MAIN PRODUCT RANGE SA-FOUNDRY IN 2021–2022

PART 2. MELTING FURNACES AND SCRAP RECYCLING

SA-FOUNDRY Sp. z o.o.

sa-foundry.com

Melting furnaces and recycling

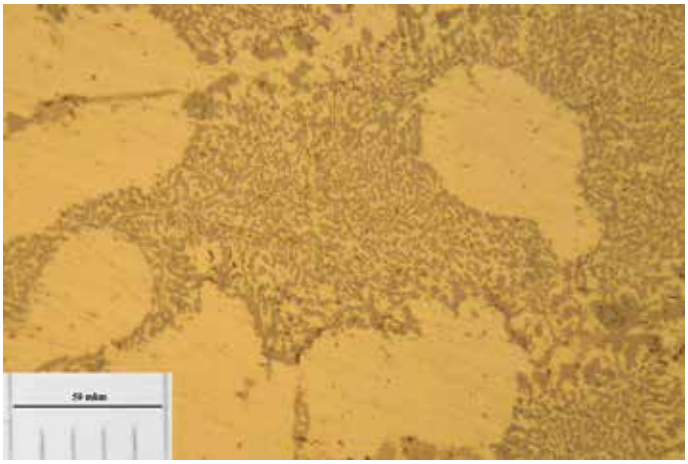
Krakow, September 2021

A. Consulting and engineering for foundries and recycling factories

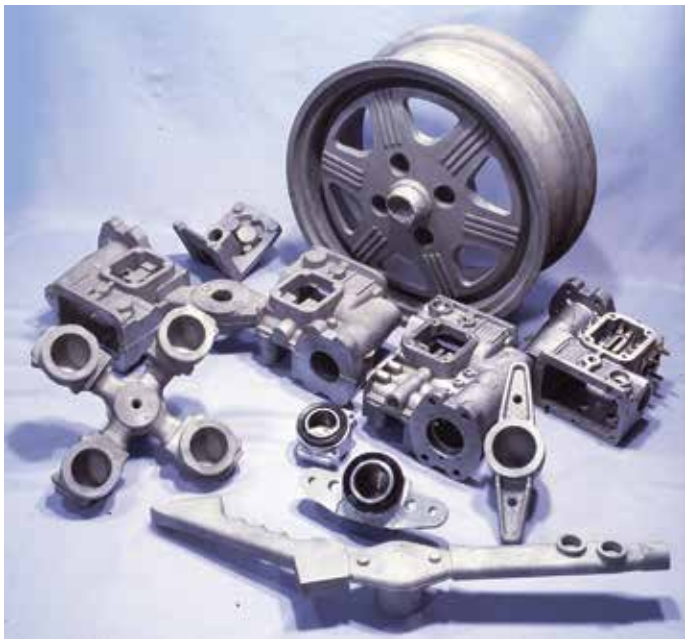
More than 30 years of experience in the foundry industry and taking into account the modern science researches allow SA-FOUNDRY Sp. z o.o. to present effective solutions for non-ferrous metals foundries and recycling factories.

Our team of experts (among them Ph.D researchers and engineers with long-term experience) propose the wide range of consultations in the field of foundry and recycling of non-ferrous metals and alloys:

1. Selection the optimal technology, materials and equipments for new casting or recycling projects, for expansion projects and for modernization of existing foundries.
2. Selection the optimal technological parameters for increasing the productivity and decreasing the rejects for existing castings of non-ferrous metals and alloys.
3. Cast metals quality complex investigations (structure, mechanical and physical properties, cast defects analyzing).
4. Calculation and design of heating systems for foundry (furnaces and preheating systems).



Testing of new products and technical solutions in our technological center, long-term experience and up-date knowledge give us the optimal solutions in accordance to the customer's technological operations with non-ferrous liquid metals and alloys during melting and casting in various conditions.



The optimal solutions for effective casting technologies (high-pressure die casting, low pressure and gravity die casting in permanent or sand molds) can be proposed for our customers.

We are in progress for new innovative solutions in the field of non-ferrous metals and alloys casting for foundries and for recycling factories.

B. Melting and holding furnaces for non-ferrous metals and alloys (aluminium, copper, zinc, lead)

One of the most important stages in obtaining of founding or feedstock is the preparation of metal and alloy melt. Depending on the grade of melt, required capacity, melt purity requirements (non-metallic inclusions, gas saturation) and the available energy resources, we offer a wide range of furnaces including the following:

- **Tower, reverberatory and dry hearth type gas melting furnace with different capacities and productivity.**
- **Gas or electric reverberatory type holding furnace for non-ferrous metals and alloys.**
- **Crucible stationary melting and holding furnaces (electric, gas and liquid fuel) with different capacities and maximum temperatures.**
- **Crucible tilting melting furnaces (electric, gas and liquid fuel) with different capacities and maximum temperatures.**

Based on the engineering problems of our customers, we are ready to offer effective solutions to provide enterprises with the required quantity of the high-quality melt. We are ready to develop (in cooperation with the leading European manufacturers) and supply you with industrial melting and holding furnaces characterized by optimal performance, low energy consumption, high productivity and reasonable cost.

