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Pyrotek Refractory Furnace Relines Help Reduce Downtime for Aluminium Producers

Since 1974, the Pyrotek TAB Refractory Services team has performed furnace relines and maintenance for major aluminium companies around the world. It has installed over 1100 aluminium furnace linings in more than 30 countries.

Services include furnace relines and repairs in primary and secondary aluminium plants, as well as foundries, for all types of furnaces, including reverberatory, melting, holding, top-loading, tilting, rotary and others.

To optimize furnace refractory lining, operational factors must be considered, such as furnace type, alloy composition, operating temperatures and melt rate, type of fuel used and charging and drossing practices. Furnace design is also important. Factors include type, static or tilting, capacity, desired casting temperature and position of freeze plane.

A furnace refractory lining typically lasts four to 15 years, depending on the type of furnace. Service life varies depending on alloy, melt rate, combustion system, scrap charging size, practice and other variables.

Corundum growth, mechanical damage, metal penetration, thermal shock, erosion and chemical attack can contribute to refractory failure. Over the years, the Pyrotek TAB team has developed lining compositions and materials that can withstand the harshest environments.

Pyrotek's big-block linings ensure that shapes are manufactured under optimum conditions. Their fast installation rate results in reduced furnace downtime. Pyrotek big-block refractory shapes are designed for easy maintenance.

The big-block refractory systems are pre-fired to 550°C (932°F), which eliminates water to allow for faster commissioning, develops a strong ceramic bond and allows firing shrinkage that results in less stress relief cracking. Installation is not affected by ambient temperatures. They also can be combined with castable or brick furnace linings.

To maximize service life, Pyrotek TAB provides "zoned" refractory lining consisting of both cast-in-place and precast monolithic blocks. Utilizing different refractory materials in different furnace areas extends the lining's durability and reduces furnace maintenance and downtime.

Pyrotek's global refractory team and engineering centres work with aluminium operations to select the optimal refractory design and materials for their applications.

In some cases, upgrading from brick to Pyrotek's nonwetting, corundum-resistant linings in smelting furnaces can increase ingot and billet casting capability.

Furnace lined by Pyrotek's TAB Refractory Services.

After a 5-year period, some Pyrotek customers reported that furnace downtime due to refractory repairs was reduced by up to 65 percent. Total furnace availability increased by up to 12.6 percent, and output increased by up to 26 percent. Refractory costs per pound of aluminium produced were reduced by up to 22.8 percent.

For one South African operation, relining its 12 smelting furnaces with furnace linings designed and installed by Pyrotek TAB increased the average capacity of each furnace to 75 tonnes from 55 tonnes, which translated into additional annual revenues of USD$30 million for the aluminium company.

USA Furnace Reline

Pyrotek's TAB Refractory team has been selected to supply and install refractory lining for a new furnace at Logan Aluminum Inc.'s plant in Russellville, Kentucky, USA. The 154-tonne (340,000-pound) tilting holding furnace, one of the largest in the world, was supplied by UK-based manufacturer Mechatherm International Ltd.

Two low nitrogen-oxide burners allow the furnace to have holding and melting capacity. Furnace features include a large 10 metre (33 foot)-wide door, roof-mounted radar molten metal sensor and integration for an under hearth electromagnetic stirrer, Mechatherm says. The furnace is expected to begin operating later this year.

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Selecting the Right Scrap Material, Cleaning and Processing Equipment Can Increase Metal Yield and Casthouse Efficiency

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"Mechatherm has been working with TAB for over 25 years on many worldwide projects. We have always found them very flexible to work with and they are always quick to respond to requests. Their knowledge and expertise implementing turnkey projects including the design, supply, installation and bake-out is first class. Working together to achieve tight budgets and schedules we have had a very successful partnership and look forward to working with Pyrotek TAB on future projects," says Stuart Allen, Director of Sales, at Mechatherm.

Logan manufactures flat rolled aluminium sheet primarily for use in the beverage can market.

Novelis Furnaces

Pyrotek TAB Refractory was awarded the contract for the refractory lining of six new aluminium melting furnaces by Mechatherm for the Novelis recycling plant in Nachterstedt, Germany. The plant was commissioned in 2014 and processes 400,000 tonnes of aluminium scrap annually.

The melting furnaces are the biggest dual-chamber recycling furnaces in the world. They consist of three 180-tonne dual-chamber side well furnaces, which each have
500 tonnes of refractory, and three 130-tonne side well furnaces with 300 tonnes of refractory each.

After the project, Pyrotek TAB was awarded the casthouse refractory maintenance contract. The key objectives of working with Novelis were to reduce furnace outage time, increase furnace availability and lower total costs of refractory per tonne of aluminium produced.

"Pyrotek's TAB is an important and strategic partner for us, when it comes to fast repair reaction times, material availability and to further minimize furnace outages and repair times in our plant," says Michael Jordan, Novelis Plant Manager.

Saudi Arabia Project

Pyrotek's Saudi Arabian operation, TAB KSA, provided the turnkey refractory furnace linings at a greenfield project in Saudi Arabia jointly owned by Alcoa and the Saudi Arabian Mining Co. (Ma'aden). The integrated aluminium facility, which began pouring metal in 2012, includes an alumina refinery, a smelter, a casthouse and a rolling mill. The smelter has a capacity of 740,000 tonnes per year.

Pyrotek's big-block refractory furnace relines, performed by its TAB Refractory Services group, have shown to last longer and help reduce downtime.

Pyrotek participated in what was reportedly the largest aluminium furnace refractory project in history. It consisted of the following:

- Five 100-tonne ingot furnaces
- Five 135-tonne slab furnaces
- Three 85-tonne billet furnaces
- One 36-tonne coil melter
- One 90-tonne remelt furnace
- Two 120-tonne used beverage can (UBC) side-well melters

Following the project, Pyrotek was awarded the Ma'aden casthouse refractory maintenance contract with the goal of significantly reducing the producer's refractory cost per tonne of aluminium produced.

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