

# Cleaning furnaces and removing dross easily and effectively

This article describes the advantages of the current range of equipment offered by the Italian company T.T. Tomorrow Technology for dross removal and furnace cleaning

Dross has always a negative connotation in the aluminium-producing community. High oxidation rate, poor thermal efficiency, and reduction in furnace melting capacity are universally-recognised negative factors originating from the presence of dross.. The contaminated scrap which is now easily available on the market always results in excessive dross production, despite the low oxidation target of the latest generation of melting furnaces now installed and operated in many casthouses.

Effective skimming and furnace cleaning are therefore important factors in the drive to achieve production efficiency, together with quality and economy. These are also the main benefits that clients have achieved by the adoption of the automatic or semi-automatic de-drossing and furnace cleaning equipment manufactured by the Italian Company T. T. Tomorrow Technology, based near the city of Padua.

Over the last nine years, the development and production of equipment, by this organisation, designed to skim and clean furnaces, has not only been driven by productivity and quality issues, but has also been influenced by health and safety legislation which requires operators to be protected from injury and exposure to heat and other hazards in proximity to furnace doors.

The diverse requirements of a number of clients led to the design and manufacture of several different machine concepts such as: rubber-tyred diesel vehicles controlled by the driver, and rail-mounted or fixed machines which can be manually-operated or can function under radio-control, fully or semi-automatically.

It is well known that dross acts as a thermal insulator on the surface of the molten bath, reducing the efficiency of the transfer of heat from the flame to the metal. The opportunity to remove the dross from the furnace, easily and quickly, results in higher heat-exchange efficiency, thereby lowering the chamber temperature (reducing metal oxidation) as well as ensuring a shorter melting cycle. All these are factors which lead to cost savings and higher productivity.

Dross adhering to the furnace walls and corners, as well as the presence of solid deposits of dross and heavy metals lying on the furnace bottom, results in a decrease in overall capacity. There is also a reduction in metal quality due to the existence of uncontrolled alloy constituents and composition-polluting elements (particularly iron) which can easily enter into solution in the aluminium.

Again the opportunity to remove deposits from the furnace bottom easily and effectively results in enhanced productivity and an improvement in quality.

The automation (both in terms of the frequency and of the operation itself) of these routine furnace-tending procedures significantly improves all the aspects of the melting process. It also ensures that



The long 'telescopic' arm allows for a comprehensive clean in even the deepest of furnaces.

these often unpleasant and arduous operations are routinely carried out on night shifts or during unsupervised periods.

Skimming and furnace cleaning equipment designed and manufactured by T. T. Tomorrow Technology can provide the following benefits:

- Increased furnace utilisation and lower gas consumption by reducing the time required to effectively and accurately de-dross and clean the furnace;
- Provide greatly improved heat transfer by removing the dross acting as thermal insulation on the molten metal, with ease and precision;
- Reduce the amount of aluminium removed with the dross during skimming operations to an absolute minimum
- Avoid dross, sludge and metal build-up that progressively reduce the furnace capacity, and in turn adversely effects the metal composition; such deposits also require unscheduled downtime in order to carry out cold furnace cleaning using hammers, excavators, etc;
- An increase in the speed of the cold charge melting cycle, as a result of the ability to mix and submerge scrap into the melt;
- Increase refractory life by avoiding the thermal stress caused by lengthy de-drossing procedures

with the associated falls in furnace temperature and the mechanical stress resulting from the use of percussion tools in the cleaning operations;

- Reduction in the manpower required to carry out the furnace-tending operations;
- An improvement in casthouse safety by removing the operator from the proximity of furnace door during de-drossing operations;
- Eliminate the need for forklift trucks to operate in front of the furnace.

It is worth noting that, during the de-drossing operation, the tool is moved back and forth with precise and controlled movements parallel to the liquid bath. This optimum standard of control eliminates the oscillations that are often experienced with more traditional de-drossing systems. Tool movements may be precisely controlled by the operator using the remote control joystick, or can be carried out fully automatically (without any intervention of the operator). The precision of this furnace tending operation provides a considerable number of economic and production advantages, minimising the unintentional removal of aluminium while maximising the cleanliness of the molten metal. Where the operator is in control of the skimming procedure, he is seated in a safe cabin. Alternatively, he can be manning the remote control



T. T. Tomorrow Technology rail-mounted de-drossing equipment operating at the hot chamber of a twin-chamber melting furnace.



TT Tomorrow Technology's latest rubber wheel de-drossing vehicle for furnace cleaning

console in the safest location, in order to avoid the potential risk of splashes of molten metal from the furnace.

In line with normal TT Tomorrow Technology standards, the machine configuration, structural characteristics and working parameters have been designed to enable the equipment to be simple, reliable and easy to maintain. All electrical and hydraulic components have been positioned on the main frame of the machine, away from the

furnace to avoid exposure to heat and molten metal. This also eliminates the risk of fires, originating from the hydraulic oil that could potentially leak into the furnace.

A further advantage of the rail-mounted or fixed machines is that no special foundations or extensive civil works are required for their installation. Such systems may be mounted on rails in front of the furnace doors, allowing the equipment to operate on more than one furnace, or may be fixed in

front to the furnace.

The high flexibility of the rubber-tired diesel-propelled vehicles is subject to no constraints, allowing them to be also employed for scrap-charging duties, thus transforming them into multi-purpose furnace-tending vehicles. As a result, a sole operator is able to carry out the entire tending operations, including charging, skimming, alloying and furnace cleaning, in a casthouse housing several furnaces.

Clients around the world employing furnace cleaning machines supplied by T.T. Tomorrow Technology point to a number of advantages:

- High economic returns;
- Ease of use;
- High reliability and minimum maintenance;
- Flexibility;
- Easy implementation within existing casthouses. The range of casthouse products provided by T.T.

Tomorrow Technology, in addition to skimming and furnace cleaning systems, also includes several types of furnace-charging equipment (rubber-tired diesel vehicles, as well as rail-mounted or fixed machines which can be fully or semi-automatic), material handling systems (scrap, liquid metal, coils, billets, slab and rolling mill roll transporters), as well as dross treatment and other items of downstream equipment.

#### Reader Reply No.58

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