Also, as sales representative of one of the world leading Company – **Axiom Machinery inc.** (Canada) we propose our customer full range of modern furnaces for melting and holding of non-ferrous alloys.

Some examples of proposed furnaces:

MINI STACK MELTING FURNACE

GM-E Series gas mini stack melting furnace, also known as mini shaft, or mini tower melter, has all the features and melting speed of our large central stack melting furnace, but has a much smaller footprint. This furnace is designed to be placed beside a die casting machine, or in any location where space is limited. It can also serve as a central melter for smaller dip out operations. This series features an automated charging elevator for simplified charging. The GM-E Series is controlled by a PLC and a large color HMI touch screen which runs

a sophisticated program that optimizes performance, operation, and efficiency. The GM-E Series is very competitively priced.

DRY HEARTH MELTING FURNACES

GM-D Series gas dry hearth melting furnace features a charging chamber that has no molten metal in it thus it reduces the dangers of metal splash and prevents temperature drop caused by the addition of cold ingots or scrap to the metal bath. The charging chamber is angled down and as the metal melts it runs into the metal bath. The GM-D Series is controlled by a PLC and a color HMI touch screen which runs a sophisticated program that optimizes performance, operation, and efficiency.

ELECTRIC HOLDING FURNACE FOR ALUMINIUM

The EH-A Series electric holding furnace features a pneumatic cover for easy maintenance access. The lining is cast out of premium quality, high heat durable refractory with a secondary layer of refractory fiberboard. The EM-C Series is controlled by a PLC and

a color HMI touch screen which optimizes performance and efficiency.

CRUCIBLE STATIONARY MELTING/HOLDING FURNACE FOR ALUMINIUM, BRASS AND ZINC ALLOYS

The ESF-BU300 furnace low electric energy consumption due to the modern fiber-type insulation materials.

BU 300 (capacity 300 kg of Al) or BU 350 (capacity 350 kg of Al) crucibles from Morgan (Noltina, Germany) can be installed into furnace.

Heating elements are made from modern Resistohm P145 wire in form of spirals on ceramic tubes for long term life time. Furnace electric power – 75 kW, 3 phases. Melting rate (approximately) – 80 kg Al per hour.

Furnace control cabinet with electronic PID regulator of temperature for precise temperature control and low electric energy consumption (average electric power consumption – 0,6-0,8 kW*h per kg of aluminium melt).

CRUCIBLE MELTING ELECTRIC TILTING FURNACE FOR ALUMNIUM, BRASS AND ZINC ALLOYS

The ETF-BU350 furnace can be tilting by servomotor for pouring liquid metal into a casting mold or transporting ladle (safety and low energy expense). Rigid construction of the furnace body is made from structural steel.

The furnace low electric energy consumption due to the modern fiber-type insulation materials. BU 350 stabil crucible from Morgan (Noltina, Germany), crucible capacity: 350 kg of Al. Furnace electric power – 63 kW, 3 phases. Melting rate (approximately) – 75 kg Al per hour.

Heating elements are made from modern Resistohm P145 wire in form of spirals on ceramic tubes for long term life time.

Furnace control cabinet with electronic PID regulator of temperature for precise temperature control and low electric energy consumption.

C. Equipments for recycling of non-ferrous (aluminium, copper, zinc and lead) scrap

In recent years, the volume of scrap and waste recycling of non-ferrous metals and alloys has shown steady growth. For example, today in the aluminum industry, scrap and waste recycling is the dominant process.

SA-FOUNDRY sp. z o.o. offers modern equipments for scrap and waste recycling of non-ferrous metals and alloys. We realize turnkey projects that include a full range of equipment, materials and technological support, as well as equipments for each stage of scrap recycling.

Generally, the complex of equipments for recycling scrap of non-ferrous metals and alloys includes:

- **Tilting rotary furnaces for scrap melting.**
- **Reverberatory holding furnaces for the melt.**
- **Ingot casting mashines.**
- **Exhaust gas filtration systems.**

Currently, the recycling cells for non-ferrous metal and alloys scrap based on tilt rotary furnaces and holding furnaces are most in demand and have the following main advantages:

- Low fuel consumption.
- High metal yield.
- High performance.
- The ability to work on a heavily contaminated and unprepared scrap, including slag.
- The ability to automate the recycling process.
- Reduction or elimination of metal "contamination" with harmful impurities (for example, iron)

Depending on the scrap quality and estimated performance, we are ready to offer the most efficient and reliable equipment with the required characteristics, modern consumable materials and technological support of the projects.

