

LF-EMS, Electromagnetic stirring for ladle furnaces

More melt per day, less energy and cleaner product at Pilsen Steel, Czech



“ABB’s EMS solutions and their outstanding long-term performance are important for Pilsen Steel to act as a globally competitive and reliable supplier of quality products. With the new EMS we can achieve one extra melt per day and we expect an investment payback within 11 months,” concludes Steel plant manager Mr. Martin Novak

Summary

- Revamp in 2007 of earlier EMS installations for 70 and 120 tonnes ladles
- New EMS with increased stirring power for one additional melt per day
- 7% shorter mixing time after vacuum degassing of steel bath
- Electric energy consumption reduced up to 5 kWh/tonne
- Investment payback within 11 months

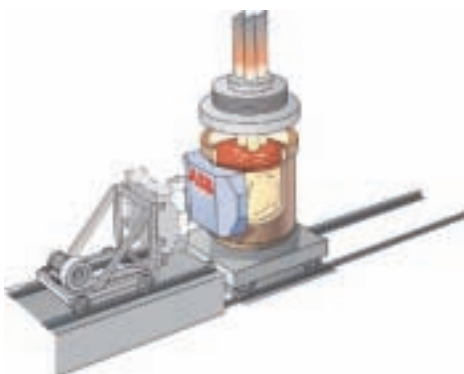
Customer

Pilsen Steel, Czech formerly Skoda Steel and Skoda Hute is a company with over 140 years experience and 1900 employees. The company has steel making, casting and forging capacity 1 to 80 metric tonnes with downstream machining capabilities. 75% of the production is for export and the main customer segments are power generation, shipbuilding and rolling mills as well as cutting and forming machinery producing crankshafts, wind mill shafts, etc.

Objectives

EMS was installed by ABB in 1985 at the ladle furnace in Skoda Steel. After more than 20 years of continuous operation, Pilsen Steel saw the need to upgrade the process to meet the requirements for today’s steel products and qualities. To achieve Pilsen Steel’s project targets, ABB proposed that Pilsen Steel increases the stirring performance of their EMS system. This recommendation was based on process experience and simulation data from over 130 ABB EMS installations in ladle furnaces worldwide.

Electromagnetic stirring by ABB



In metallurgical processing, effective and reliable stirring of the melt is one of the prerequisites for higher productivity and improved process performance. In over 1200 installations, the steel and aluminium industry have chosen non-contact electromagnetic stirring technology, invented and continuously adapted by ABB, to deliver necessary long-term and important viable results.

By electromagnetic stirring, EMS, it is possible to achieve effective stirring by the interaction between the magnetic field from the static induction coil placed outside the ladle furnace and the electrically conducting metal bath. The low frequency field penetrates through the ladle wall for non-contact stirring of the melt. Induction stirring in the ladle furnace gives efficient mixing of the entire melt while maintaining an unbroken protective slag layer in the ladle.

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With over 130 EMS systems in ladle furnace installations since 1965, ABB can accurately define optimized solutions for any ladle furnace between 20-300 tonnes with project payback and performance guarantee.

ABB scope

- Stronger EMS unit from 1000 to 1300A, (standard unit ORT 1350)
- Control system integrated into operator's control room
- Auxiliary EMS system parts
- Installation supervision, commissioning & training
- Spare parts

Benefits

- One additional melt per day, from 5 to 6 melts/day
- 10% shorter refining time
- Reduced electrical consumption of arc furnace to 5 kWh/tonne
- 7% faster mixing time after vacuuming
- Stabilized production reliability for Clean and Super-Clean steel grades
- Return of investments within 11 months
- Time for preventive maintenance reduced by 20%

Leading solutions for challenging objectives

Based on vast process experience and accurate simulation tools ABB can early define the results of implementing EMS. Achievable results depend on customer targets, current process conditions and chosen solutions. ABB can conclude the following, based on 130 installations of EMS on ladle furnaces:

- 5-15% higher yields of alloys and 5-10°C lower tapping temperature
- Less synthetic slag addition with still unbroken slag layer
- Higher heating efficiency and less wear of electrodes
- Cleaner steel, for example 10% less oxygen and hydrogen content
- Minimum maintenance costs because of non-moving parts and non-coil contact with the furnace or the melt
- No impact on existing or new ladle furnace design and function
- Safe and easy stirring operation, typically 1-2 melt rotations/minute, fully variable and reversible
- Standard stirring units for 20-300 tonne capacity ladle furnaces
- Rapid implementation with one day start-up and pay back within 11 months
- Turnkey and performance guarantee commitments with financial solutions/package and worldwide service organisation



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