

Celebrating performance achievements and production flexibility of Shougang Jingtang plant featuring Daniele QSP-DUE® technology

The only plant the in world producing HRC in an unlimited range of steel grades, in coil-to-coil, semi-endless and endless mode

A new milestone in thin-slab casting and rolling has been achieved by Daniele QSP-DUE® technology, operating now in China. A celebratory event took place on July 2nd at SGJT premises in Caofeidian industrial area, Tangshan c, Hebei province, China.

There, SGJT has been successfully operating the world-first thin-slab rolling plant, which is flexibly producing quality-strip products in three rolling modes.

Shougang Jingtang produces 2.1 Mtpy of hot-rolled coils in a wide mix of steel grades and strip dimensions, from 0.8- to 12.7-mm-thick and from 900- to 1600-mm-wide

The Daniele QSP-DUE® plant has reached nearly 190,000 tons per month of productivity -equivalent to about 2.3 Mt on yearly basis- exceeding design capacity, with true endless production for up to 97% by weight within each casting and rolling sequence, and about 90% of the overall production below 2.5 mm thickness. Also, casting sequence duration is in excess of 14 hours, with cruise speed of 5.4-5.5 m/min for low-carbon grades and 5.2 m/min for weather-resistant grades. Additionally, up to 37 heats cast in 24 hours, equivalent to about 7800 tons, or the caster throughput of 6.4 t/min, represents a world record in thin-slab casting.

The unique ability of the QSP-DUE® technology is to perform in coil-to-coil, semi-endless and endless rolling modes, selecting the most suitable process in accordance with the high-quality requirement of various steel grades and strip dimension, optimizing at the same time yield, energy consumption and OpEx. This is something completely new, even compared with the latest generation of plants limited to pure endless capability. Furthermore, slab widths can be changed up to 250 mm during casting.

Recent developments in thin-slab casting and rolling plants are focused on endless production, which means a rigid connection between the caster and the mill, so that the buffer function is weakened, the temperature increases, and evenness is strengthened. No buffer between caster and mill could result in high costs due to lost production time during mill roll changes, and longer casting sequences cannot be realized.

Instead QSP-DUE® technology includes an 80-m long tunnel furnace between caster and mill to solve the problems of slab-temperature unevenness, and to create a buffer for mill roll changes. At SGJT online work-roll change during production is regularly performed, without having to interrupt the casting sequence. The tunnel furnace makes it possible to perform the switch-over between the three rolling modes, underscoring its role as a key equipment to maximize plant flexibility.

The single-strand vertical-curved thin-slab caster produces slabs reduced from 130 mm mould-exit thickness to 110 mm, using Daniele dynamic soft-reduction. SGJT is the world's first plant to produce hot-rolled coils starting from 110-mm-thick slabs. The ability to provide the mill with slabs of such thickness is reflected in a remarkable increment in the reduction ratio from slab-to-strip, for the production of coils with outstanding quality.

Furthermore, coil-to-coil, semi-endless and endless rolling modes are an intrinsic benefit of QSP-DUE® technology to optimize the energy consumption according to the final strip gauge.

A capital innovation of QSP-DUE® is to eliminate the use of fossil fuel in all the steps from caster to rolling mill. The tunnel furnace always has been regarded as a polluting part of the process. The new generation of QSP-DUE® eliminates traditional gas heating, operating the furnace with a mix of induction heaters and electrical radiant panels, thus eliminating the direct emission of CO₂.

Danieli Universal Rolling technology is applied to both long and flat products production by using single-strand casters which ensure high productivity and high quality.

For long products (QLP), Danieli Octocaster® guarantees 8 m/min of production speed, which is equivalent to 1.2 / 1.4 Mtpy productivity with just one casting strand. For flat products (QSP), Danieli Dysencaster® targets to average casting speed of 6 m/min for 145-mm-thick, thin-slabs for productivities up to 4.5 Mtpy, again with one casting strand only.

During the event, Shougang Group General Manager Mr. Zhao MinGe claimed: “The world’s first Multi-Mode Continuous Casting and Rolling production line, MCCR, has gone through an extraordinary journey from design, construction, commissioning and operation to a monthly output of more than 188,800 tons in May this year, exceeding the design level and achieving full production”.

He added: “I can still remember that when we discussed the SGJT phase II project, we set a target that we should develop and research the future-oriented advanced technology, reflecting the future technical development direction of the iron and steel industry, and build a low-cost high-end strip production line! The solution of Multi-Mode Continuous Casting and Rolling production line was born, which was the right choice of our guideline of ‘Dare to take responsibility, dare to innovate, dare to be the first in the world’”.

Zhao continued, saying: “In the process of production line design and construction, in the absence of experience to refer to, all parties overcame the difficulties and carried out the research and development of the third-generation endless rolling technology. During commissioning, in the difficulties of Covid-19 situation, the active linkage between local and foreign experts has been implemented in the spirit of ‘One team’ which was proposed by Mr. Benedetti. It not only created a new situation in the changing environment, but also solved one technical bottleneck after another, which greatly shortened the transitional time from running in to stable production. At the same time, it gave birth to new opportunities in the crisis. To change from passive to proactive, our team level has been significantly improved”.

He closed his message by saying: “The road of cooperation and development will be wider and wider, and the achievements of mutual benefit and win-win will be more and more fruitful”.