Tilting rotary furnaces for aluminium scrap melting

Reverberatory holding furnaces for the aluminium melt

Ingot casting mashines. Equipment example from ALM Company

Exhaust gas filtration systems. Equipment example from ALM Company

Today, the basic scheme for non-ferrous scrap recycling includes:

1. The gas or liquid fuel tilting rotary furnace for scrap melting.
2. The gas / liquid fuel or electric holding furnace (usually reverberatory type) for technological treatment of melt before pouring (introducing the additives, refining, degassing, structure modification).

The tilting rotary furnace is the "heart" of this complex. The tilting rotary furnace capacity is varied in the range of 1 – 21 ton. As an example, the main technical parameters of tilting rotary furnaces with a capacity of 3 and 5 tons are shown in table 2.

Table: The main parameters of SA-Foundry tilting rotary furnaces with a capacity of 3 and 5 tons

No.	Parameters	The furnace type	
		ARTF-3	ARTF-5
Charging			
1.	Capacity of aluminium, kg	3.000	5.000
2.	Door opening diameter, mm	1300	1400
3.	Liquid capacity, m3	1,6	2,5
4.	Maximum charge weight (including flux), kg	3.410	6.150
Productivity			
5.	Melting time of one charge, hours	~ 2	~ 2
6.	Non melting time (charging, pouring melt and discharging slag), hours	~ 1	~ 1

No.	Parameters	The furnace type	
		ARTF-3	ARTF-5
7.	Cycle time “tap to tap”, hours	~ 3	~ 3
8.	Number of cycles per day (24 hrs)	7 – 8	7 – 8
9.	Productivity per month, ton	~ 500	~ 800
Burner			
10.	Maximum burner power, kW	1500	1750
11.	Minimum gas consumption, m3/h	38,8	38,8
12.	Maximum gas consumption, m3/h	156	182
13.	Burner fan, m3/h	2300	2500
Mechanical part			
14.	Drive power, kW	25 kW / 380V	30 kW / 380 V
15.	Variable melting angle of furnace tilt, degrees	0 – 15	0 – 15
16.	Rotation furnace speed, RPM	0 – 6	0 – 6

Because the tilting rotary furnace works as a periodic melting furnace, the harmful impurities (for example, iron) in the charge are significantly reduced during melting, which is very important for secondary aluminum alloys production. The rotation of the furnace facilitates the mixing of the scrap, melt and flux, contributes to the formation of a uniform melt, heat transfer, as well as an effective reaction with flux. The scrap melts 2-3 times faster than in a static furnace with the same capacity, which ensures low energy consumption.

SA-Foundry is ready to offer effective technical solutions for the scrap and waste recycling of non-ferrous metals and alloys.

D. Transport (transfer) ladles for non-ferrous metals and alloys

To date, the most flexible solution for the transportation of liquid metal is the use of transport ladles. We have gained experience in design of ladles for non-ferrous metals and alloy melts.

Depending on customer requirements, we can offer a wide range of optimal solutions including the following:

- Manual one- and two-handed ladles of various capacity.
- Heated ladles (usually electric) to control the melt temperature during melt operations (degassing / refining operations for instance) or pouring.
- Electrical drive tilting ladles (servo-drive).
- Hydraulic tilting ladles connected to a loader hydraulic pump and controlled by a loader operator with the possibility of ladle turn around a vertical axis (optional).

CRANE OPERATED TRANSFER LADLE

Our STL-B Series Crane Operated Transfer Ladle features a cast refractory which is both lightweight and durable. The hand operated crank wheel allows for precise pouring. Available in several standard sizes. Custom size are available.

FORKLIFT OPERATED TEAPOT TRANSFER LADLE

Our STL-C Series Forklift Operated Teapot Transfer Ladle features easy pouring and added operator safety. The fully covered design offers excellent efficiency. The lining is made of lightweight refractory. This ladle is design for forklifts with a rotating carriage and is available in a couple of sizes. Custom sizes are available.

CRANE OPERATED ELECTRIC HEATING TRANSFER LADLE

The ETL-Series Crane Electric Transfer Ladle is available in a variety to sizes. The ladle features a graphite crucible for long life and extended use. Available in four standard sizes. Custom sizes are also available on request.

FORKLIFT OPERATED ELECTRIC HEATING TRANSFER LADLE

Our ETL-B Series Forklift Operated Electric Transfer Ladle is designed for forklifts which have a rotating carriage. The ladle features a graphite crucible for long life and extended use. Four standard sizes are available. Custom sizes also available on request.

