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**“Over the past 20 years, the company’s development and production of equipment and vehicles designed to skim and clean furnaces has been driven not only by productivity and quality issues, but also by health and safety regulations that require operators to be protected from injury, heat and other hazards near furnace doors”, Giovanni Magarotto, Managing Partner, T.T. Tomorrow Technology SpA**

## Efficiency in furnaces tending operations

T.T. Tomorrow Technology SpA has been producing machines for more than 20 years for casthouses and anode plants. The board of directors responsible for this joint stock company and its entire staff are well prepared for the new challenges in the aluminium industry and for the new scenario brought about by the Covid-19 pandemic. The high ability to understand the customers' needs for innovative solution, the flexibility in adapting the products, the perfect design and high-quality components characterize the company. This article describes the advantages of the current range of equipment for dross removal and furnace cleaning.

T.T. Tomorrow Technology, which is located in Due Carrare near Padua, Italy, has always been focused on providing the best solution to the installed melting capacity of the melting furnaces in order to prevent the negative effects of dross on aluminium production. High oxidation rate, poor thermal efficiency and reduction of furnace melting efficiency are generally recognized negative factors caused by the presence of dross. The contaminated scrap available on the market today often leads to excessive dross formation, despite the low oxidation target of the latest generation of melting furnaces installed and operated in many casthouses today.

Effective skimming and furnace cleaning are therefore important factors in achieving efficient production in addition

to quality and cost-effectiveness. These are also the main advantages that customers have achieved by using the latest generation of T.T.'s special furnace tending vehicles and automatic or semiautomatic de-drossing and furnace cleaning equipment.

Over the past 20 years, the company's development and production of equipment and vehicles designed to skim and clean furnaces has been driven not only by productivity and quality issues, but also by health and safety regulations that require operators to be protected from injury, heat and other hazards near furnace doors.

Different customer requirements led to the design and manufacture of various machine concepts, such as rubber-tyred, driver-controlled diesel vehicles and rail-bound or stationary machines that can be operated manually or fully or semi-automatically under wifi control.

It is well known that the dross acts as a thermal insulator on the surface of the molten bath and reduces the efficiency of heat transfer from the flame to the metal. The ability to easily and quickly remove dross from the furnace results in a higher heat exchange efficiency and thus in a reduction in chamber temperature (reduction of metal oxidation) and a shorter melting cycle. These are all factors that lead to cost savings and higher productivity.

Dross adhering to the furnace walls and corners and the presence of solid deposits of dross and heavy metals on the



furnace bottom reduce bath capacity. There is also a reduction in metal quality due to the presence of uncontrolled alloy constituents and composition- polluting elements (especially iron) that can easily dissolve in aluminium.

Again, the ability to easily and effectively remove deposits from the furnace bottom leads to higher productivity and quality improvement.

The automation (both in terms of the frequency and the operation itself) of these routine furnace tending procedures significantly improves all aspects of the melting process. It also ensures that these often unpleasant and strenuous operations are routinely carried out on night shifts during unattended periods.

## **Advantages of skimming and furnace cleaning equipment**

Skimming and furnace cleaning equipment from T.T. Tomorrow Technology provide the following advantages:

- Increased furnace utilization and lower gas consumption by reducing the time it takes to de-dross and clean the furnace effectively and accurately;
- Clearly better heat transfer by easily and accurately removing the dross that acts as thermal insulation on the molten metal;
- The amount of aluminium removed with the dross during skimming operations is reduced to an absolute minimum;

- Prevention of dross sludge and metal build-up that will gradually reduce furnace capacity and adversely affect metal composition; deposits also require unplanned downtime to clean the cold furnace with hammers, excavators, etc.;
- An increase in the speed of the cold charge melting cycle through the ability to mix scrap and submerge it into the melt;
- Service life extension of refractory material by avoiding thermal stress due to lengthy scraping processes with associated temperature drops in the furnace and mechanical stress due to the use of percussion tools during cleaning operations;
- Reduced need for personnel to carry out furnace tending operations;
- Greater safety in the casthouse by keeping the operator away from the furnace door during de-drossing operations;
- No forklift trucks required to work in front of the furnace.



Different customer requirements led to the design...

The tool is moved back and forth parallel to the liquid bath with precise and controlled movements during the de-drossing operation. This optimum control standard eliminates the oscillations that often occur with conventional de-drossing systems.

The tool movements can be precisely controlled by the operator via the joystick on the remote control or fully automatically (without operator intervention). The precision of this furnace tending operation offers a number of economic and production advantages as it minimizes the unintentional removal of aluminium while maximizing the cleanliness of the melt. While controlling the skimming procedure, the operator sits in a safe cabin.

Alternatively, he can operate the remote control console at the safest location to avoid the potential risk of metal splashes from the furnace.



... and manufacture of various machine concepts

## **The entire range of furnace tending vehicles updated**

During the last two years, TT Tomorrow Technology has updated its entire range of furnace tending vehicles and tending robots, offering the aluminium industry a new-model with all-wheel steering and telescopic boom up to a length of 40 feet. The high flexibility of the rubber-tired, diesel-powered vehicles is not subject to any restrictions so that they can also be used for scrap feeding and thus become multi-purpose furnace tending vehicles. The new



generation of skimming robots has been delivered with full wifi control to many customers in Europe, North America, Mexico and several countries.

A great advantage of the skimming robot on rails is that no special foundations or complex construction work are required for its installation. Mostly, these robots are already assembled and delivered ready to be placed on the rail prepared in front of the furnaces, which allows quick operation after operator training.

As a result, a single operator in a multifurnace casthouse can perform all tending work including charging, skimming, alloying and furnace cleaning.

T.T.'s production policy and market strategy are aimed at providing high-efficient vehicles and equipment to protect the aluminium industry from inferior and low-cost products that flood the market at the expense of good quality. Customers around the world who use T.T.'s furnace tending machines point to a number of advantages:

- High economic return;
- Ease of use;
- High reliability and minimal maintenance;
- Flexibility;
- Easily implemented in existing casthouses.



The whole fleet of vehicles and plants for charging, skimming and cleaning the furnaces have been recently featured with a remote connection to T.T. office in Italy, thus providing a diagnostic check, software upgrade and the possibility of control system modification and offering a real-time service to the customers' needs in any part of the world.

In addition to skimming and furnace cleaning systems, T.T. Tomorrow Technology's casthouse products include various types of furnace-charging systems (rubber-tyred diesel vehicles and electric rail-bound or stationary machines, fully or semi-automatic), material handling systems (scrap, liquid, metal, coils, billets, slab and rolling mill roll transporters), dross treatment and other downstream equipment.







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## Your **Technology** for today & **Tomorrow.**

We are aware not all customer needs are the same, thus customisation has become the key element of our success. We design tailored vehicles and equipment, offering a wide range of personalized solutions, to ensure their maximum performance and reliable operations.



SYSTEMS AND EQUIPMENT FOR THE ALUMINIUM INDUSTRY

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