IBAAS 2025
TECHNICAL LECTURE SERIES

CONTACTLESS EMS STIRRING OF BATH AND 95% ALUMINIUM RECOVERY FROM DROSS : A MODERN APPROACH TO FURNACE OPTIMIZATION

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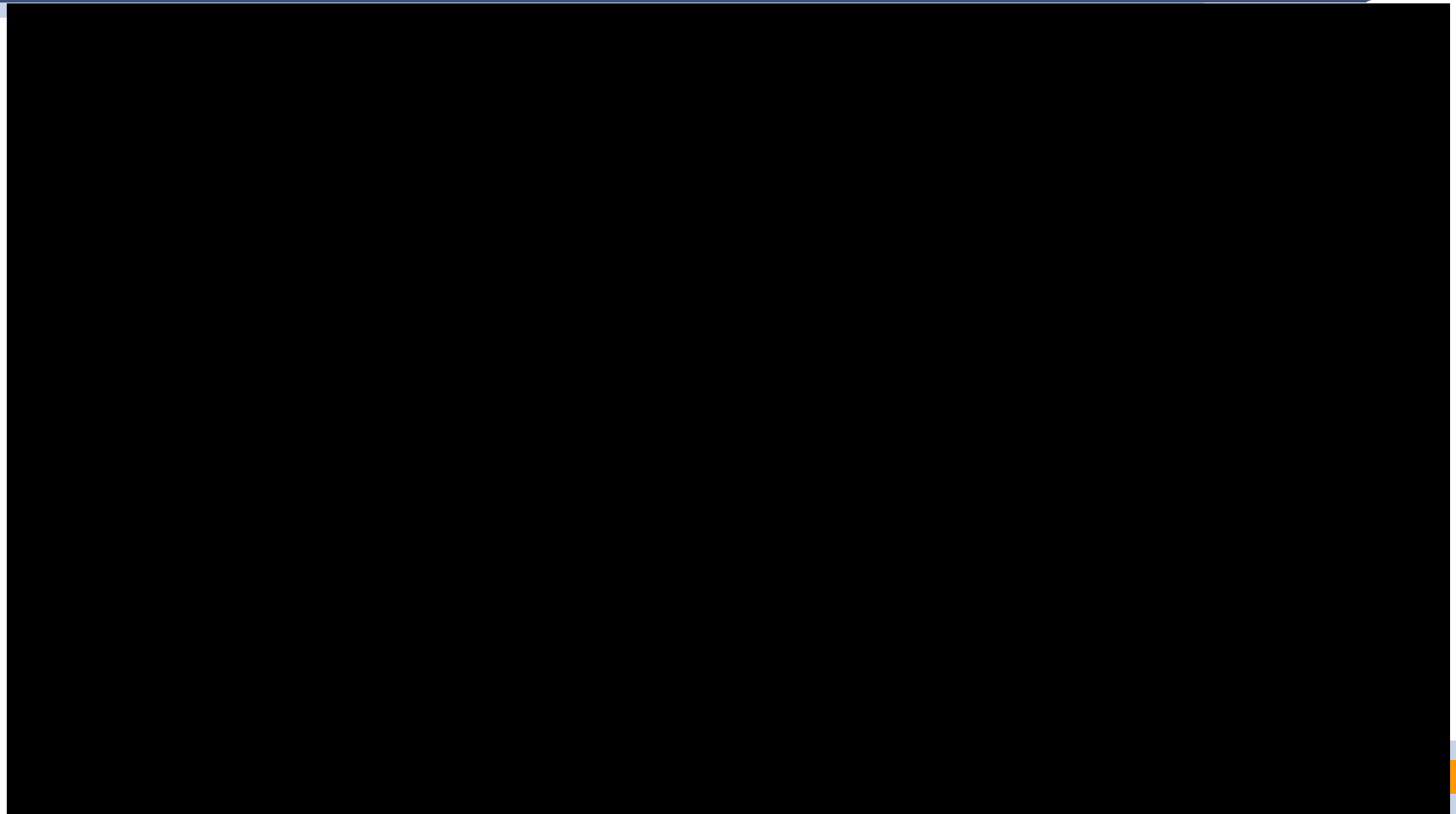
FLOW OF PRESENTATION

1. ALTEK Video on Dross Management Value Chain.
2. ALTEK Brief.
3. CASTHOUSE KPI Expectations – Furnace Operations.
4. Bath Stirring : Contactless EMS Option and How it Works.
5. Advantaged of EMS as way forward.
6. ALTEK EMS : Types and Advantages.
7. ALTEK ONSPEC : A Complementary Technology to EMS

1. DROSS Generation and Its Handling post Skimming.
2. PRIMARY Recovery Of ALUMINIUM From DROSS : **DROSS PRESS** as way forward
3. Factors in Designs of Dross Press.
4. ALTEK DROSS PRESS Advatages
5. SECONDARY Recovery Of Aluminium : **ALTEK ALU SALT** Process
6. SECONADRY RECOVERY Of Aluminium : Salt free "**R A M E**" Technology for smelters.
7. Complete DROSS MANAGEMENT Value Chain Strategic Thinking.
8. Conclusions
9. Q & A – Thought Provocations

A quick tour of Dross Management : Video



ABOUT ALTEK – EXPERTS AND REPUTED IN DROSS MANAGEMENT

- ALTEK is a technology-based company in the design, manufacturing and installation of Aluminium Dross & Scrap Processing Plants.
- 2 MFG Bases- UK & USA.
- Customers - Novelis, Hydro , Others for Years.
- Products include EMS, Dross Press, Dross PANS, Tilt Rotary Furnaces, ONSPEC online Metal Analyzer, and Zero Waste Processing plants(ALUSALT and RAME).
- Part of Large Conglomerate US$ 5 Billion HARSCO for STEEL Industry.

