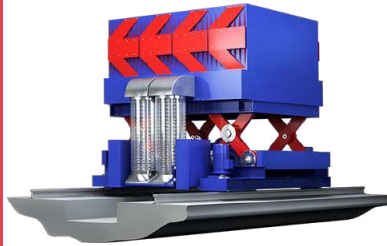




www.refractory-power-tech.fi
www.uniheat.cz



**EQUIPMENTS FOR
AL. PRODUCING**



**ELECTROMAGNETIC
STIRRERS**



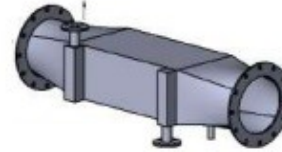
**REFRACTORY
MATERIALS**



**HIGH TEMPERATURE
FIBER REFRACTORY**



**HIGH TEMP.
HEAT EXCHANGERS**



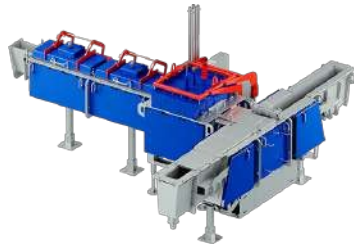
**HEAT EXCHANGER
FLUE GAS - WATER**



**STEEL
CONSTRUCTIONS**



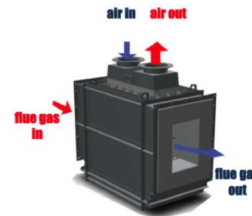
**STEEL
CONSTRUCTIONS**



**FILTRATION AND
TRANSFER OF MELT**



**HIGH TEMPERATURE
DENSE REFRACTORY**



**HEAT EXCHANGER
FLUE GAS - AIR**



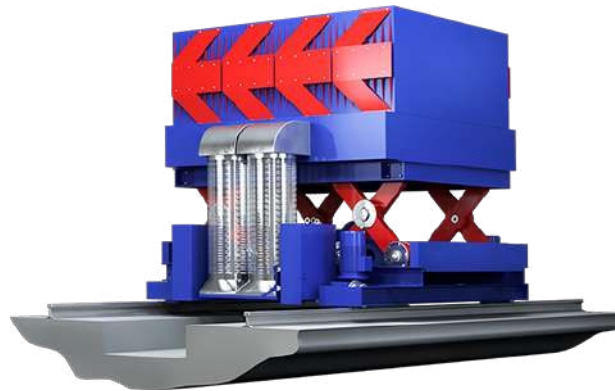
GASS, AIR PIPES

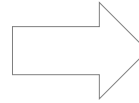
EQUIPMENTS FOR ALUMINIUM PRODUCING



660062, Russia, Krasnoyarsk,
Televizornaya, 4B

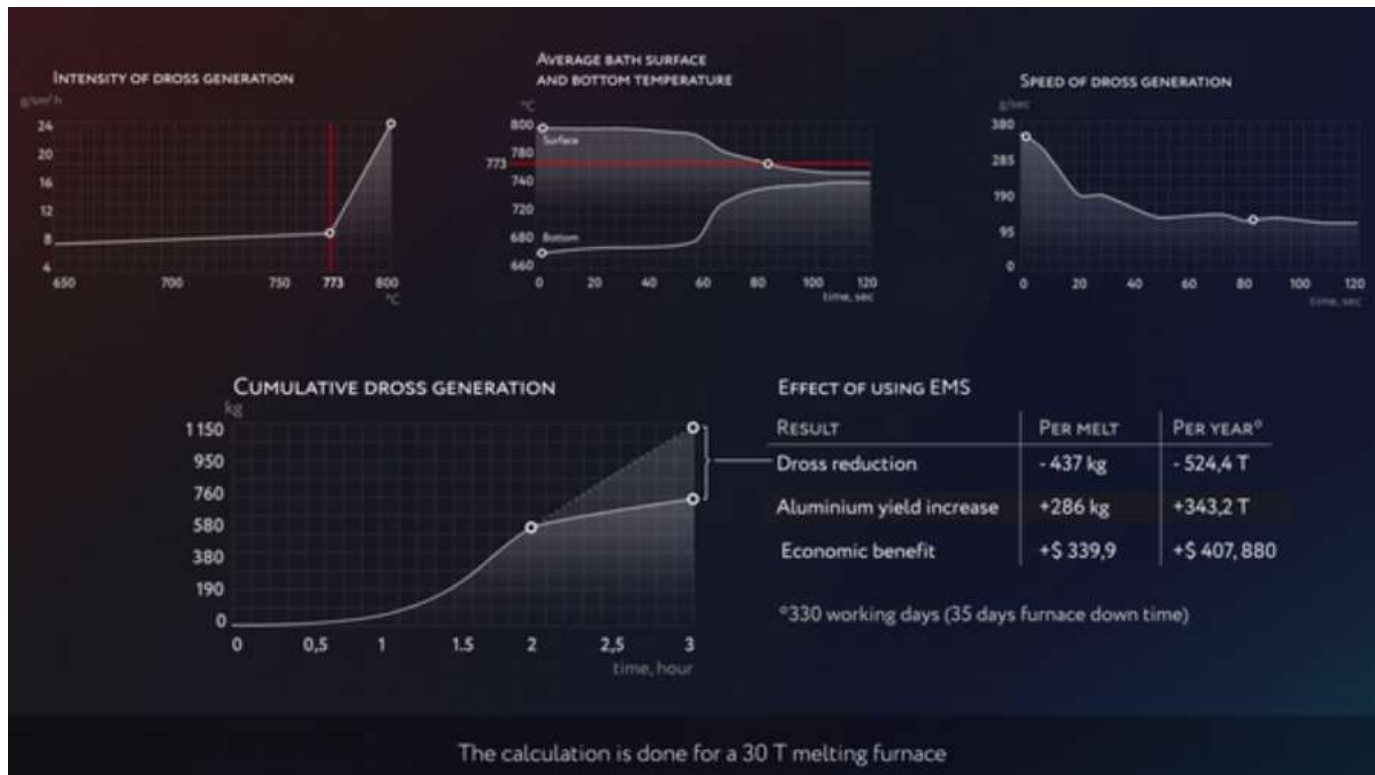
electromagnetic stirrers





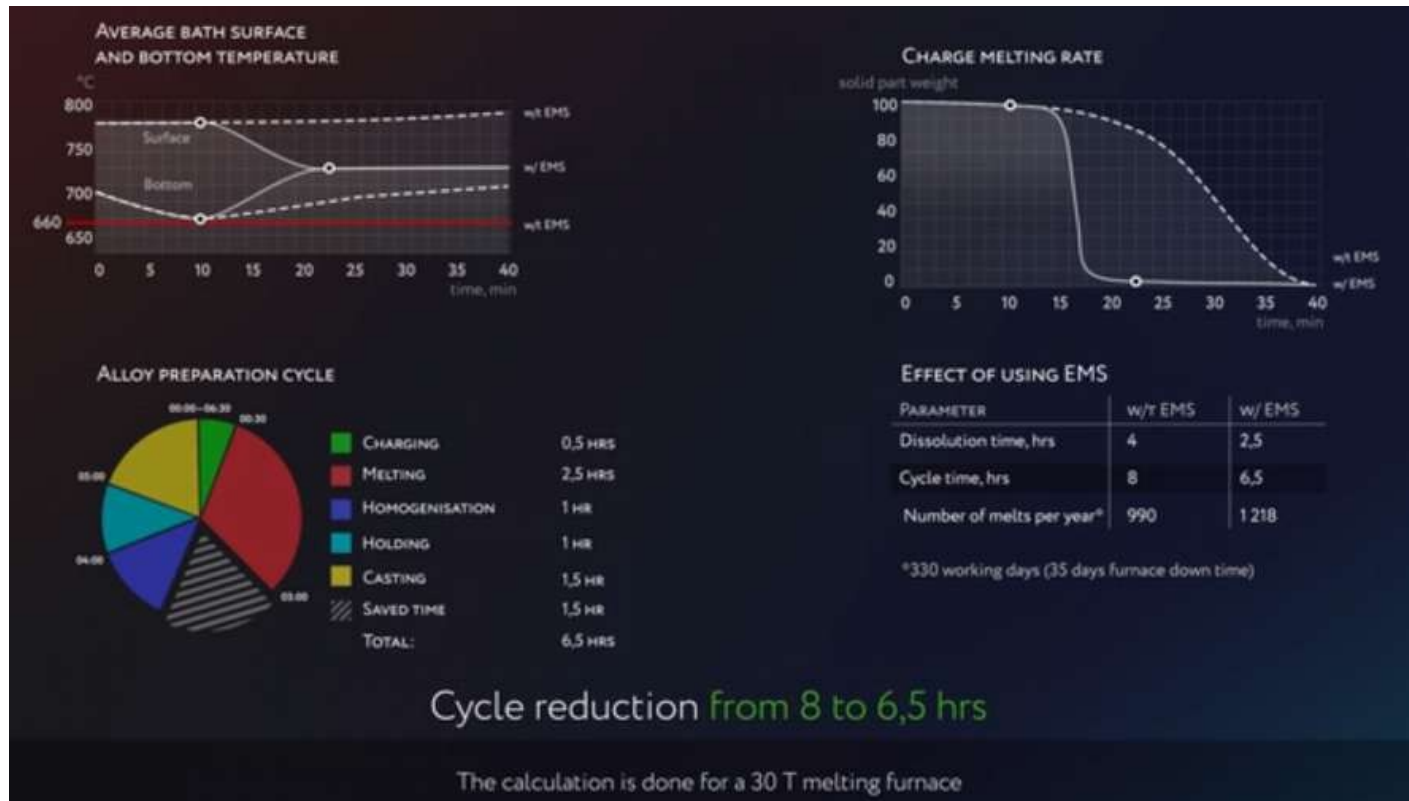
Parameter	Improvements
Improved bath temperature uniformity	3-5 minutes
Excellent alloy homogenisation	
Furnace productivity increase	up to 25%
Energy savings	up to 15%
Low dross generation	15 to 40% reduction
Maximizes quality and aluminium yield	

Reduced Dross Generation



A raise of the furnace temperature will increase the dross formation drastically at bath surface temperatures above 770°C. A low surface temperature will reduce the formation of dross, which in turn is advantageous for the heat transfer to the melt and the overall aluminium yield. The use of EM stirring will reduce the generation of dross by 15 to 40% when melting charges with a solid content of 80-100%.

Faster Melting – Increased Furnace Productivity



The lower surface temperature obtained when using electromagnetic induction stirring increases the heat transfer to the melt. The heat transfer will also increase, by means of convection, between the submerged scrap and the melt. These two effects, due to stirring, will increase the melting rate. A typical reduction of the melting time is 5 to 15 %.

