

# ALUMINIUM INSIGHT

Improving Performance in Production

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## ask the expert...

### THE BIG BLOCK REVOLUTION IN FURNACE REFRACTORY OPERATIONS



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In recent years, the manufacture and use of large precast refractory shapes to line aluminium melting and holding furnaces has become more popular, along with a trend to move away from traditional brick to new monolithic linings. These large precast shapes or "Big Blocks" can be used for complete furnace relines, or for specific areas within a furnace lining in combination with traditional monolithic lining materials. This avoids the problems sometimes encountered in installing high technology castables. Mike Bradshaw\* outlines the background, key features and range of benefits offered by Big Block refractory systems in responding to a range of customers' questions.

#### Q: What is meant by Big Block refractory systems?

A: A Big Block refractory system can be typically described as a pre-fabricated furnace lining, designed and manufactured off site and shipped to site in a kit form. The concept is designed to reduce the overall furnace outage and improve the performance and service life of the refractory lining.

#### Q: What types of refractory materials are involved?

A: These innovative refractory structures are produced in a controlled production environment where they are high-fired on all six sides to maximize the physical properties of the refractory material. Considerations that must be taken when selecting refractory materials include such variables as alloy composition and the internal furnace environment.

#### Q: What type of furnaces benefit from Big Block systems?

A: The Big Block refractory systems can be designed and manufactured for most types of furnaces and applications, with the exception of typical rotary type furnaces. Although certain parts of the furnace can be evaluated, such as the cone shaped front area of the rotary furnace.

#### Q: What are the main considerations in design and installation?

A: Big Block sections are easily combined with other construction methods, for quick repairs or retrofitting and TAB refractory engineers work closely with customers to help select the best material for the particular furnace application. Keyway locking design of the block system speeds refractory replacement and allows one or multiple blocks to be replaced at one time as required.

The main factor to be considered is the physical door opening to each furnace evaluated; restrictions on height of a door opening may have an impact on the shape and size of blocks that can be designed due to the need to move and position these blocks inside the furnace.

#### Q: What advantages and benefits are offered by Big Block designs?

A: Pyrotek TAB Big Block refractory solutions improve furnace performance and reduce downtime due to the availability to replace selected blocks should particular areas of the furnace be damaged.

Blocks are manufactured in laboratory-style conditions in a purpose-built facility, which results in a cast block with optimum properties.

Blocks have indefinite shelf life and there are no issues with storage of spare blocks. Also, special refractory materials can be used that are only available as precast shapes.

Installation of Big Block systems is not affected by ambient temperatures, so the process provides a much easier method of construction for extreme climatic conditions, such as in the Middle East where temperatures can negatively affect the mixing and placing of refractory castables.

Big Block installation is less labour-intensive than traditional brick replacement or patching and also, depending on furnace circumstances, turnaround time can be reduced by 25% to 40% compared with traditional methods.

Hydrogen off-gassing during commissioning is also reduced because the



Examples of TAB Big Block projects recently completed

blocks are high-fired prior to installation.

#### Q: What experience and references does TAB have?

A: Pyrotek's TAB Refractories Division is a world leader in improving the performance of refractory systems in aluminium melting and holding furnaces. Since 1974, TAB has specialised in the design, reline and maintenance of aluminium furnaces, having completed projects in over 30 countries. Many full and partial Big Block systems for all types of furnaces have been devised and successfully installed throughout the UK and Europe, including in Switzerland and Russia.

*Mike Bradshaw joined TAB in 1993 and holds qualifications in building construction and in advanced AutoCAD design. He has extensive experience of refractory design and construction of both precast shapes and on site furnace construction, ranging from brick, monolithic and big block methods of refractory installation. He is responsible for the management of all projects and contracting globally, including all engineering, design and resource planning.*