

# AL-EMS, Electromagnetic Stirring of Aluminium

## Optimised stirring for melt homogenisation in aluminium ladles at Ljunghäll AB, Sweden



“ABB’s AL-EMS System works without any problems and allows us to assure total melt homogenisation for producing high quality die cast products.”

Morgan Karlsson  
Meltshop Manager

### Summary

- Less than 4°C thermal displacement between surface and bottom during heating
- Reduced surface hotspots and thereby surface oxidation
- Increased heat transfer to melt
- Payback within one year

### Customer

Ljunghäll AB is a manufacturer of die cast aluminium products and specialises in technically advanced castings for the automotive, telecom and general industries. They work as a development and, in some instances, design partner from an early stage, creating added value through offering complete solutions, products and associated services that meet the high quality, safety and environmental requirements of their customers.

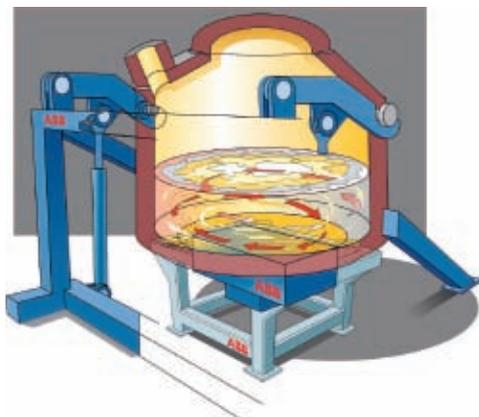
### Objectives

As an economical consequence they are purchasing liquid aluminium which is delivered once a day in three 8-tonne ladles. Since the aluminium is not used immediately, the ladles can be idle for up to 24 hours. To maintain to quality both stirring and heating are crucial during this time. Therefore Ljunghäll AB decided to invest in ABB’s stirrer system, AL-EMS, to assure total melt homogeneity but also to improve burner fuel efficiency.

### Highlights

By acquiring ABB’s stirrer system, AL-EMS, Ljunghäll AB obtained a total melt homogenisation in their aluminium ladles. The AL-EMS reduces the surface temperature by suppressing surface oxidation and improving heat transfer to the melt. This reduces the burner’s running costs and improves melt quality due to the absence of chemical and thermal gradients.

### 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 has 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 attain effective stirring through 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 hotspots of the melt. This and the minimised oxidation of the melt surface greatly improves the heat transfer to the melt. Stirring by EMS also allows for a more uniform chemical analysis.

The ABB logo, consisting of the letters 'ABB' in a bold, red, sans-serif font.

# Reliable and Consistent Stirring at Ljunghäll AB



Left picture: Simulation tools are based on 1200 EMS installations and quickly indicate a possible solution, project payback and performance guarantee. At Ljunghäll AB the result is effective stirring of the entire melt, ~1 rotation/minute.

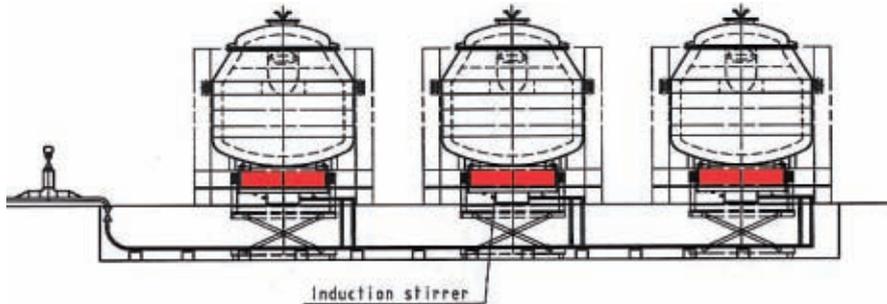
Right picture: Eight-tonne aluminium ladle placed in tilting rig with an ABB AL-EMS mounted beneath.

## ABB scope

- Performance guarantee
- 3 EMS units, standard model ORD 12
- Control system integration
- Auxiliary EMS system parts
- Installation, commissioning and training

## Benefits

- Rapid homogenization of temperature and chemical analysis
- Reduced surface hotspots and thereby surface oxidation
- One day start-up and high system availability
- Payback within one year



## Leading solutions for challenging objectives

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

- 100% availability since EMS unit has no moving parts and is never in contact with the ladle or the melt
- Safe and easy operation of stirring, typically 1-2 melt rotations/minute, fully variable and reversible
- Rapid implementation with one day start-up and payback within 12 months
- Turnkey and performance guarantee commitments with financial solutions/packages and worldwide service organisation



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