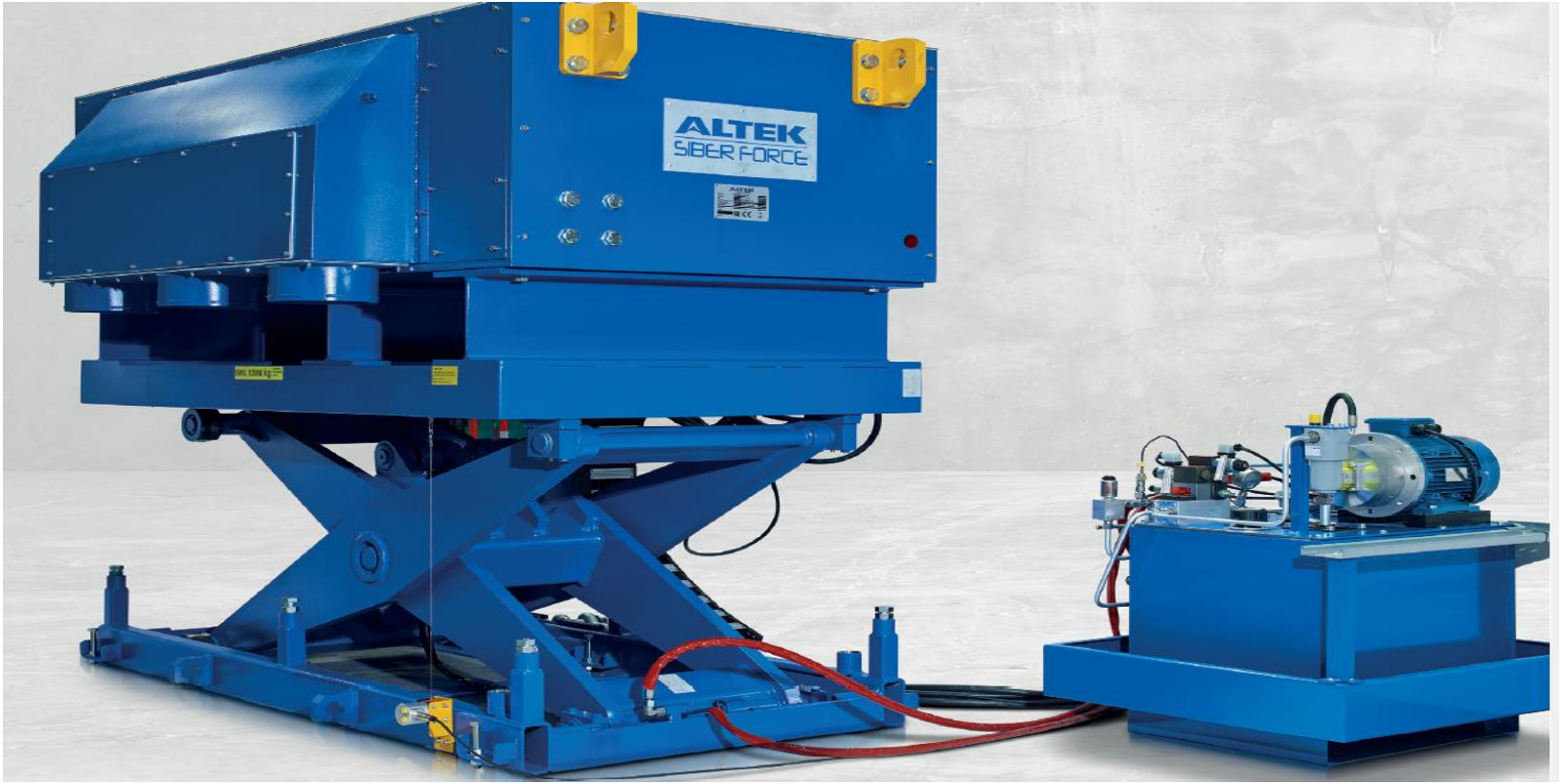
Cast House Operations : Expectations

Main Key Performance Expectations circles around:

1) Melt Cycles
2) Melt Loss
3) Heat Loss
4) Quick Alloying Time
5) Homogeneous Bath Temperatures
6) Less Dross generations
7) Maximum Aluminium Recovery from Dross
8) Dross Handling and Disposal
9) Safety

And Many More

Contactless EMS Stirring



EMS : How It Works when Furnace door is closed.

