



Precast Big Block Furnace Refractory Lining for Rebuild

ALUMINIUM PROCESS

Primary Aluminium Plant, Holding Furnace
Metal Temperature: 720°C (1328°F)

FURNACE CAPACITY

40,823 kilograms (90,000 pounds)

PRIMARY ALLOY

6xxx Series

PREVIOUS SITUATION

The furnace—last re-lined 15 years prior—displayed significant refractory deterioration with excessive corundum buildup around the top of the metal level and loosening lamination repairs in danger of falling off into the melt. The steel shell of the furnace showed signs of excessive heat wear caused by the worn insulating refractory.

Problems associated with worn/aging insulation:

- Reduction in energy efficiency due to the compression of the existing insulation.
- Reduced furnace capacity from buildup.
- Increasing frequency and cost of repairs. Unplanned furnace downtime may cause loss of metal revenue.



Furnace appearance before rebuild

PYROTEK SOLUTION

Pyrotek’s engineering team assessed the condition and performance of the furnace and proposed a custom rebuild solution to optimize energy efficiency and refractory life while minimizing furnace downtime. The analysis compared precast and fired furnace shapes versus a cast-in-place installation. Determined based



Rebuild was performed using Pyrotek precast furnace shapes

on usage and process needs, a material package was provided per area of the furnace: lower wall, upper wall, roof, lintels, jambs, sill, and hearth.

The estimated cost of the cast-in-place option was USD\$33,300 less than using precast shapes. However, the cast-in-place option required an additional 10 days of production downtime. For this facility, an increase in furnace operation time of 10 days resulted in an estimated revenue gain of USD\$2.2million.

PROCESS IMPROVEMENTS

- Furnace rebuild using precast shapes was estimated to reduce the furnace downtime by 10 days.
- Renewed the furnace lining to reduce unplanned outages and costly repairs and to regain capacity.
- Big block furnace refractories are produced in a controlled environment and high-fired on all six sides to maximize physical properties.
- Reduced hydrogen off-gassing during commissioning because the blocks are high-fired to operating temperature prior to installation.
- Customer opted to use Pyrotek’s TAB Refractory Services division for future projects to streamline installation and avoid unexpected delays with using multiple contractors.

ESTIMATED SAVINGS

The furnace downtime was targeted to be 10 days less than a cast-in-place option which would result in the following savings:

Aluminium Produced Daily	201,720 pounds
Conversion Cost Per Pound	USD\$0.15
Total Daily Production Savings	USD\$30,258
Total 10-day Cost Savings	USD\$302,580

