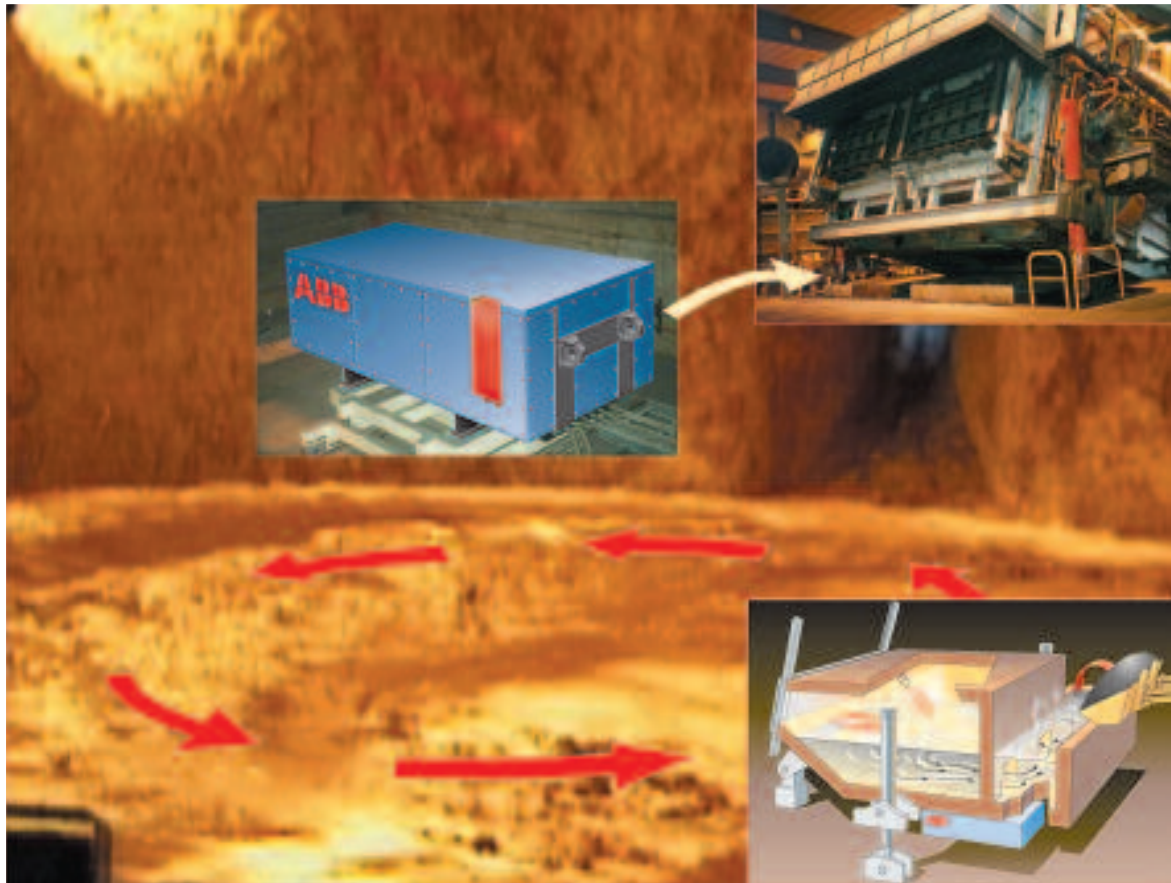


# AL-EMS

## ElectroMagnetic Stirrers for Aluminium Furnaces



## AL-EMS

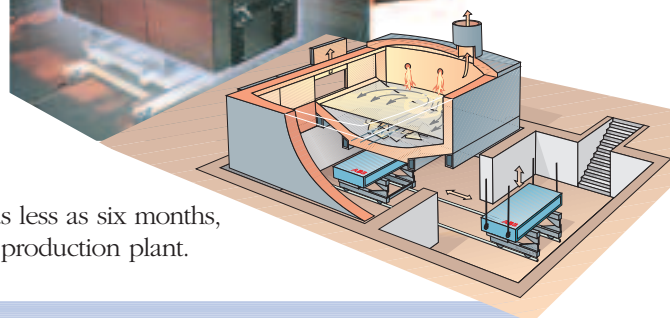
# ElectroMagnetic Stirrers for Increased Productivity & Economy in Aluminium Processes

ABB's ElectroMagnetic Stirrers, AL-EMS help you to be more cost effective and to achieve tighter tolerances in your aluminium melting, holding and refining operations.

