

Highly productive billet production at Thép Viet Steel, Vietnam

Thép Viet Steel has built a complete new electric steelmaking plant as a greenfield project. Steel production is based on scrap as input material. The steel is continuously cast into billets on a 3-strand caster. In August 2007, less than two years after contract signature, the new minimill shop went into production in Vietnam. This article summarizes the successful project after two years of operation. In June 2009, the second phase of the project was completed with the commissioning of a continuous rolling mill with a nominal capacity of 80 t/h suitable to produce quality reinforcing bars.



Figure 1. 3-strand billet caster at Thép Viet Steel

In 2005 Thép Viet ordered a complete new electric steel making plant, suitable to produce about 400,000 t/year of billets starting from scrap via the 3-strand continuous billet caster. The first phase of the plant was completed and put into operation in August 2007 just twenty months from placement of the order. The second phase of the project was completed in June 2009 with the commissioning of a continuous rolling mill suitable to produce quality reinforcing bars at a nominal capacity of about 80 t/hour.

The new 3-strand, 8-m-radius, billet caster was designed, manufactured and supplied by STS in less than ten months. Together with a high-efficiency combination of a 60 t AC electric arc furnace and ladle furnace, the caster (figure 1) plays a very important role, as it delivers first class billets directly to the walking beam heating furnace, via the provided hot charging system. Today, the Thép Viet steel making plant is performing well and the billet production rate is typically around 64 t of 125 mm square billets in 50 minutes.

The main features of the continuous caster supplied by STS to Thép Viet are:

- ladle turret and tundish cars equipped with automatically displayed weighing system,
- hot tundishes equipped with quick changing system for nozzles,

- unique mould design with only few, easily assembled components,
- user-friendly foot roller design,
- high-tech mould level control system of the radiometric type, incorporating automatic strand start/stop function and low radioactive sources,
- aprons with automatic, pneumatically controlled/operated pressure and position setting,
- withdrawal-straightening machines, pneumatically operated, double unbending points, with computer controlled straightening pressure,
- pneumatically controlled/operated rigid dummy bar system,
- high-efficiency automatic torch cutting machines with automatic cut-to-length pre-setting system,
- overhead billet transfer bridge with automatic delivery to the turn-over billet cooling and collecting bed,
- hydraulically operated turn-over walking beam billet cooling and collecting bed with final bank,
- highly user-friendly comprehensive HMI supervision system, expandable without major modifications in the years to come.

All the continuous casting machines made by STS are designed to be customer friendly. This provides the operator major advantages, especially during negative economic trends. For example, the caster enables reduction of the mainte-

Giorgio Cabai, President; Fabrizio Cabai, Managing Director, STS Selected Technological Supplies s.r.l., Udine, Italy

Contact: www.sts-cast.it
E-mail: sts@sts-cast.it

nance costs to a very minimum without jeopardizing safety and product quality. The maintenance work can be easily performed without any special tooling. Most components are market available. All parts available on the market are from first class suppliers and can be directly procured simply by looking them up in the provided manuals without requiring any special or hidden code. All electrical and electronic components incorporate most modern and up-to-date technology. All required spare parts are supplied as a service to the customer for the whole life of the caster.

The 3-strand continuous caster delivered to Thep Viet incorporates a modern automatic mould level control system of the radiometric type plus a billet marking machine.

Automatic mould level control system

Liquid steel level control in the mould is recognized as one of the most critical points in the billet casting process. The system developed by STS allows automatic start and stop of the strand in a very easy and safe way and very effectively controls the break-out rate around 0.5% with tendency to zero. The system starts working automatically when the meniscus position is around 80 mm from the top mould flange thus reducing steel turbulence and increasing mould and stirrer activity (where applicable) utilizing the entire copper tube length.

The Automatic Mould Level Control System (AMLCS) of the radiometric type (figure 2) is equipped with low emission sources together with very precise level detection instrumentation directly connected to the scintillation counter. The level instrument makes use of a unique technology of overlapped pulse acquisition that guarantees a very fast and, at the same time, very stable level signal. The result, with open stream casting, is a stable level at a flat line without speed fluctuations.

Billet tracking system

Like all casters made by STS, the casting machine delivered to Thep Viet includes a software package for real-time billet tracking. The package consists of a sophisticated and advanced system



Figure 2.
Automatic mould level control system

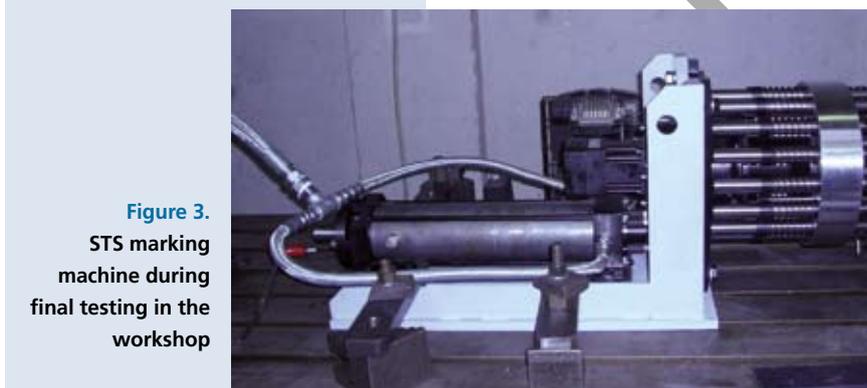


Figure 3.
STS marking machine during final testing in the workshop



Figure 4. Around 64 t of 125 mm square billets are produced in 50 minutes

designed for tracking the billets, allowing real-time monitoring and recording of billet production parameters for off-line analyses.

The system divides the cast sections into small virtual slices and monitors each slice throughout the complete billet casting process, including the cutting line. Independent of where the billets are cut, the system keeps track of the individual virtual slices, enabling their correct assignment to the billet after cut-

ting. Thus the system always provides the correct information of each billet even when changing – for whatever reasons - the billet length during casting.

Billet data are stored for off line analysis and for automatic cast reporting with clear indication of the average solidification parameters and quality-sensitive alarm logging individually for each produced billet. The software is directly interfaced with the billet marking machine.

Billet marking machine

The Thép Viet continuous casting machine is equipped with a marking machine of the revolving type (figure 3) designed and developed by STS for quick marking and easy identification of all the billets leaving the casting machine. This marking machine performs well and safely in the harsh steel mill environment, with maximum working efficiency and minimum maintenance requirements. The punching movement is mechanically driven, with pneumatic servo assistance allowing easy regulation of the impressed force according to specific plant conditions. All movements are driven by brushless motors for maximum precision and reliability. Guides and electrical parts are completely protected from heat and scale to ensure utmost reliability and minimum maintenance.

Conclusion

The casting machine initially started production with 125-mm-square and 12-m-long billets (figure 4). The caster is designed to produce bars up to 160 mm square. During plant commissioning no time was found for an appropriate personnel training abroad. This limitation obliged Thép Viet to use the initial production phase for site experience. Nevertheless, remarkable results were achieved, mainly due to the special dedication of the Thép Viet personnel and thanks to the highly appreciated commitment exercised by Mr. Do Xuan Chieu (Chairman), Mr. Truong Lam (Project Manager) and Mr. Do Hoang Son (Caster Manager). At present the plant is performing well and billet production rate is typically around 64 t of 125 mm square billets in 50 minute long sequence casting. ■



STAHLLEISEN
COMMUNICATIONS