Electromagnetic Stirring for Furnace Bath Stirring.

Concept is based on the principal of a linear induction motor.

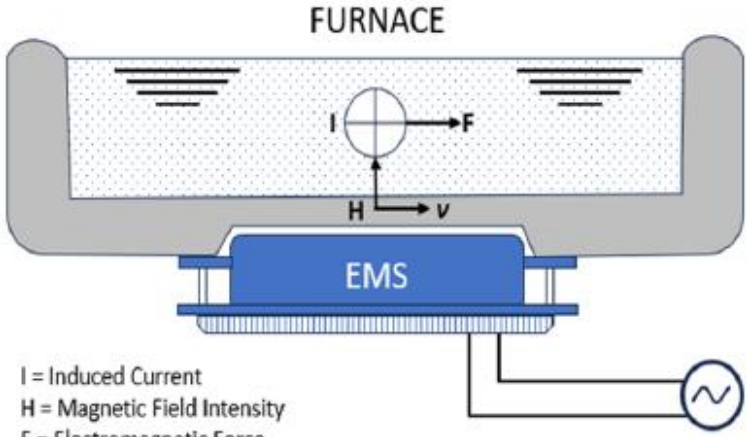
A low frequency air-cooled inductor is placed on the bottom or side of a furnace. When electrical power is applied to the coil, a magnetic field is generated creating a strong movement of molten metal.

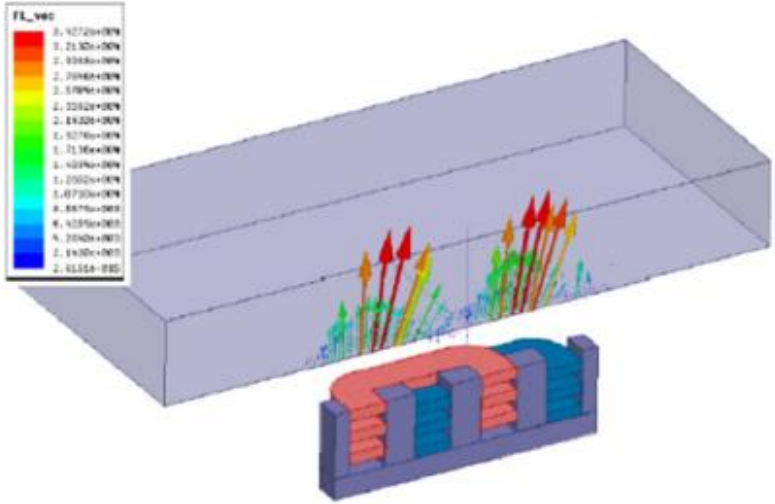
The magnetic field penetrates any kind of refractory type or thickness meaning EMS can be installed on almost any type or configuration of furnace.

No physical contact is made with the molten bath

The system comprises of no moving parts.

Graphical Representation of EMS Working





Expected Advantages of EMS

Increased productivity - Increased thermal transfer of burner energy to solid metal, improved alloy dissolution and reduced dross formation all contribute to a significant increase in productivity up to 25%.

Energy savings - Typically uses 90 -140kWh per furnace cycle also reducing Fuel or Gas consumption by as much as 15%. This equates to large energy savings year on year.

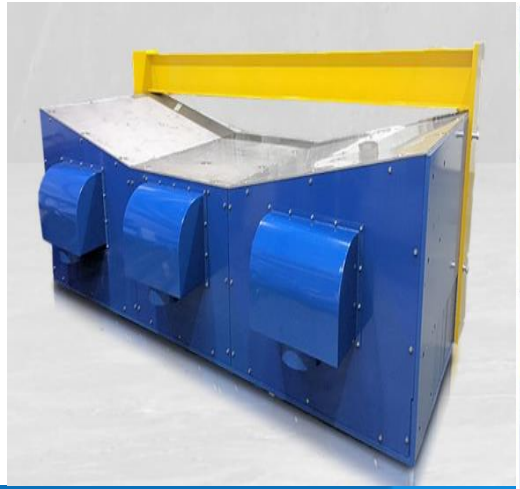
Temperature and chemical homogeneity - Once the stirring cycle is initiated, the thermal gradient between the top and bottom of bath will be ±5°C within 5 minutes.

Reduces melt loss up to 25%*

No moving parts and easy to maintain

It is said that 8 Minutes of Furnace door opened looses US$ 1,000

ALTEK EMS TYPES AND ADVANTAGES



Versatile

Altek's EMS is extremely powerful, and can be used in many stirring applications: bottom-mounted, side-mounted, for side-well chamber pumping, multi-chamber circulation and more.

ALTEK EMS ADVANTAGES

SIBER FORCE® EMS Bottom-mounted with wheels on a support frame with rails (left) and Lift System (right)

Advantages : Many – Mainly

1) The stirring action created by the SIBER FORCE® EMS is more effective compared to other technologies allowing all parts of the furnace to be stirred rapidly and homogenously.