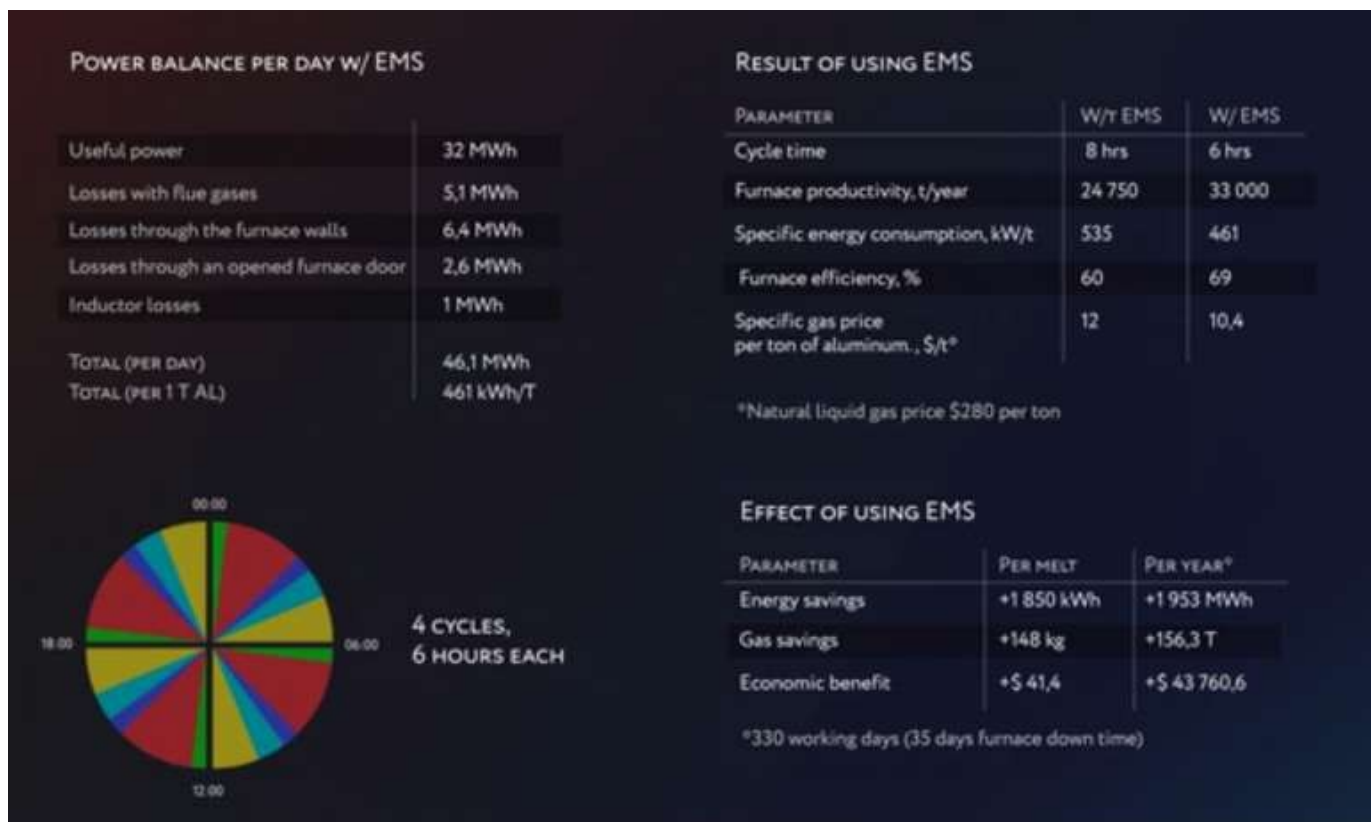
The total melt preparation time will be shortened by more than just the decrease in melt time as the stirring will reduce time for 'knock down of scrap', 'open doors for inspection' etc.

Excellent Alloy Homogenisation



The strong stirring of the melt will rapidly homogenise the constituent elements, reduce the need for door opening for mechanical stirring and shorten the time needed for alloying. This is of special importance for high alloy melts containing elements like magnesium, titanium and silicon. The homogeneity of the bath increases the overall aluminium yield. On alloying with Silicon the saving in time compared to opening doors several times to mechanically stir can be one to two hours.

Increased Thermal Efficiency



The lower surface temperature obtained when using electromagnetic induction stirring increases the heat transfer to the melt. The heat transfer will also increase, by means of convection, between the submerged scrap and the melt. These two effects, due to stirring, will increase the thermal efficiency of the furnace. The overall energy consumption will decrease in proportion.

