Improved EMLI Technology for Early Slag Detection and Enhanced Steel Yield and Quality

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Ladle slag carryover into the tundish has been a significant challenge in steelmaking, adversely affecting the tundish refractory material reducing its lifespan. Additionally, slag carryover compromises steel quality due to slag entrainment, which is a primary source of undesired inclusions in the final products. To achieve high-quality steel and maximize yield, it is essential to minimize slag carryover. A sensitive slag detection system is required to control the quality by controlling the movement of slide gate plates.

Among the various solutions currently exist, electromagnetic slag detectors have proven highly effective, significantly reducing the amount of slag carried into the tundish. It is mounted close to the slide gate system allowing direct measurement of the slag carry-over through the flow channel. This technology enables the production of superior-quality steel achieving notable increase in yield. As customer demands for higher yield continue to grow, there is an ongoing need to enhance the sensitivity of slag detection sensors to meet these expectations. To enable real-time and early warning of slag entrainment during the tapping process, a slag detection system with higher sensitivity, faster response and higher repeatability is required.

The present study reports the comparison in performance of the different EMLI slag detection sensors (both existing and new) at the Höganäs AB facility in Halmstad. The measurements show that the new system achieved 40 to 50% improvement in response time, with a slag detection probability exceeding 90% compared to the existing system. The next generation sensor has the potential of detecting difficult steel grades in shrouded condition improving process efficiency and product quality. In conclusion, the new sensor can further minimize slag transfer due to its improved characteristics by providing a reliable detection signal of the slag to close the gate, providing a desired balance between a higher yield and quality.

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