2) The Inductor is 100% air-cooled reducing its power consumption when compared to other devices and from a safety aspect, eliminates the use of water around the furnace.

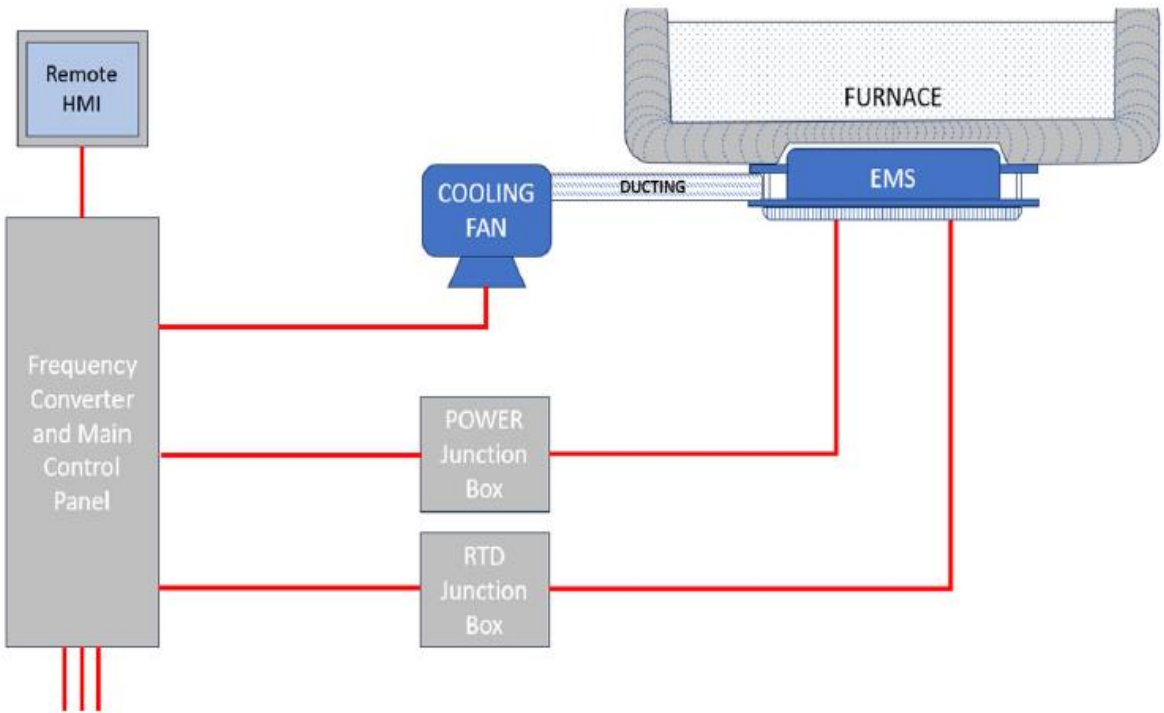
3) The SIBER FORCE® EMS can be fitted to both the side and at the bottom of a furnace making it uniquely suitable for both new and retrofit installations.

ALTEK EMS : Advantages over Water cooled Old Technology

1. Lower annual operating costs (by 25 to 50%) due to lower power consumption (inductor coils are made from solid copper conductors and not tubing).
2. Improved heat losses within the stirrer (as compared with a water-cooled hollow copper tubing) allows the inductor to be air cooled.
3. Installation and maintenance are easier as they provide for long life with minimal maintenance.
4. No emergency water back-up supply needed (usually required to protect water-cooled coils in case of power failure).
5. As there is no water and no hollow copper tubing within the inductor, service requirements
6. are much lower and the risk of contamination or deterioration to the copper tubes and the
7. inductor over time is negated.
8. No physical contact with the melt.
9. As the EMS inductor has no contact with furnace wall and no internal moving mechanisms there is negligible wear, providing improved product lifecycle and reliability compared with other water cooled old stirring technologies.

BOTTOM MOUNTED EMS ON RAILS

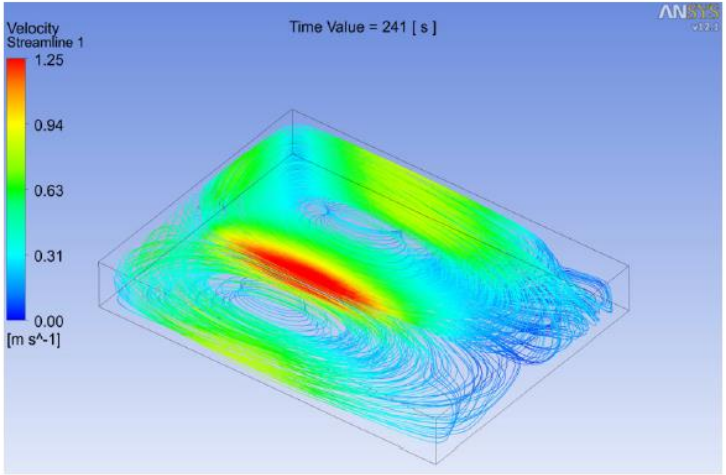
EMS CONTROL SET UP



SIBER FORCE® EMS control scheme (left) and main control system cabinets (right)