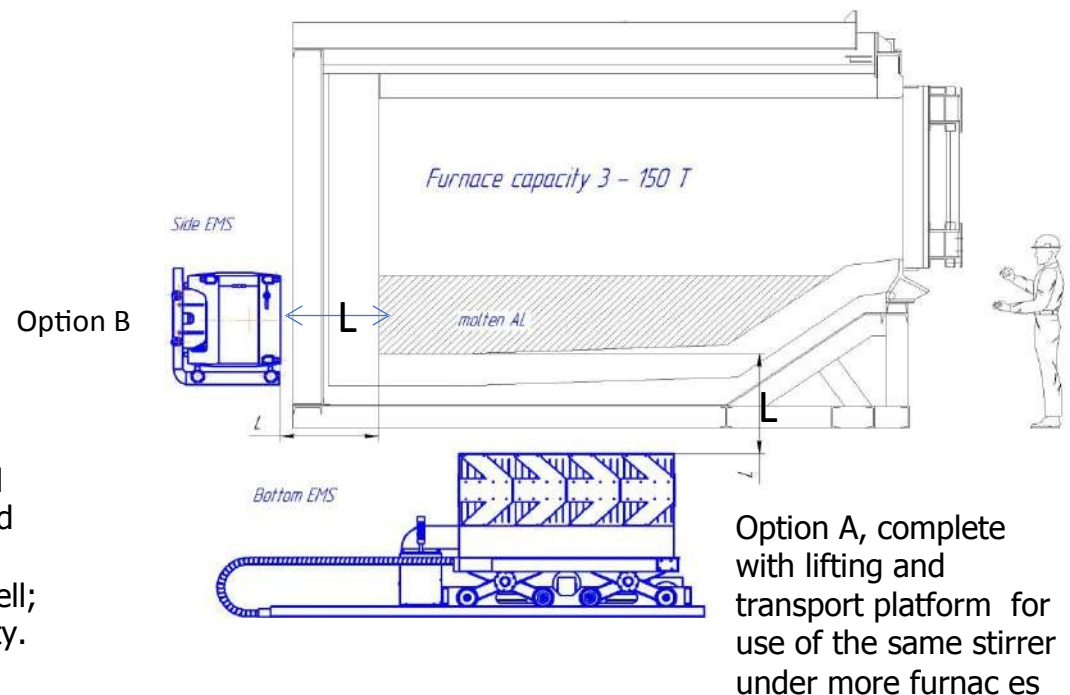
Options for installation:

- A. Underneath furnace bottom.
- B. Along furnace vertical wall(s)

IMPORTANT!

The inductor model:

- ü Depends on the distance "L", i.e. the overall thickness of the refractory bottom or wall and the steel shell plus 15 – 25 mm air space between the inductor and the furnace steel shell;
- ü Does not depend on the furnace bath capacity.



SIDE EMS AT KRASNOYARSK METALLURGICAL PLANT



SYSTEM DESCRIPTION

- 1) LIM 500 model stirrer
 - ⇒ Track mounted on the side of the furnace
 - ⇒ Standard cooling system and dust removal with a cyclone
- 2) Transistor power unit
 - ⇒ Standard
 - ⇒ No cabinet, located in the MCC room
- 3) Control panel with Automatic Process Control System
 - ⇒ Siemens based
 - ⇒ Easy to operate
 - ⇒ Standard diagnostic system

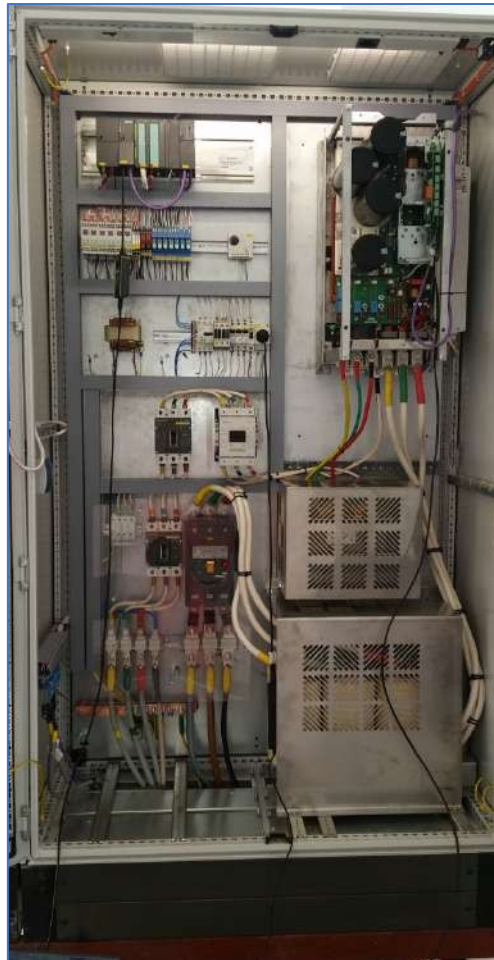
SIDE EMS AT RUSAL KRASNOYARSK SMELTER



SYSTEM DESCRIPTION:

- 1) LIM 500 model stirrer
 - ⇒ Track mounted on the side of the furnace
 - ⇒ Standard cooling system
 - ⇒ Cyclone and chemical filters
- 2) Electrical cabinet
 - ⇒ Power unit (ONTECOM design)
 - ⇒ Cooling system
 - ⇒ In-built controller
- 3) Control station
 - ⇒ Analog A-meters to monitor the work modes
- 4) Water flow control unit
 - ⇒ Efficient flow sensors IFM

BOTTOM EMS IN CHINA



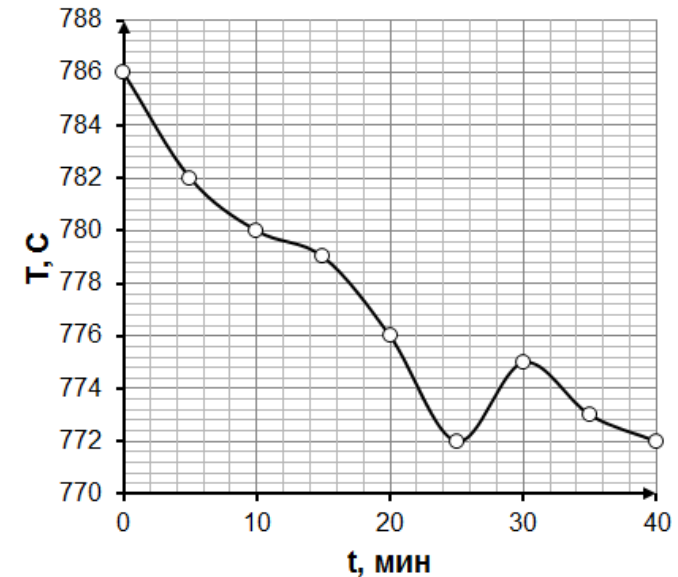
SYSTEM DESCRIPTION:

