AL-EMS, Electromagnetic stirring in aluminium

Reliable, consistent and boosted melting productivity at SAPA Heat Transfer

"Our operators are extremely satisfied with ABB's electromagnetic stirrer. It helps us increase and maintain consistent productivity, save energy and drastically improve our working environment and safety conditions", says Mr. Anders Johansson, Process Development Manager-Metallurgy

Summary

- **EMS installed as a turnkey project in 2005 on an existing 28 tonne melting furnace**
- **Productivity increase of 17% with 11% reduction of dross**
- **Fuel savings of up to 7%**
- **System availability 100% during 3 years of operation**
- **Performance according to guarantee and payback within one year**

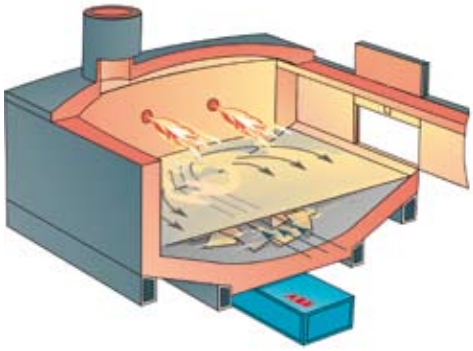
Customer

SAPA Heat Transfer is a world leading manufacturer of heat-exchanger strip for the automotive market. In Finspång, Sweden the annual production reaches 70,000 tonnes of rolled and slitted aluminium products. In the cast house, rolling and slitting mill scrap, wire mill and lithosheet scrap and primary ingots are melted. The melt is transferred to a holding furnace prior to casting. The slabs are used within the downstream rolling mill.

Objectives

In 2002 SAPA wanted to increase the in-house production of slabs due to the rising cost of sourced slabs. With 24 hour/7 day operation SAPA looked for solutions to boost productivity and to reduce operation cost of the 28 tonne melting furnace. The furnace had an average melt rate of 2.8 t/h and an annual production of around 23,000 tonnes. SAPA identified a need for implementing more effective and reliable stirring to replace the manual stirring.

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 reach effective stirring by the interaction between the magnetic field from the static induction coil placed on the outside of the furnace and the electrically conducting metal bath. EMS effectively reduces elevated surface temperatures and eliminates hot-spots of the melt. This and the minimized oxidation of the melt surface greatly improves the heat transfer to the melt for increased productivity. Stirring by EMS also allows for more uniform chemical analysis.

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Simulation tools are based on 1200 EMS installations and quickly indicate possible solution, project payback and performance guarantee for any 5-200 tonne furnace. At SAPA the result is effective stirring of the entire melt, ~1 rotation/minute, which is every 5 minutes reversed

ABB scope

- Complete turnkey project with performance guarantee
- EMS unit, standard model ORD18
- Control system integrated into operator's control room
- Auxiliary EMS system parts
- Installation, commissioning and training

Benefits

- Productivity increase of 17% with 11% less dross
- 34% increased productivity together with effective oxyfuel system
- Fuel savings of 7%, with the same reduction of CO_2 emissions
- Rapid homogenization of temperature and chemical analysis
- 100% system availability during 3 years of operation
- One day start-up and performance according to guarantee
- Payback within one year
- 41% less door open time with less manual stirring, raking operations and maintenance

Leading solutions for challenging objectives

Based on vast process experience and accurate simulation tools ABB can early define the results of implementing EMS. Possible results depend on customer targets, current process conditions and chosen solution. ABB can conclude the following, based on 100 installations of EMS at/on aluminium melting and alloying furnaces:

- Up to 25% increased productivity since effective stirring of the entire melt, 5-200 tonnes
- Up to 15% fuel savings and simultaneous reduction of fuel related emissions
- Up to 25% reduction of dross
- Up to 50% cost savings for fork lifts, rakes and manual labour
- 100% availability since EMS unit has no moving parts and is never in contact with furnace or the melt
- Safe and easy operation of stirring, typically 1-2 melt rotation/minute, fully variable and reversible
- No change of design or function of existing or new furnace and no need for any heel
- Rapid implementation with one day start-up and pay back within 12 months
- Turnkey and performance guarantee commitments with financial solutions/package and worldwide service organisation

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