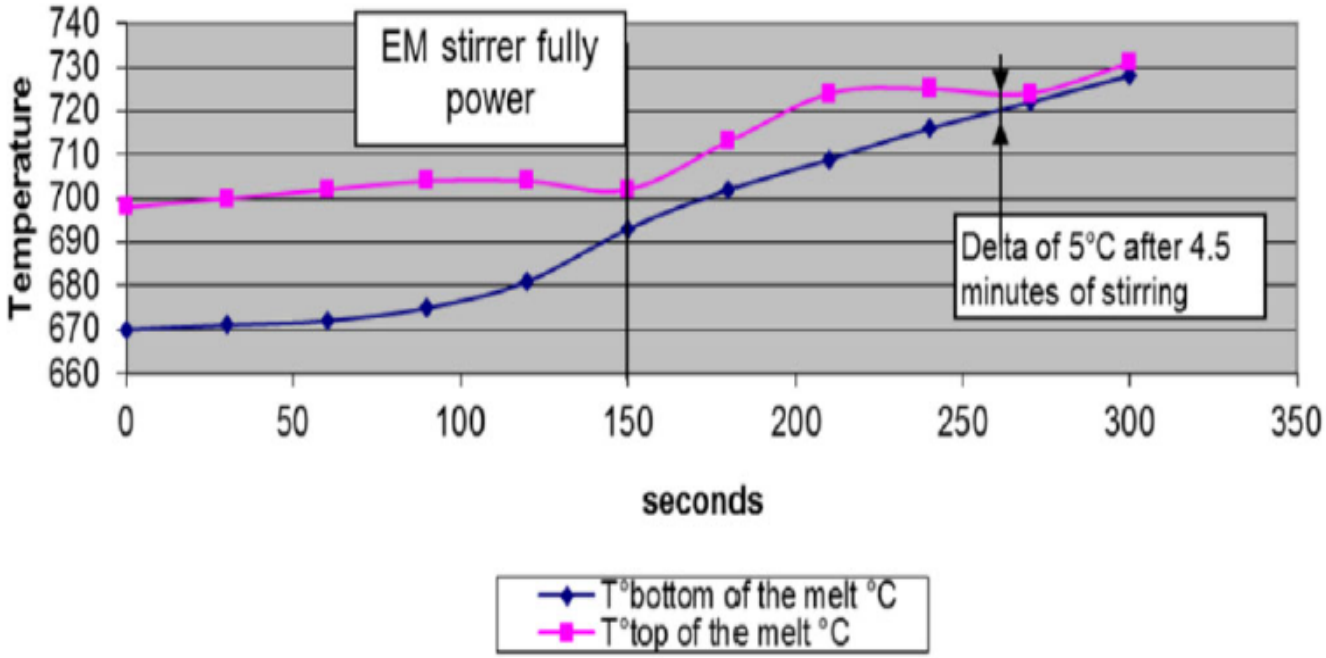
EMS STIRRING RESULTS

The EMS can start to work once liquid aluminium in the bath is present. This melting part of the cycle can be reduced due to the improved heat transfer from the combustion space to the melt and the hotter aluminium breaking down the cold boundary layer covering the submerged scrap pile.



Impact on circulation with a Bottom-mounted SIBER FORCE® EMS system on a reverberatory furnace

EMS PERFORMANCE



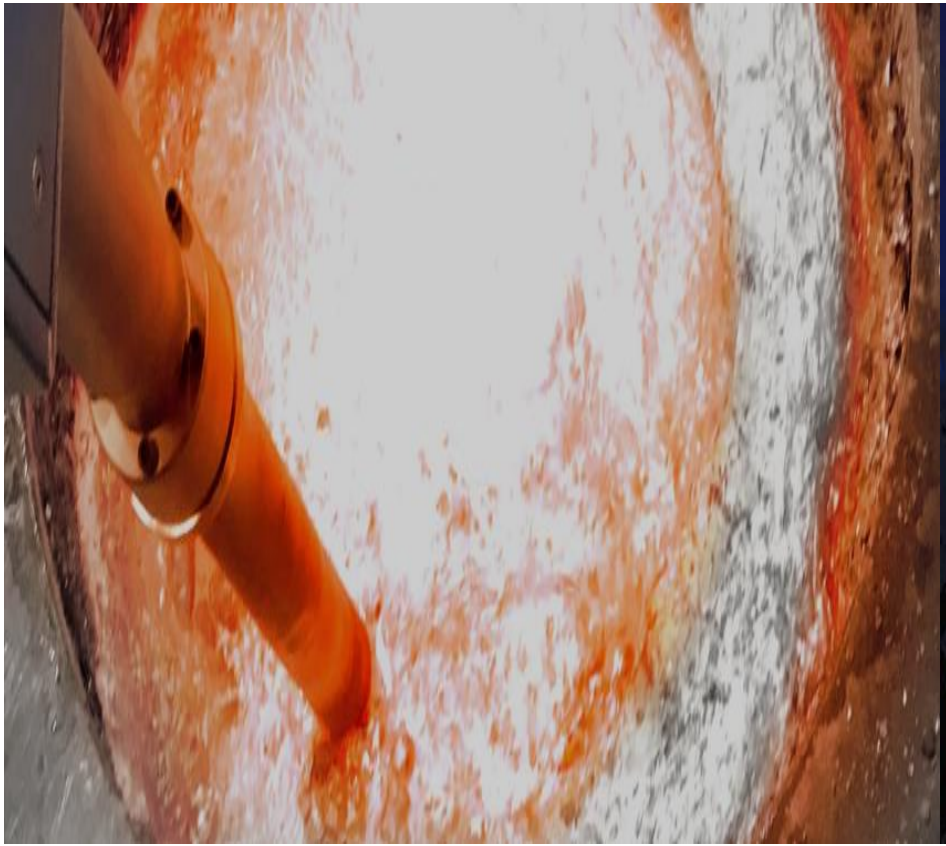
Temperature gradient after stirring. Results from actual performance test on 80T furnace