Efficient stirring of the aluminium melt is one of the most decisive factors to speed up the kinetics of reactions and for improvement of the heat and mass transfer, which are factors essential to increase the productivity, with retained or improved quality.

AL-EMS has shown to increase the productivity by 25%, reduce energy consumption by 15% and reach a dross reduction of more than 25%. With over 100 installations world wide, ElectroMagnetic Stirring can be considered as the most efficient tool to achieve these benefits.

As we often can find a pay-back time for an AL-EMS system to be as less as six months, we trust that you will find the AL-EMS indispensable for your own production plant.



## Boost your Furnace Performance



- Drastically Reduced Dross Formation
- Increased Production Rate
- Improved Metal Quality
- Decreased Energy Consumption
- Increased Furnace Lining Life
- Reduced Maintenance Cost

## Basic Characteristics

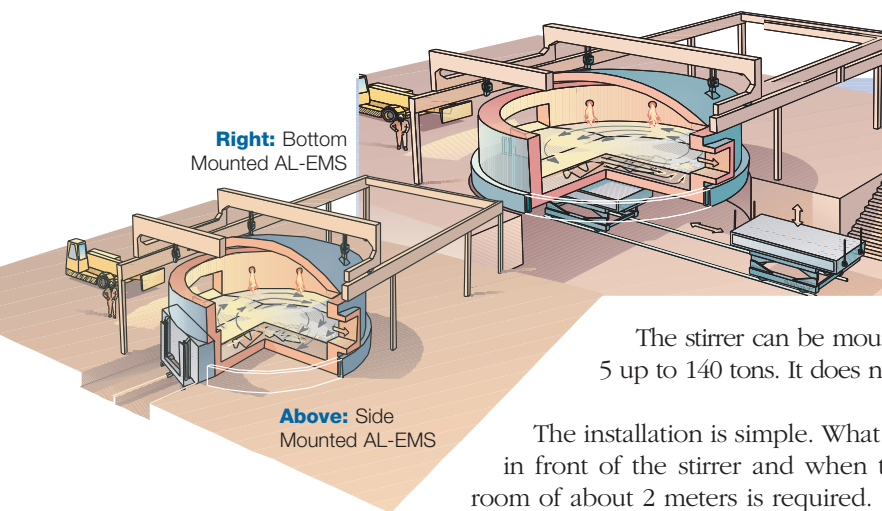
- AL-EMS is the most powerful stirring system available on the market, able to achieve one revolution of the entire furnace volume in less than a minute.
- Both bottom and side mounted versions are available both for melting and holding furnaces.
- No physical contact with the melt and no moving parts, resulting in low maintenance demand.
- Normal refractory lining can be used.
- Extremely reliable operation, with no risk for critical operational factors such as clogging tubes.
- Stirring can be performed throughout the entire melting and refining period.
- The stirring direction can be reversed, which facilitates dross skimming and counteracts dead corners.

## What is EMS?

EMS is based on the principle of a linear motor. An induction coil is placed under or at the side of the furnace and a travelling magnetic field is generated when electrical power is applied to the coil.

The metal movement is the result of the interaction between the magnetic field and the electrically conducting metal bath. An analogy can be made with an electric motor, where the stirrer acts as the stator and the melt as the rotor.

Generally, all liquids that are electrical conductors can be stirred with EMS ElectroMagnetic stirring in the aluminium furnaces. AL-EMS gives efficient mixing of the entire melt with a minimum of necessary action by the operator. Installation is simple and maintenance is almost negligible.



## Will the AL-EMS Fit your Furnace?

The stirrer can be mounted on round or rectangular furnaces from sizes of 5 up to 140 tons. It does not matter if it is a melting, holding or shaft furnace.

The installation is simple. What is needed is a non-magnetic plate (stainless steel) in front of the stirrer and when the AL-EMS is placed under the furnace, a head room of about 2 meters is required.

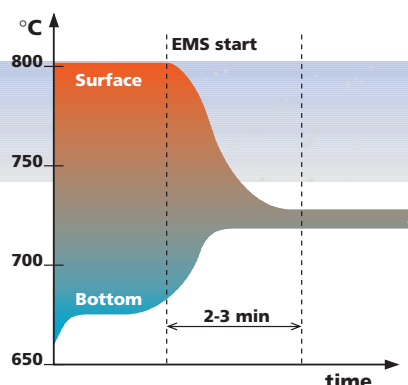
The AL-EMS has no limitations regarding installation on tilting or stationary furnaces.

