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Start-up of two continuous slab casters modernized by Primetals Technologies at Angang Iron & Steel

- **Slab quality is improved by further implementing DynaGap soft reduction**
- **Caster availability is increased**
- **State-of-the art automation features and technological packages implemented**
- **Startup 16 days ahead of schedule**

Recently, two continuous slab casters modernized by Primetals Technologies commenced operation at Chinese steel producer Angang Iron & Steel Group Co. (Angang) in its steelworks No. 2 in Anshan. The objectives of the project were to further improve slab quality by implementing DynaGap soft reduction and to increase the caster's availability. To these ends, state-of-the art automation features and technological packages were installed. Despite current quarantine challenges for the project team, CCM5 was started 7 days ahead of schedule and CCM4 went in operation 16 days earlier than planned.

Angang is part of the Anshan Iron & Steel Group Co., one of China's leading steel producers with an annual production of more than 38 million metric tons (2020) and is located in Anshan in Liaoning Province. Steel works no. 2 in Anshan employs a conversion route with a basic oxygen converter, ladle furnace and RH plant.

The single-strand continuous slab casting machines CCM 4 and CCM 5 originally supplied by Primetals Technologies are of identical design and have been put into operation in 2003. Each has a production capacity of 1.15 million metric tons per annum. The machine radiuses are 5 meters and the metallurgical lengths amount to 23.9 meters. The casters produce slabs with a thickness of 135 and 150 millimeters in a width range of 900 to 1,550 millimeters. Casting speeds vary from 1.5 to 3.2 meters per minute. The plants process ultra-low carbon to high carbon steels, deep-drawing, peritectic and structural steels as well as strip grades.

To further improve the internal quality, now all segments are modernized for the implementation of DynaGap soft reduction technology. Along with this modification the complete automation was replaced. The casters are equipped with LevCon mold level control. The straight cassette-type Smart Mold is equipped with the Mold Expert breakout detection system, DynaWidth for automatic width adjustment, and the DynaFlex mold oscillator. Smart Bender and Smart Segments as well as I-Star rollers are used in the strand-guiding system.

Dynacs 3D secondary-cooling model dynamically calculates the full 3D strand-temperature profile at any position along the strand for optimum adjustment of the secondary-cooling setpoints and the determination of the point of final strand solidification. DynaGap SoftReduction 3D fully automatic roll-gap control system allows for dynamic soft reduction to minimize centerline segregation for improved internal strand quality

DynaPhase online thermodynamic phase transformation model calculates material properties like thermal enthalpy, thermal conductivity, density and solid fraction. Furthermore, a number of expert systems were implemented. Intermix Expert provides exact knowledge of the chemical analysis at any position on the strand and online calculation of the mixed steel area and incompatible strand portions. Mold Expert provides on-line automatic breakout pre-detection and mold process data monitoring. Quality Expert online tracking, controls and supervises quality related data and provides quality prediction for the cast products, contributing to the continuous improvement of the product quality. Speed Expert cyclically calculates the optimum casting speed in any casting situation considering the influencing factors like superheat and heat pacing.



Startup of continuous casting machine CCM4 modernized by Primetals Technologies at Angang Iron & Steel

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