- 1) Two LIM 500 model stirrers
 - ⇒ 1st travels on a trolley between two furnaces
 - ⇒ 2d is installed on a lifting trolley
- 2) Electrical cabinet
 - ⇒ Power unit (RA design)
 - ⇒ Electric filters system
 - ⇒ Siemens S7-315 PLC
- 3) Control station Пульт управления
 - ⇒ Remote control from the furnace SCADA

TESTING THE EMS IN CHINA



Solid charge faster melting
and melt temperature homogeneity



The stirring allowed to decrease
the metal surface overheating

The solid charge melting time
was reduced by 1,5 hours

TESTING THE EMS IN CHINA

ABB

Elem.	AVG	d	d,%	5B5		5B4		5B3		5B2		5B1	
				1	2	1	2	1	2	1	2	1	2
Mg	0,1583	0,0021	1,2948	0,1635	0,1535	0,1612	0,1585	0,1593	0,1594	0,1567	0,1582	0,1579	0,1551
Si	0,3262	0,0066	2,0318	0,3287	0,3097	0,3386	0,3270	0,3258	0,3325	0,3186	0,3176	0,3316	0,3320
Fe	0,1610	0,0031	1,9451	0,1624	0,1518	0,1650	0,1627	0,1629	0,1638	0,1584	0,1572	0,1626	0,1634
Cu	0,0049	0,0001	2,0408	0,0049	0,0046	0,0050	0,0050	0,0049	0,0049	0,0048	0,0048	0,0050	0,0051
Ti	0,0044	0,0005	11,7647	0,0046	0,0044	0,0036	0,0036	0,0038	0,0047	0,0041	0,0053	0,0050	0,0051
Zn	0,0036	0,0002	5,6180	0,0038	0,0035	0,0037	0,0036	0,0035	0,0029	0,0038	0,0034	0,0035	0,0039
Mn	0,0060	0,0002	2,5621	0,0059	0,0060	0,0058	0,0058	0,0060	0,0061	0,0062	0,0065	0,0059	0,0059
Cr	0,0044	0,0001	1,1494	0,0044	0,0044	0,0043	0,0043	0,0043	0,0043	0,0044	0,0044	0,0043	0,0044
V	0,0073	0,0002	3,2462	0,0074	0,0073	0,0068	0,0068	0,0071	0,0073	0,0072	0,0076	0,0074	0,0078

Ontecom

Elem.	AVG	d	d,%	6B5		6B4		6B3		6B2		6B1	
				1	2	1	2	1	2	1	2	1	2
Mg	0,1837	0,0048	2,5973	0,1791	0,1797	0,1836	0,1772	0,2050	0,1795	0,1860	0,1798	0,1838	0,1828
Si	0,3371	0,0059	1,7607	0,3271	0,3349	0,3355	0,3244	0,3462	0,3409	0,3540	0,3353	0,3361	0,3370
Fe	0,1399	0,0026	1,8819	0,1380	0,1383	0,1381	0,1334	0,1423	0,1389	0,1494	0,1400	0,1393	0,1409
Cu	0,0031	0,0001	1,9355	0,0030	0,0030	0,0031	0,0030	0,0032	0,0031	0,0033	0,0031	0,0031	0,0031
Ti	0,0076	0,0015	19,4702	0,0067	0,0068	0,0070	0,0071	0,0121	0,0079	0,0100	0,0048	0,0069	0,0062
Zn	0,0021	0,0003	16,3462	0,0023	0,0019	0,0028	0,0021	0,0018	0,0019	0,0025	0,0015	0,0024	0,0016
Mn	0,0040	0,0001	2,0896	0,0039	0,0039	0,0040	0,0039	0,0042	0,0040	0,0040	0,0041	0,0041	0,0041
Cr	0,0034	0,0001	2,1701	0,0035	0,0034	0,0034	0,0033	0,0036	0,0034	0,0035	0,0034	0,0033	0,0033
V	0,0095	0,0010	10,0529	0,0091	0,0089	0,0088	0,0089	0,0118	0,0101	0,0112	0,0080	0,0089	0,0088



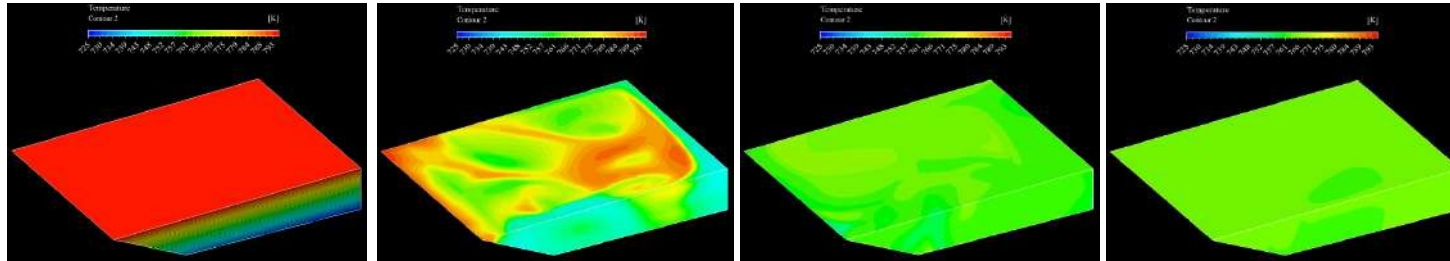
Metal sampling during the tests

Comparison between the Ontecom and ABB stirrers
on the same furnace
(alloying elements dissolution - 40 min)

