17% improved productivity for Nordural with ABB electromagnetic stirring

Electromagnetic stirrer for aluminium furnace reduces cycle time, eliminates pre-alloying, facilitates de-drossing & increases safety at one of Europe’s largest & most sustainable aluminium smelting plants.

Nordural in Grundartangi, Iceland is one of Europe’s largest aluminium smelters, responsible for supplying 2% of aluminium globally with an annual production of around 317,000 tons of pure aluminium and aluminium alloys. In line with the company’s commitment to producing low carbon aluminium, the plant uses electricity from renewable and sustainable resources and considers it key to have well-maintained equipment and to run their smelter at maximum efficiency.

Customer need
As demand for more complex alloy products grows together with the need to keep costs at a minimum, aluminium producers are increasingly turning to cheaper alloys which are much harder to dissolve. The need to stir the aluminium melt becomes greater, though in ways that do not compromise on modern safety standards. In 2017, Iceland’s Nordural Grundartangi installed two ABB AL-EMS’ with the aim of increasing the overall efficiency and safety of its alloying furnaces.

Customer site: Nordural Grundartangi, Iceland
Customer need: Enable efficient, consistent melting of cheaper, harder master alloy via improved dissolution rate
Application: Aluminium alloying furnace
ABB scope: 2 x ORZ 320 AL-EMS electromagnetic stirrers
Customer benefits: 17% improved productivity including reduced cycle time, removal of pre-alloying step, simplified de-drossing, improved safety
Commissioning year: 2017
**ABB solution**

“Stirring the melt decreases temperature gradient, resulting in lower surface temperature. A cooler surface significantly reduces surface oxidation and minimizes dross formation, which is major challenge with aluminum furnaces,” said Tommy Jonsson, Regional Sales Manager for North Europe at ABB Metallurgy. “Full power stirring is particularly well-suited to improving alloy dissolution rate, which enables aluminum producers to melt harder master alloys without compromising on efficiency”.

“The ABB AL-EMS’ strong stirring action allows us to dissolve Ti80Al20 master alloys directly in the furnace instead of pre-alloying in a ladle, meaning we can eliminate one step in the process. This, together with a shorter cycle time, has resulted in a 17% improvement in furnace productivity.” noted Halldor Gudmundsson, responsible for alloys and product development at Nordural Grundartangi’s casthouse.

Electromagnetic stirring works on the principle of a linear motor. An induction coil is placed under or at the side of the furnace. When electricity is applied to it a traveling magnetic field is generated, penetrating the furnace bottom and refractory to create a powerful stirring action throughout the entire melt. The ORZ 320 model installed at Nordural Grundartangi uses a multi-coil concept (MCC) that allows two stirrer coils (located under the furnace) to share transformer and frequency converter via a switch-over unit with one control system and water station for cooling water.

Electromagnetic stirring also helps to reduce rejects and increase aluminium yield due to faults caused by variations in melt chemical analysis “The global stirring force delivered by the ABB AL-EMS involves minimal operator intervention for the entire furnace cycle, and requires negligible maintenance,” said Tommy Jonsson.

Control parameters for the AL-EMS including stirring force, interval and direction can be adjusted as per customer requirements, resulting in optimization of the furnace process as well as reduced energy consumption, which helps to lower costs. Additionally, safety is increased with less human intervention and simplified dedrossing.

**What can you expect from an ABB AL-EMS?**

Results from our 320+ installations worldwide show that the ABB AL-EMS facilitates energy savings of up to 10 percent as temperature difference between the melt surface and the roof is maximized, improving heat transfer to the melt and reducing heat loss. Dross formation can also be reduced by as much as 16 percent, resulting in higher yield and contributing to productivity improvements of up 25 percent. The ABB AL-EMS is characterized by simple and safe operation with low running costs and very little maintenance.

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