

Money-saving solutions for plate mills

Cost-Saving Measures Keep with the Times

Only a year ago, worldwide steel consumption was at an unprecedented peak, and the installed production capacity was just able to meet this demand. As a consequence of this situation and in combination with other factors – such as the dramatic increase in the iron ore, coke, scrap, alloy, energy and freight costs – steel prices reflected this demand. Now with the dramatic reduction in steel consumption, producers are looking to cut costs, and they are focusing on four areas: raw materials, energy, consumables and manpower.



A platemill back-up roll being shipped

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Plate mills are no exception to this rule, and neither are they immune to the need to cut costs during a market downturn for rolled steel products. It's no coincidence, therefore, that several recently developed plate-mill solutions from Siemens VAI target operating-cost reduction for the mill owner.

Reduced raw-material costs: MULPIC® technology

For a wide range of plate products, accelerated cooling systems allow a given set of properties to be achieved using less alloying, leading to raw-material

cost savings and often also enhanced product weldability. As a general rule, the higher the rate of cooling that can be sustained, the leaner the steel can be. In practice, the most severe limitation on high-rate inline cooling is the avoidance of thermal buckling. For this reason, system designs are delineated more by the features incorporated to ensure cooling uniformity than by considerations of efficiency, and the MULPIC® technology, exclusively licensed to Siemens VAI, has a dominant market position because of its proven design for high-intensity cooling uniformity.



Mill operators pulpit at Shagang, PR China

The metallurgical control capability further described in the fourth section of this article is further enhancing its use in precision alloy design.

Reduced energy costs: Plate Steckel Mills

The Plate Steckel Mill solution from Siemens VAI, pioneered at NISCO in China, has set new benchmarks in near netshape rolling for HSLA products including line pipe. In fact, 20 mm thick X70 steel at -15°C has been established as a commercial product, and thicker, stronger and lower-temperature variants are actively being developed. The same process is a focus for hot charging development. By exploiting both, the plate-steckel route can demonstrate 40 percent energy savings over the conventional thick-slab practice for some products. Meanwhile, research is being conducted with the assistance of the Institute for Microstructural & Mechanical Process Engineering (IMMPETUS) at the University of Sheffield to optimize cast thickness and reheating practice with a view to lower energy consumption in plate making.

Reduced consumable costs: large back-up rolls

A major concern for operators of wide-plate mills in recent times has been the severe shortage of large back-up roll casting and forging capacity, leading to prohibitive lead times and prices. Siemens VAI has developed a number of technical concepts both to reduce back-up roll weight (as a temporary solution to reduce manufacturing lead times), and to allow fabricated construction of the roll. These have been complemented by joint development activities in the supply chain aimed at increasing foundry capacity to

enable full-weight back-up rolls to be manufactured. The increase in ingot size has been successfully seen through to a finished roll weight increase of 30 tons.

Reduced manpower costs: new automation concepts

This is an area in which Siemens VAI seems to be ahead of customer needs. Our plate-mill partners consistently tell us that they don't want a mill without operators, because of the critical role that diligent mill staff fulfill in process supervision. Nonetheless, Siemens VAI process-control capability is now ready to provide a completely hands-free rolling process as soon as the market demands it.

Traditionally difficult areas such as squaring and turning can now match the best operators by using vision-system-based techniques. Alignment in the shearline is another area ready for the exploitation of similar principles, and a cross-company development project based at the Siemens Roke Manor Research facility in the UK is investigating the application of vision systems to process control in multiple fields of metals manufacturing.

The Microstructure Monitor, a metallurgical model that predicts steel properties accurately enough to replace the test house mills for some time. It is now available for a significant range of plate grades. Since plate certification safeguards so many safety-critical applications, the development once more leads the market needs (see *metals & mining* 2|2009, p. 58).

Siemens drive systems combine dynamic performance and low energy consumption. For main drives, the most powerful and demanding drives in all rolling processes, the extended vector control with Rotos (Reduced Optimized Task Oriented Switching) is incorporated in the Sinamics SM 150 medium-voltage source converter. It benefits both, making the most out of the drive system and optimized pulse pattern in each mode for a motor-saving operation. Cost savings over the long haul are possible in the entire range of drive solutions, not last by choosing speed-controlled drives instead of constant speed drives for auxiliary applications (see *metals&mining* 1|2009, p. 52). Plate-mill technology development at Siemens VAI continues apace, bringing new processing capability as well as cost reductions for our customers. ■

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