The presented range of possible solutions to the non-ferrous metal and alloy transportation and metal pouring can be adapted to different production volumes and available melting equipment.

E. Ladle preheaters and dryers - electric or gas burner

According to our experience and researches we propose to the market electric or gas burner ladle preheaters and dryers. Ladle dryers and preheaters are used widely in metal melting applications on foundry and metallurgy foundries. These ladle preheaters and dryers can be used for:

- drying the new ladle refractory lining,
- ladle preheating prior to the molten metal is poured.

Handle electric foundry ladle preheater and dryer

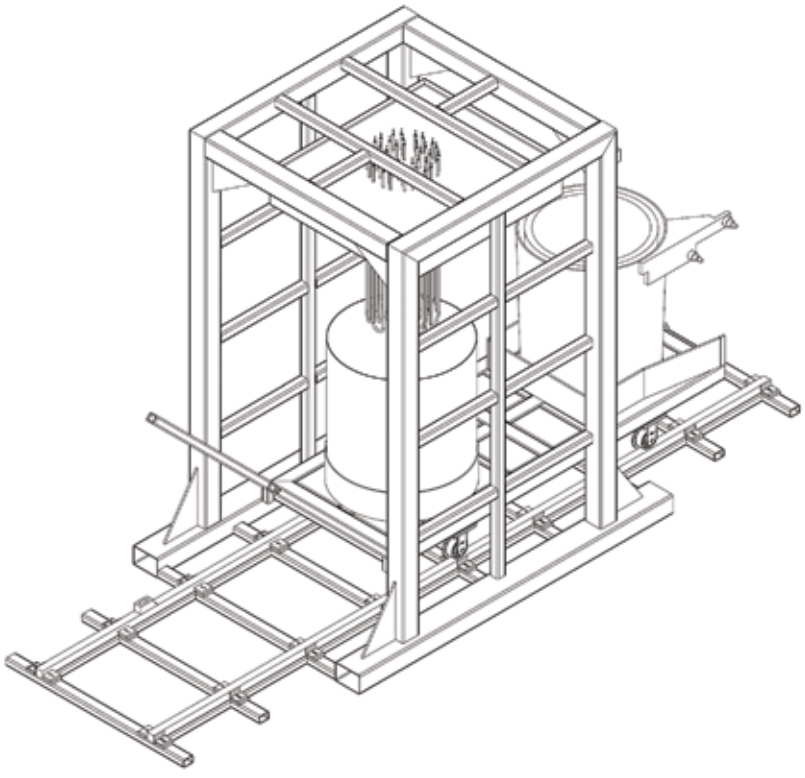
The main advantages of using electric ladle preheaters and dryers:

- Energy saving. More thermal efficiency (up to 80 % compared to the 5-15 % for simple burning and 20-30% for burners with recuperators). Lower operation costs.
- More precise temperature control and easier to operate.
- Increased ladle refractory lifetime (no thermal shock effect from burner).
- Reduced environment and pollution problems (reduced CO_2 emission).

The main advantages of using gas burner ladle preheaters and dryers:

- Fast heating rate.
- More simple and rigid construction.

All models of electric or gas burner ladle preheaters and dryers are designed by customer requests.



Automatic electric station for preheating and drying of foundry ladles

F. Melt transfer troughs and furnace lining

The main advantages of proposed systems:

- Avoid continuous repairs.
- Our troughs have no metal penetration and are easy to clean.
- Helps to reduce inclusions due to robust ceramic structure.

Melt transfer system

Furnace lining

Precast parts for furnaces and ladles

Contents

For notes

SA-FOUNDRY Sp. z o.o.

ul. Koszykarska nr 27B, lokal 26,
kod poczt. 30-717, Kraków, kraj POLSKA
Numer KRS: 0000624462
REGON: 364765255, NIP: 6772404829
E-mail: foundrysa@gmail.com
Website: sa-foundry.com
Phone: +48 (511) 480-980

*Automatic gravity die casting cell based on tiltable gravity casting machine SA-Foundry ALG-1500*1300*

Our authorized dealer in Ukraine:

“Engineering Company - SAS” Ltd.

03680, Kiev, st. Semashko 13, of.105
Phone/Fax : +38 044 424 25 03, +38 044 423 82 99
e-mail: info@sasua.com.ua

Website: www.sasua.com.ua

Our authorized dealer in Turkey:

ACAN MAKINE IMALAT SANAYI VE DIS TICARET LTD. STI.

Cumhuriyet Mah. 1993 Sk. Papatya 2 Residance A Blok D.81 Esenyurt, Istanbul, Turkey
Phone: +90 212 694 67 44, +90 212 852 88 25
Fax: +90 212 852 26 06
E-mail: acan@acanmachine.com
Website: acanmachine.com