## Homogenization of Temperature and Analysis



The temperature difference between top and bottom of an unstirred bath normally lies in the range of 50 to 80°C. With the forced circulation of AL-EMS, the temperature difference decreases to less than 5°C in about 2-3 minutes after the start of the stirrer.

At the same time, the dissolution rate of alloys will be improved by a factor of 5-10.



## Energy Savings

The heat transfer to the melt will be improved, since the temperature difference between the melt surface and the roof is maximized.

Savings up to 15% have been achieved due to reduced heat losses and improved heat transfer to the melt

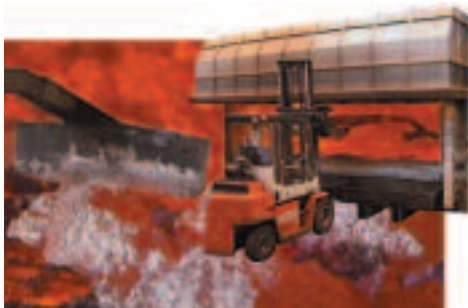


## Reduction of Dross Formation

The oxidation velocity of aluminium increases rapidly at temperatures over 775°C. By stirring the melt with AL-EMS we will obtain a decreased temperature gradient resulting in a lower surface temperature which will significantly reduce the surface oxidation.

The rapid and complete homogenization of the analysis throughout the entire melting and refining period coupled with the minimum use or complete elimination of mechanical stirring due to electromagnetic stirring, will further reduce the formation of dross.

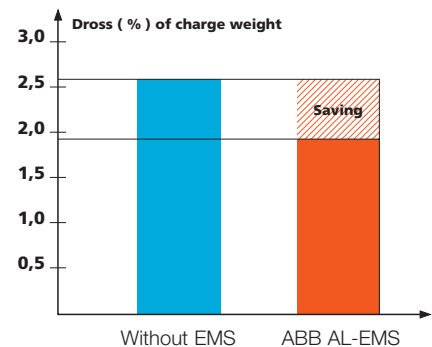
- Reduction of dross formation 25 - 50% has been achieved
- Substantially decreased need for mechanical stirring and knockdown of scrap
- Stirring pattern on the melt surface will facilitate dross skimming



Traditional mechanical stirring and dross skimming



Optimized stirring with AL-EMS



## Economy

The increased heat transfer, the improved dissolution rate of alloys and the drastic reduction of dross formation obtained with AL-EMS, will result in considerable cost savings and production increases.

When adding the costs associated with manual stirring such as rakes, fork lifts and repair of furnaces and lining damages, plus the savings in energy consumption related to operating with a closed furnace door during stirring, an AL-EMS investment will, in most cases, show a pay-back time of about 6-12 months. The total savings over a five years period will, in any case, be huge.



## AL-EMS are designed for high **Performance**, **Simplicity**, **Reliability** and long **Life**.

The power supply equipment is extremely compact, resulting in less space requirement in the electrical room. If needed in your facilities, a container solution is also available to house the electrical equipment, as well as the water cooling system.

The use of ABB's frequency converter ACS 600 and the ABB controller makes it possible to have simple control of the stirring power and direction of the traveling field. Low frequency is applied to all AL-EMS systems in order to generate a deep penetrating magnetic field. Cooling of the stirrer is accomplished using hollow copper conductors, which require a small amount of low conductivity cooling water. In between the windings, dry, rigid vibration-proof insulation is used.

By using many of ABB's standardized components that are well-proven and widely acceptable, the system purchase price can be kept low and technical risks and maintenance will almost be eliminated.