ONSPEC AS COMPLEMENTARY TECHNOLOGY TO EMS

OnSpec™ is a LIBS (Laser Induced Breakdown Spectroscopy) technology which allows the user real-time process control enabling a number of benefits including the potential for tighter chemical tolerances, the ability to determine when alloying additions have dissolved and the ability to essentially alloy in real time without the need to take samples and wait for information back from the lab.

With some casthouses waiting up to 20 minutes to obtain their material chemical analysis results before proceeding either with further adjustment, casting or transfer, Onspec™ allows production to take control of their efficiency and give immediate results overcoming any delays. Utilising Onspec's latest technology by taking 400 LIB samples in 2.5 minutes, the data obtained is accurate and recorded using ALTEK's developed industrial data collection software.

ONSPEC

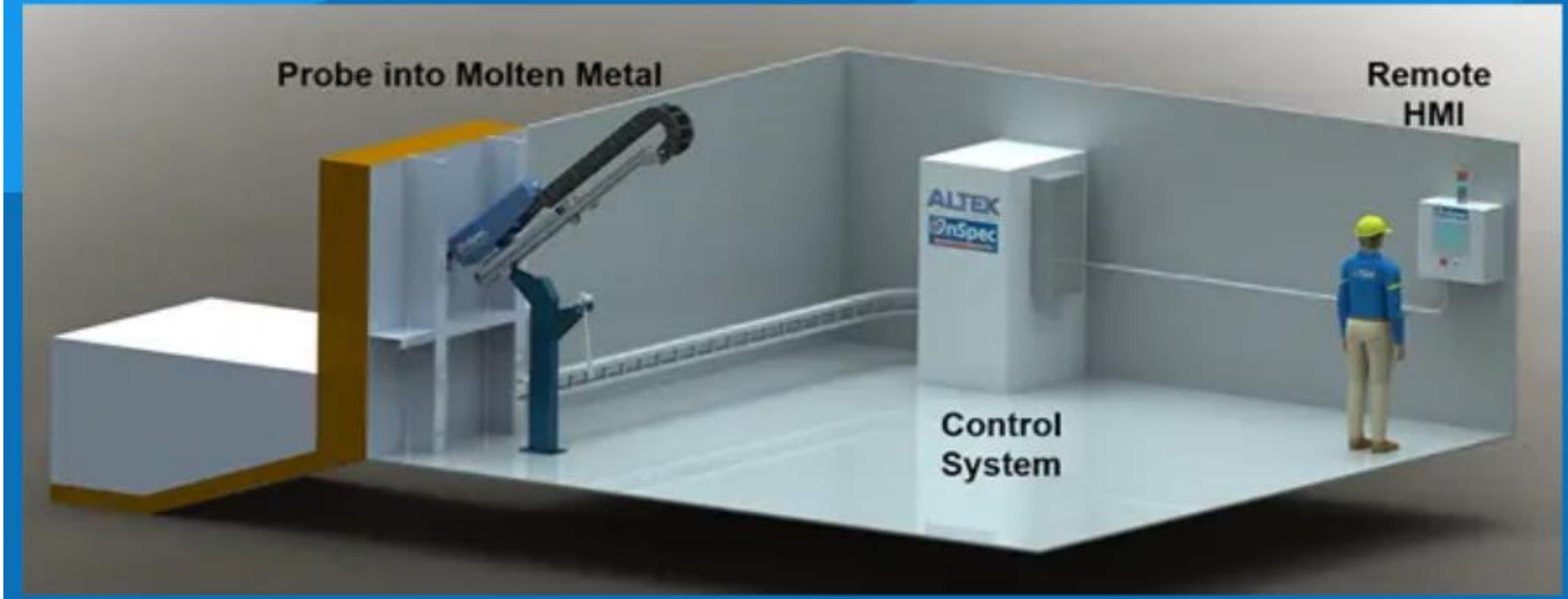


OnSpec™ Continuous Molten Metal Analysis

Metal quality is a critical and essential part of the finished product and the control of this as an integral part of the production process. OnSpec™ is a Laser Induced Breakdown Spectroscopy allowing real-time process control.

