

New aluminium recycling plant in Thailand

As recycling is an ever increasing issue for the twenty first century, Shyam Narayan, Managing Director of Alva Aluminium Ltd and Peter Newman, Director of Furnace Engineering Pty Ltd have shared with Metal Castings Magazine the information about a recently installed state of the art aluminium recycling plant on a Greenfield site on the Eastern seaboard of Thailand. The plant is designed to initially process 100 tonnes of commercially available aluminium scrap over twenty four hours. The plant illustrates a 21st century approach to effective recycling.

TILTING ROTARY FURNACE

The Tilting Rotary Furnace is energy efficient with less than 600 kWh consumption per ton of aluminium melted. And has a 7m³ capacity with air/natural gas burner for melting all types of aluminium scrap. The basic concept of this furnace is similar to a concrete mixer.

The burner and the flue is installed on the door and the single entry and exit point allows a double pass for the combustion products resulting in the very low energy consumption identified above. The furnace operates under positive pressure, and this eliminates air ingress and allows the burner to be programmed by the Vari-gas feature of the PLC to operate in a preset air rich, neutral or gas rich mode depending on the type of charge. With proper control of this Vari-gas feature, the need for salt and/or flux can be eliminated or greatly reduced.

CHARGER

A rail mounted vibrating charging machine of 5m³ capacity is installed to charge each load in approx. 3 minutes. The charger travels perpendicular to the furnace opening as well as parallel to the furnace door, allowing an additional TRF in future to be loaded with the same charging machine.

HOLDING FURNACE

Preheated ladlers are used to transfer approx. 13 tonnes of molten aluminium to one of the two hydraulically tilting 30 tonnes aluminium capacity furnaces in less than 15 minutes. In these furnaces, additions are made to meet the final alloy specification. In addition to alloying and superheating, these furnaces are equipped with two natural gas fired burners, rated to melt 5 tonnes aluminium per hour. It is envisaged that while one furnace is casting, the other can melt sows, clean high density scrap such as cylinder heads and aluminium wheels.



DANTHERM BAGHOUSE

Alva Aluminium Ltd, in line with its commitments to reducing pollution emissions and adhering to the Thai government policy, has set up a baghouse commissioned by Dantherm Filtration (Denmark). The baghouse consists of two cassette type filters each with 1,260 lime coated bags designed to separate particulate matter (and deposit into jumbo bags) from air with a maximum capacity of 150,000 Nm³/h. The baghouse operates automatically as per the requirements of the three furnaces.

STAS DEGASSING SYSTEM

In order to reduce hydrogen levels, a 4 rotor system is installed, using piped oxygen free nitrogen supplied by a dedicated liquid nitrogen tank (VIE) located outside the factory. The small “bubbles” dispersed in the molten stream of aluminium in the launder act as carrier to float the hydrogen to the surface.

After which, the molten metal flows through a pre-heated filter where undissolved solid particles and dross are removed before going to the casting wheel.

ODT INGOT CASTING AND STACKING MACHINE

In South East Asia die casting foundries typically use 5-6kg ingots for ease of handling. However Alva has gone for a 7.5kg ingot design which is also easy to handle. In fact, Alva has received reports from customers that melting loss is reduced compared to smaller ingots.

ODT designed and installed a system with a maximum capacity of 1500 ingots per hour.

A laser sensor maintains accurate molten metal level by controlling the tilt angle of the holding furnace from the casting line console.

Molten aluminium is fed into the centre of the casting wheel which distributes molten aluminium into individual moulds on a continuous conveyor.

A cooling water system using recycled water removes the heat of the molten metal thereby solidifying the ingots.

Once the solidified ingots are quenched through a secondary cooling system, a robot automatically stacks at 500kg or 1000kg bundle. The bundle is weighed on a stacking line and then goes through a strapping machine, fit for sea voyage. A typical half stack consists of 79 ingots of 7.5kg each resulting in a stack of approx. 600kg.

The initial plant layout allows for the installation of a second Rotary Tilting Furnace. This will virtually double the production of this aluminium recycling plant. ●