Comparable results with the
Ontecom stirrer consuming less
power

3D modeling capabilities

Rapid homogeneity of the melt constituent elements and uniform bath temperature*

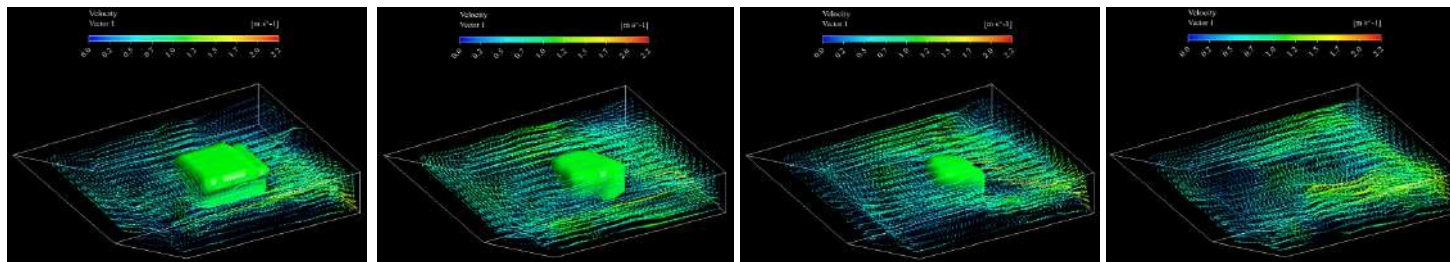


$\Delta T \sim 120^\circ\text{C}$

$\Delta T \sim 5-7^\circ\text{C}$

0 —————→ 1 min.

Faster melting of a 750 kg T-bar*

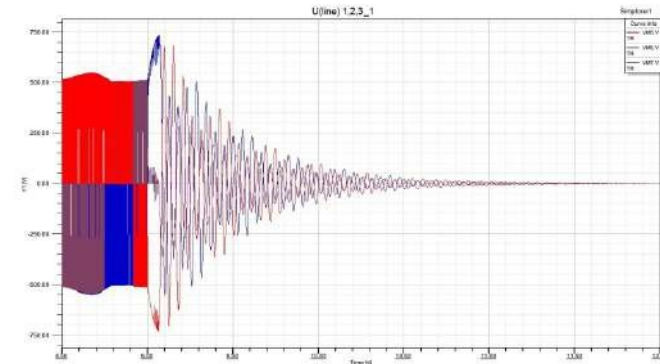
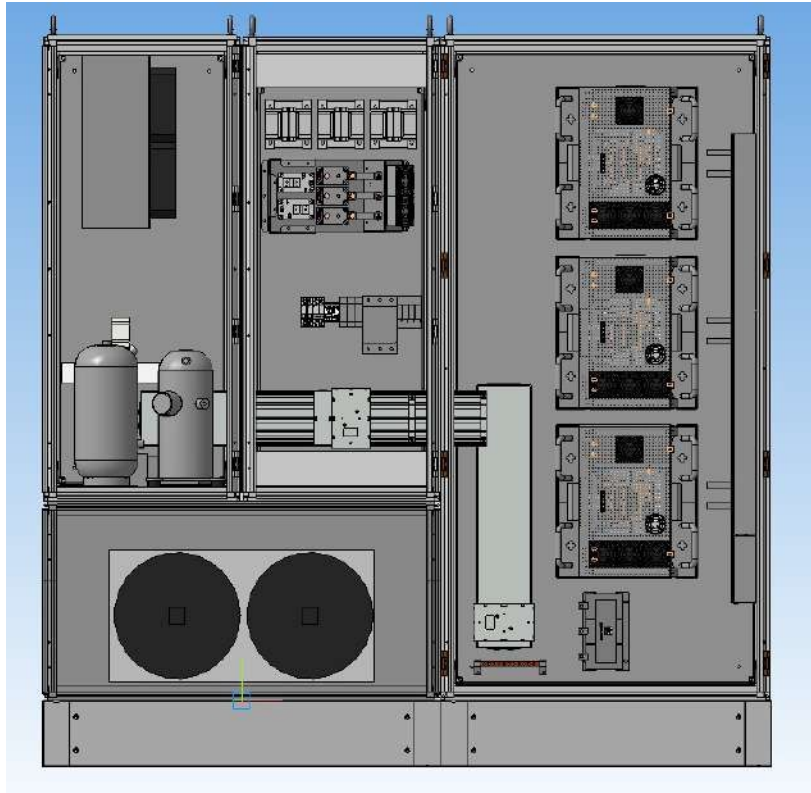


0 —————→ 2 min

- ü EMS work optimization for the Customer's specific conditions;
- ü Selection of the necessary stirrer model and power supply;
- ü Recommendations for tuning the EMS work modes and their combinations.