ONSPEC AS PATENTED

Furnace Application



ONSPEC

1. No sample preparation as it is In-situ analysis.
2. Help in Reduction of overall cycle times of Furnace.
3. Continual ONLINE feedback on melt chemistry.
4. Faster response time to melt problems.
5. Increased operator safety with doors closed.
6. Real time process control with 400 LIB samples in 2.5 minutes.
7. It is ONLINE SPECTRO Accuracy with Data recording.
8. Safer operation practices

9. EMS COMPLEMENT: Reduce Bath Stirring time due to Homogeneous Bath alloying.

DROSS PRESS : FIRST STEP TO DROSS MANAGEMNT FOR INHOUSE RECOVERY OF ALUMINIUM

Dross PRESS Working

1. The Dross Press works on the principle of compressing and cooling dross as quickly as possible with its press head cooling technology, fume extraction systems and other special technical features.

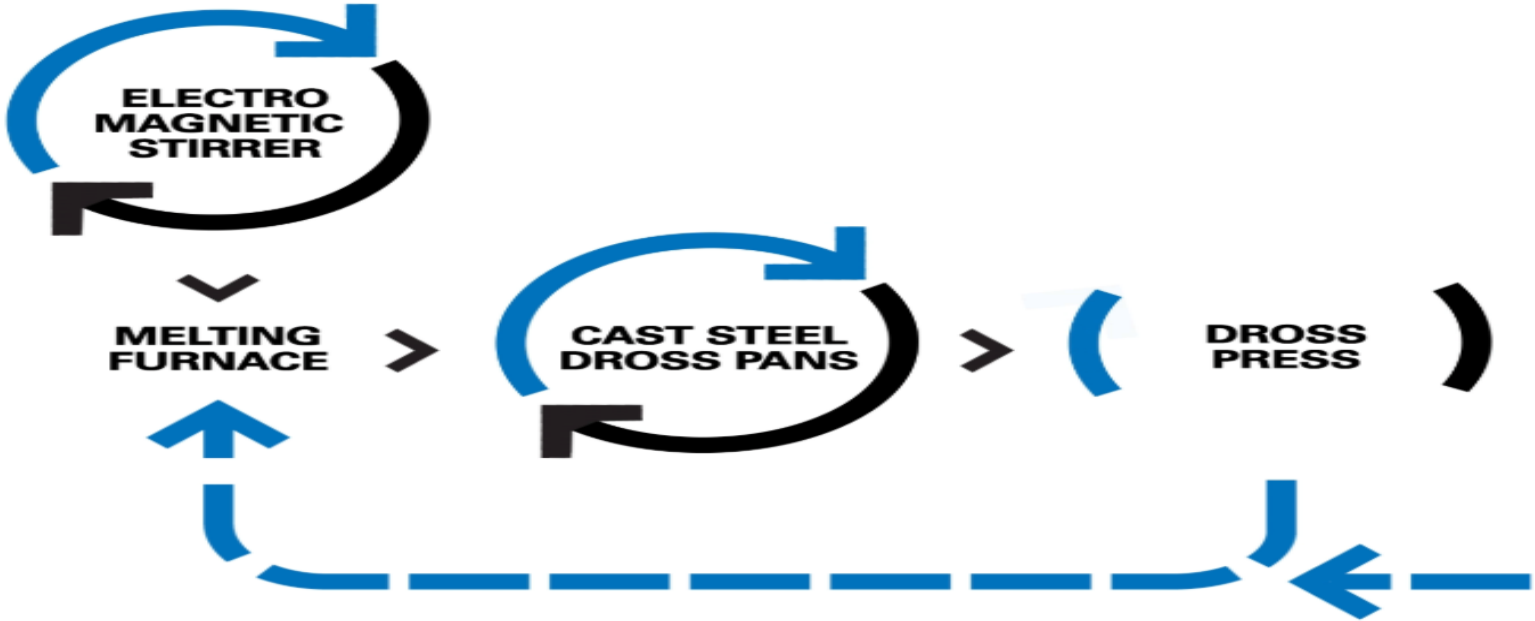
2. This preserves valuable aluminium which would otherwise be lost to oxidation (1% loss per minute).
3. This benefit comes in two forms, in-house drain and Post compressed Skull for secondary recovery.

4. Hot dross is skimmed from the furnace into special alloy, two-piece cast steel pan sets.

5. The full dross pan is sent directly to the Dross Press where the automatic cycle will begin.

Dross Press

1. After the cycle has finished, the pan set is left to cool for as little as ONE hour before tipping. The pressed dross skulls can be stacked easily and neatly, and the metal drain ingots formed in the sow moulds are returned to the melting furnaces for re-melting.



