



Industry: Glass
Application: Regenerator
Product Solutions: JM23 IFB and Superwool Plus Blok 800
Location: United Arab Emirates

April 2022

The Challenge

In modern fossil-fired furnaces, the heat contained in the waste gases leaving the furnace is used to preheat the combustion air, in order to produce higher flame temperatures and improve efficiency. The air preheating system most commonly used is the regenerative system.

The regenerators, located at each side of the tank are chambers built with fire clay refractories and containing a checker work of magnesite bricks. They act as heat exchangers between hot flue gases and cold air.

Our customer requested we optimize the design of the insulation lining to:

- Minimise power consumption in producing higher flame temperatures
- Reduce heat loss and increase energy efficiency of furnace operation

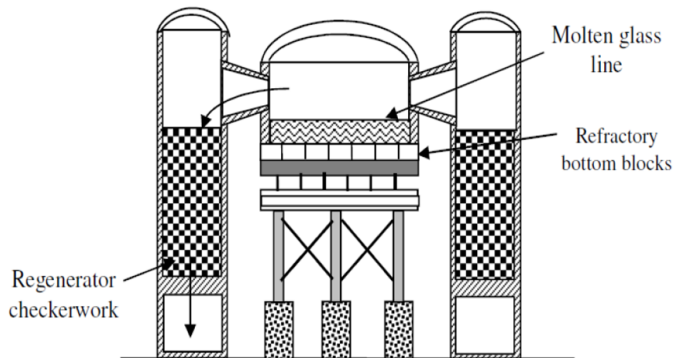


Figure 1: Glass regenerator refractory lining system

Application Overview

The original lining system consisted of:

- Hot face 231mm of mullite-based / Fireclay bricks
- 114mm of Fireclay bricks
- 114mm of Grade 23 insulating firebricks (IFB)
- 75mm of a final outside spray

Due to negative pressure in the regenerator, the spray was applied to prevent atmospheric air from seeping through the bricks which could lead to reduced efficiency.

The key challenge was about having better insulation and not an equivalent outside spray. Therefore, Morgan tested different options with various materials using Simu-Therm™ Heat Flow modelling software.

The resulting heat flow calculations convinced them to make the change to our Thermal Ceramics IFB, JM23.

There is significantly less heat on the body of the kiln lined with JM23 IFB, demonstrating its excellent thermal insulation performance resulting in greater energy savings and improving workplace safety.

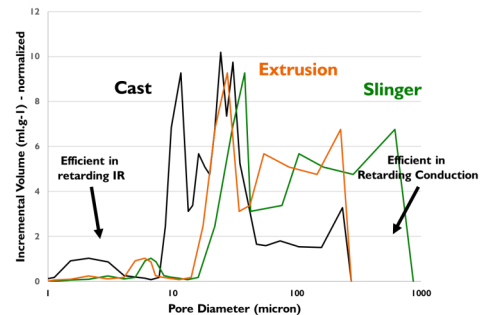


Figure 2: JM23 IFB have better pore size distribution which makes it a more efficient material that reduces thermal conductivity

Glass Regenerator Back-up JM[®]23 and Superwool[®] Plus Blok 800

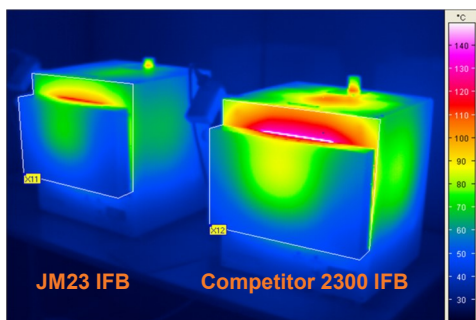


Figure 3:
IR thermograph of test kilns during 1000°C firing test. JM23 results in significantly fewer hot spots

The Solution

The new proposed system eliminates the presence of spray fumes and is easier and quicker to install. The new cold face is reduced by 15%.

Thermal Profile Comparison (1200°C Zone)

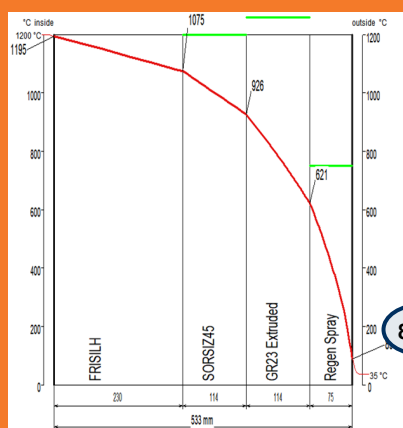


Figure 4: Before
The initial cold face temperature is 89°C

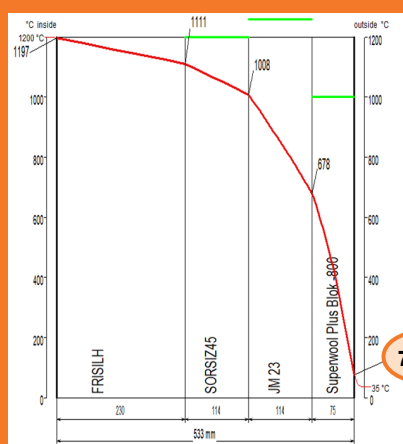


Figure 5: After
Using the proposed lining system comprising JM23 and Superwool Plus Blok 800, the cold face temperature is reduced by 15% to 76°C

Customer Impact

With low thermal conductivity due to the unique manufacturing process, JM23 IFB delivers the perfect balance of low density and homogenous porosity.

With the new thermal profile, JM23 IFB and Superwool Plus Blok 800 lining system reduces the hot face temperature by 15% from 89°C to 76°C.

With stringent quality processes in our JM IFB manufacturing operations, our customer was impressed and has successfully switched to JM insulating firebricks in their furnace design. We have secured future projects with the customer.



Figure 6: Completed glass regenerator refractory lining system made up of JM23 IFB and Superwool Plus Blok 800