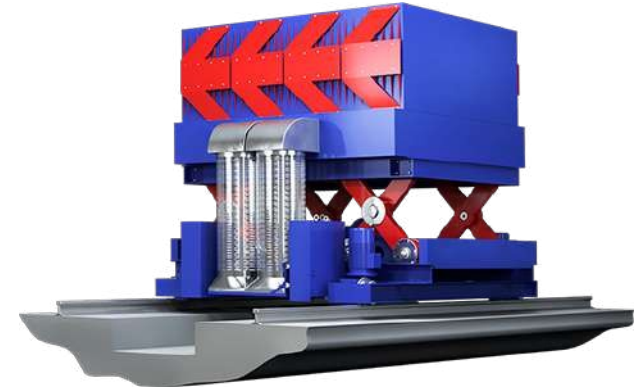
*The results for a 20 T melting furnace

POWER UNITS FOR EMS DESIGNED BY ONTECOM



Main features:

- Modular IGBT-frequency converters;
- Additional monitoring and control systems;
- Control software optimization per the Customer requirements



aluminium filtration



- ü Filter box with single chamber for 10-23" filters
- ü Filter box with two chambers 10-23" filters (one cover moves between two filter chambers)

Possible design of filter boxes:

- Straight-through
- Twin
- By-pass
- Double filtration

Heating system options:

- Without heating system
- With radiation heating system (filter box cover radiating surface always faces down)
- With convection heating system (air blowing/vacuuming tool and hot air gun are used for blowing)
- With combined heating system (radiation and convection heating)
- ü Filter box for 10-23" duplex filter (SELEE) with gas heating system (flameless heating of a ceramic foam filter)



REFERENCES

"Practice has shown that preliminary heating ensures faultless start of casting and ceramic foam filter filtration throughout the whole area. Specifically, it is worth noting the simple and efficient heating system that enables to protect heating elements from excessive heat exposure and their further breakdown. The service life of heating elements increases considerably... In the course of operation, the covers design proved to be convenient, balanced and good serviceability. The steady-state compressed air cooling system has high reliability to minimize the human factor. Solutions of the kind can be duplicated to heat filters and chutes in other units..."

Extract from the Reference on the supply of two sets of twinned aluminum filtration units UFP-15, RUSAL, Bratsk, PJSC, 2017



aluminium launders



ü Aluminum melt transfer trays

Heating system options:

- Without heating system
- With radiation heating system based on arc heaters (arc-shaped heating elements with flexible ceramic mats)
- With convection heating system based on hot air guns (air blowing/vacuuming tool is used for blowing)
- With heating system with lining built heaters (flexible ceramic mats are used as heaters, protection from melt leakage)

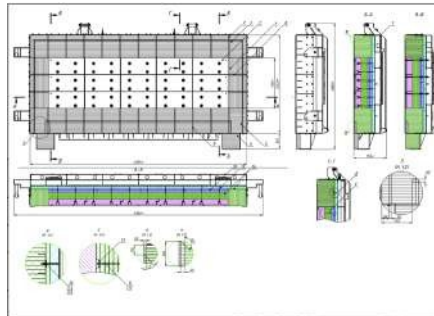
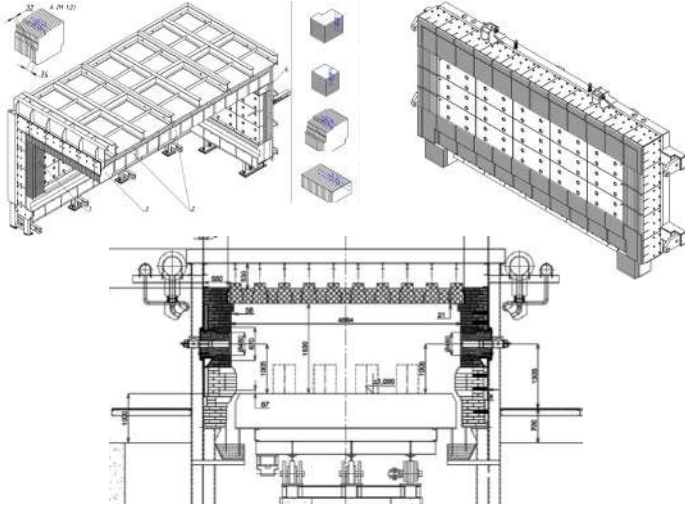
ü Trays for aluminum melt distribution as per the customer's requirements



