as API (American Petroleum Institute) and IF (interstitial-free) grades. Angang therefore decided to further extend its strip production applying this solution. A plant configuration was implemented with two



- 1 2-strand medium-thick-slab caster, Angang, China
- 2 Single-strand, ultra-wide, medium-thick-slab caster, SSAB Swedish Steel (formerly IPSCO Steel), Alabama, U.S.



Single-strand, ultra-wide, medium-thick-slab caster, Nanjing Iron & Steel Co., China

2-strand casters that directly feed the cast slabs into a high-capacity hot-strip mill. This is indeed the most compact plant worldwide capable of producing more than five million tons of high-quality hot band per year. With this economy of scale, conversion costs from steel to strip are much lower than in conventional plants. The impressive production benefits achieved at Angang convinced other Chinese steel producers to base their hot-strip production on the medium-thick-slab casting process, including Jinan Iron & Steel Co., Tangshan Guofeng Iron & Steel Co. and Lingyuan Iron & Steel Co. In all of China, Siemens VAI-supplied medium-thick-slab casters with a total of 13 strands are capable today of casting 16.5 million tons of steel per year.

Ultra-wide-slab casting

Another feature of the medium-thick-slab concept is that the slabs can also be cast in ultra-wide-slab casters followed by rolling in a plate mill. Such plant configurations can produce plates with widths of more than 3 m at thicknesses of up to 50 mm. Siemens VAI installed ultra-wide-slab casters at Ipsco Steel, Alabama, U.S. (now SSAB Swedish Steel), at Nanjing Iron & Steel Co., China, as well as at Tokyo Steel, Japan. This again underlines the high degree of flexibility of the described solution.

According to Andreas Flick, Senior Vice President

of Siemens VAI Continuous Casting Technology, “Our customers are convinced by the benefits offered with medium-thick-slab casters, especially the ideal balance between product quality, caster output, capability to roll thinner-gauge strip and also the overall production flexibility of this line concept. We see a promising outlook for this casting solution for both machine upgrades and backwards-integration projects as well as for new plants.”

Concluding remarks

Medium-thick-slab-casting technology fills the gap between conventional hot-strip production and the latest generation of thin-slab casting and rolling plants. Whether flat or long, ultra-wide or narrow, thick, thin or medium, Siemens VAI offers superior casting solutions to help producers meet their needs for the economical production of all steel grades in the required capacities and product dimensions. ■

Author
Anton Wagner
Contact
casting.metals@siemens.com