# Improved furnace Economy with AL-EMS

**Increased lining life with AL-EMS**

**Gas-savings up to 15%**

**Dross-reduction up to 25%**

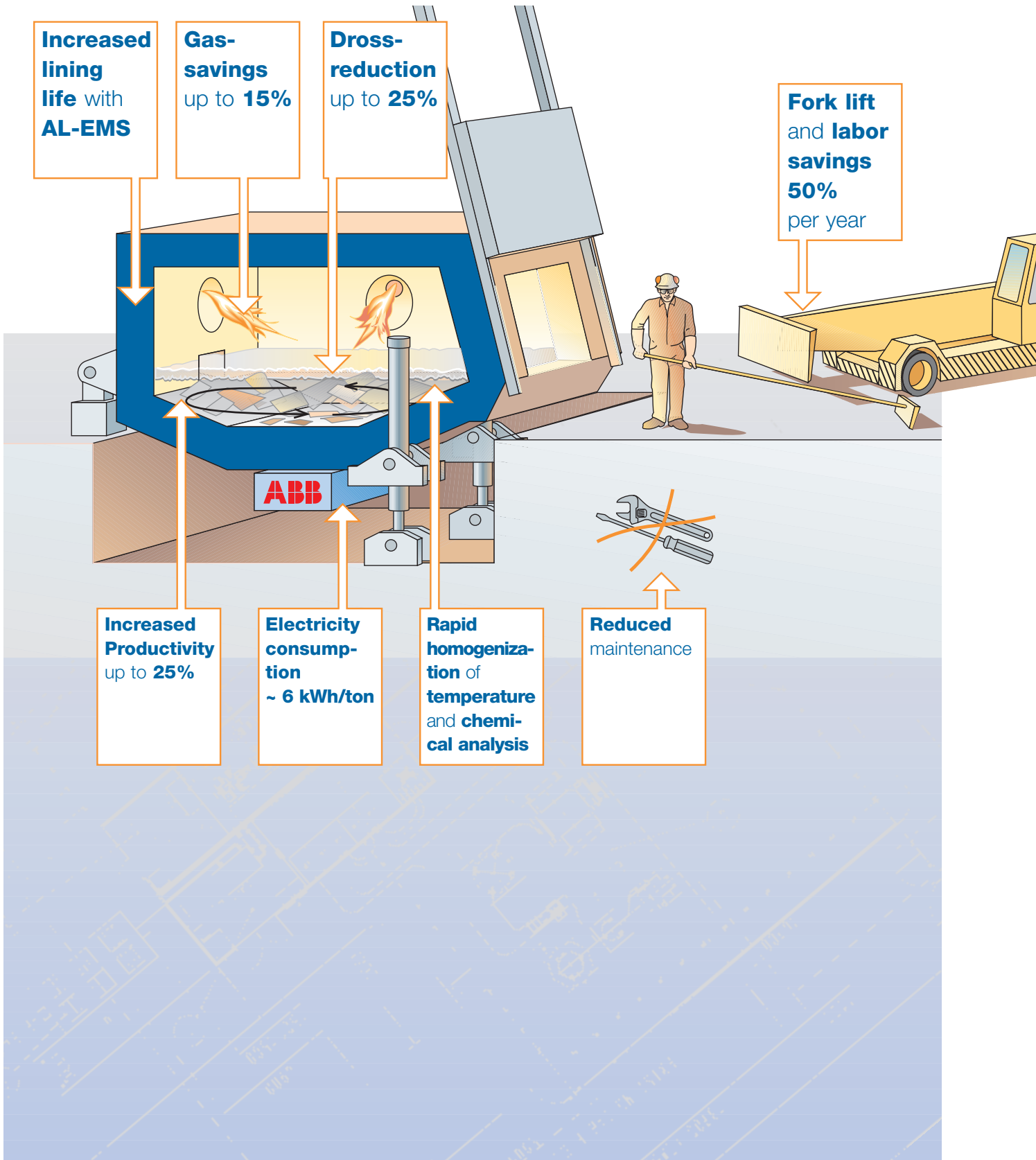
**Fork lift and labor savings 50% per year**

**Increased Productivity up to 25%**

**Electricity consumption ~ 6 kWh/ton**

**Rapid homogenization of temperature and chemical analysis**

**Reduced maintenance**



# The **Reliable** way to **Quality** in **Metallurgical Processing**

In metallurgical processing, the technology employed for stirring and mixing the melt is one of the prerequisites for higher quality and productivity. ABB's electromagnetic stirrers and brakes were designed with these in mind. The resulting benefits in terms of reproducible, profitable production have demonstrated over and over again. The pay back times for the investments are less than one year for many of our customers.

As a diversified, multinational company operating in all parts of the world, ABB is not only able to provide advanced Industrial IT solutions for stirrers and brakes but also to assist our customers world wide to finance the investment, to service and maintain it, and to fine tune and upgrade the equipment. Combined with our metallurgical know-how, this makes ABB an ideal, dependable partner for your company when it comes to selecting and installing electromagnetic products for aluminium melting and holding furnaces and casting.



Being a company with a history going back over 120 years and with a vast process knowledge in melt/cast operations based on more than 50 years experience, ABB will not only still exist when our customers need a helping hand but also have the competence and network to provide high quality products and local services for years to come.

You will find our representatives in most countries and on all continents. We are confident that you will find it worth while to further investigate what ABB can offer within Electromagnetic Technology in Metals.



### ABB Metals

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