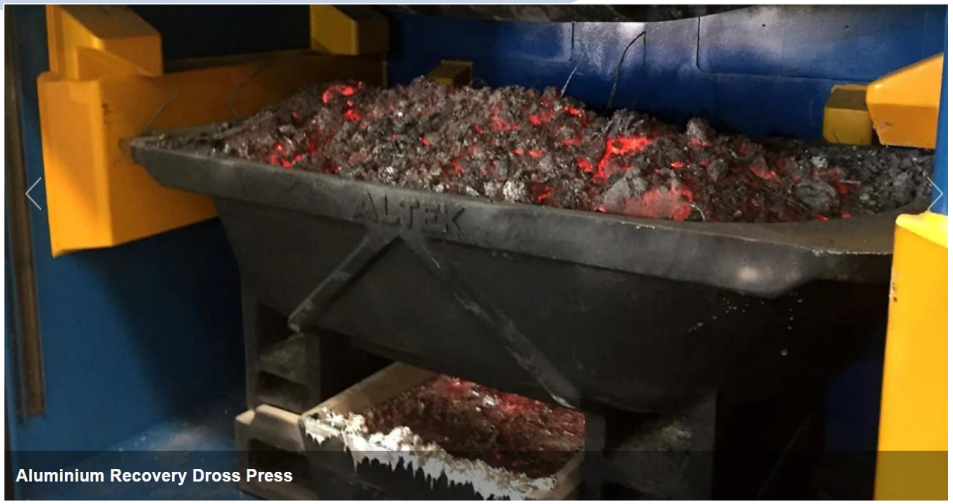
ALTEK DROSS PRESS

Worldwide over 550 references. And Most Widely used technology.
Robust and Proven Best technology for recovering aluminium from Dross.

- Built to stringent standards to maximise Aluminium recovery.
- Low operating costs & rapid payback of less than a year.
- Safer & cleaner work environment
- Ultra reliable
- Automated reporting statistics
- Enhanced safety features
- Upto 25% in-house drain
- Upto 75% Secondary recover of Post compacted Skull
- Short cycle times of less than 6 Minutes per compression
- Does not occupy Large space – can be near Furnace.

ALTEK FULLY AUTOMATIC TARDIS GEN.III DROSS PRESS

Aluminium Recovery Dross Press


Aluminium Recovery Dross Press

Latest Generation Dross press

DROSS PRESS DESIGN CRITERIA AN SCIENCE BEHIND COMPRESSION

MAINLY…

1. ALLOYS FOR QUALITY OF DROSS : DRY DROSS OR WET DROSS
2. FURNACE DIMENSIONS TO DESIGN ALTEK DROSS PANS
3. SKIMMING CYCLES TO DECIDE DROSS PAN FILLING
4. DROSS PRESS LOCATIONS
5. FUME EXTRACTION
6. STORAGE AREA FOR COMPACTED SKULL

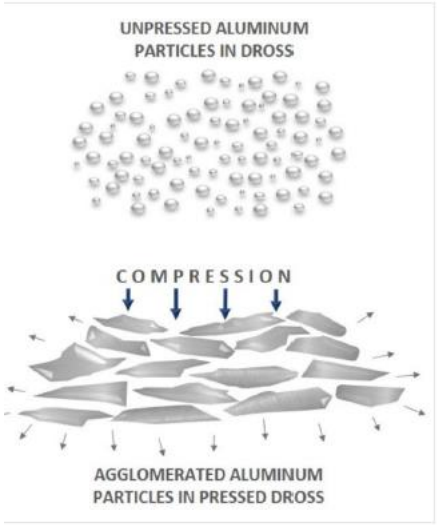
MANY OTHER POINTS…..

ALTEK DROSS PRESS ARE LONG LIFE WITH PROPRIETARY DROSS PAN METAL COMPOSITION OUT OF CAST STEEL TO RUN FOR YEARS

EVERY 1 MT DROSS SQUEEZES UPTO 250 KG OF LIQUID ALUMINIUM WHICH EQUALS 625 $ OF VALUE.

365 DAYS – 1 MT/DAY DROSS COPACTION MEANS US $ 228,000 RECOVERY.

DROSS PRESS SCIENCE



BEFORE PRESSING

AFTER PRESSING

AGGLOMERATING ALUMINIUM PARTICLES INCREASE SECONDARY RECOVERIES

ENVIRONMENT OBJECTIVE OF ALTEK DROSS PRESS

IMPROVE CASTHOUSE ENVIRONMENT

POST COMPACTION SECONDARY RECOVERY : QUICK OVERVIEW

AluSalt™ Salt Slag Cake Recycling

It has been proven around the world that the use of salt when operating Rotary Furnaces provides optimum control and maximum recovery of aluminium from dross and scrap.

Rame technology for Primary Smelters

RAME™ is a process specifically designed for primary smelters, achieving excellent yields higher than TRF with salt flux operations, is a salt free process, and has the flexibility to process all dross types. Developed by Lefebvre, the unique feature with this process above all others is that the 100% of the output dross residues from the process are reinserted into the electrolysis cells.

This is a proven process operational for over 4 years at an Alcoa smelter processing over 17 different dross alloys, and it allows other smelters the opportunity to maximise their dross value for the first time, conserve aluminium units to reduce their carbon footprint, and boast a truly circular economy process for their dross management.

BIG THANK YOU from Half Marathon Runner

KIRAN DESHPANDE

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Let us now have Thought provoking questions…….