REFRACTORY MATERIALS AND INSULATIONS



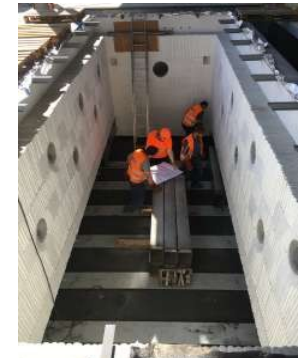
REFRACTORY MATERIALS



design



production and delivery



installation

HIGH TEMPERATURE INSULATIONS - LININGS



CF/ BS
blankets



CF/ BS
modules



CF
papers



CF / SilCal
boards



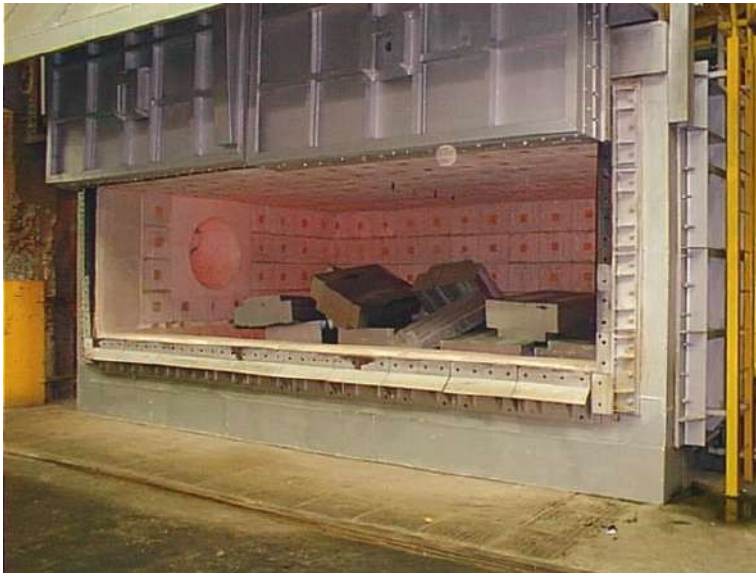
LW
bricks



concretes





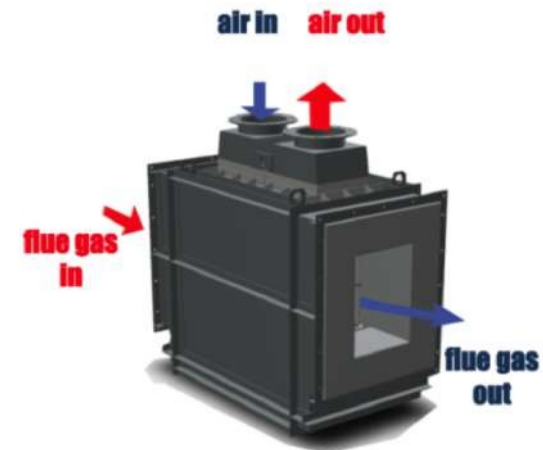


HEAT EXCHANGERS

 **Termo** heat exchanger production
nord
stream

ADVANTAGES OF RECUPERATORS FLUE GAS / AIR

- Small sizes
- High efficiency
- Very good price
- High life – up to 15 years
- Operation temperature up to 1250 °C
- Practical implementation of the projects with dust content up to 250 g/Nm³
- Working with abrasive and chemically aggressive compounds.
- Dimensions and costs are far less than using any tubes analogues.
- “Free designing” – equipment replacement without project adjustment; existing connections of the heat exchangers are fully retained.

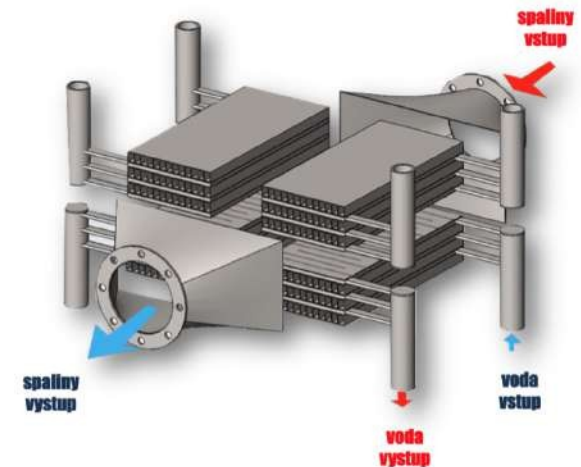


ADVANTAGES OF RECUPERATORS FLUE GAS / LIQUID

- Small sizes
- High efficiency
- Very good price
- High life – up to 15 years
- Operation temperature up to 1250 °C
- Wear-resistant steels are used. The steels increase wearing capacity 3-5 times against standard corrosion-resistant steels and 5-10 times against low-carbon steel used in gas ducts.
- The heat exchangers channel section is selected in the way that the flue gas velocity exceeds the channel scouring velocity.
- The modular design of the heat exchanger improves its maintainability . Of one of the sections is worn out, it is fully replaced. Or the most and the least worn sections are interchanged. At that it is permissible to leave other heat exchanger section unchanged if they are operational.

heat exchangers

heat exchanger production
Termo nord stream



STEEL CONSTRUCTIONS, GAS/AIR PIPES



TUBE
EXCHANGER

OPT EXCHANGER

Flue gas temperature - IN, °C	1 100	1 100
Flue gas temperature - OUT, °C	690	787
Flue gas volume, m ³ /hod	5300	5300
Air temperature - IN, °C	20	20
Air temperature - OUT, °C	500	500
Air volume, m ³ /hod	4200	4200
Sizes, mm*mm*mm	1100*1620*2200	848*840*570
Construction volume, m ³	3,92	0,4
Weight, kg	2700	630

heat exchangers

heat exchanger production
Termo nord stream





Representativ in Finland:
Refractory & Powertech Oy

legal address :

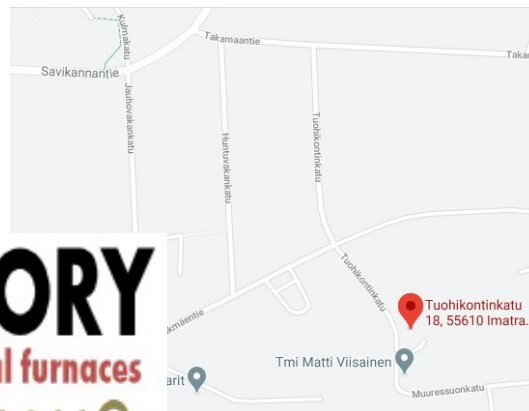
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