



**Industry:** Iron & Steel  
**Application:** 380MT Torpedo  
**Product Solutions:** Superwool 1650SI Board  
**Location:** China

**November 2022**

## The Challenge

With a global focus and commitment from the iron and steel industry to reduce carbon emissions by 2050, the industry now needs to cope with the pressure to reduce its carbon footprint from both environmental and economic perspectives.

An area of focus is the more efficient use of advanced thermal insulation materials to improve these energy-intensive applications across the Iron and Steel industry. Lined with alumina-magnesia-carbon, high alumina, and pyrophyllite bricks, our Customer wants to reduce heat loss during the molten metal transfer in the torpedo ladle. They are seeking an improved performance by adding a backup insulation lining.

Partnering with Morgan on materials and installation, the Customer expects to achieve the following:

- Lower the cold face temperature by 15~20°C
- Reduce the temperature drop during molten metal transfer
- Structural stability and integrity of the new backup through the service life of the lining
- Ease of installation and maintenance, compatible with castable and brick (re)lining

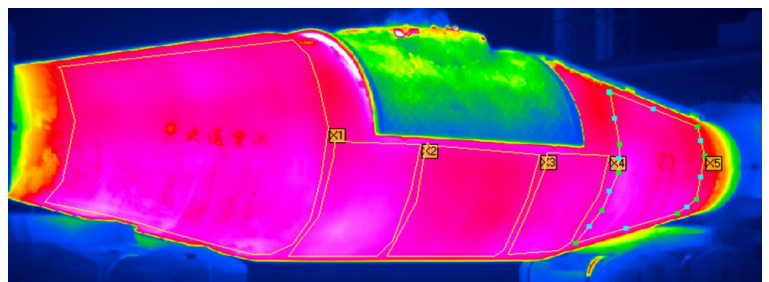
## Proposed Solution

After a full review of materials, and thermal analysis, Morgan recommended to our Customer to use Superwool 1650SI Board, our best-in-class 1650°C classification temperature, high strength, low biopersistent structural insulation board.

The water repellency of the board meets the requirement for compatibility with castables during installation. In addition, the high classification temperature of 1650°C can withstand the dynamic temperature profile up to 1150°C at the interface.

The thermal profile calculations show that the cold face temperature can be reduced to 50°C, achieving as much as 30% heat loss reduction.

Figure 1 - Thermography of torpedo without Superwool 1650SI Board backup



Solution and Results	EXISTING LINING	PROPOSED LINING
<b>Design</b>	Alumina-Magnesia-Carbon bricks: 330mm High Alumina brick: 20mm Pyrophyllite brick: 55mm x 2 mm	Alumina-Magnesia-Carbon bricks: 330mm High Alumina brick: 20mm Pyrophyllite brick: 55mm x 2mm Superwool 1650SI Board: 13mm
<b>Total Heat Loss (calculated)</b>	Heat loss: 6715 W/m <sup>2</sup>	Heat loss: 4608 W/m <sup>2</sup>
<b>Actual Measurement</b>	Cold face temperature: 248°C	Cold face temperature: 216°C
<b>Cold face Temperature reduction with proposed lining design</b>		32°C
<b>Molten metal temperature (during transportation) drop reduction</b>		10.1°C

# Superwool<sup>®</sup> 1650SI Board Backup Insulation for 380MT Torpedo



## Installed System

Engineering, design, material supply and installation of proposed system for optimal thermal insulation performance



Figures 2 and 3 - Installed Superwool 1650SI Boards in torpedo ladle

Figure 5 (below) — Inspection of Superwool 1650SI Board lining in torpedo at 1 year service life



## Impact for the Customer

Post-performance analysis was conducted with thermography, in-situ molten metal temperature monitoring and lining inspection at 12 months in-service:

- Reduction of 30-35°C in cold face temperature
- Inspection of backup lining at 12 months indicated integrity of lining system
- Average reduction of the molten metal temperature dropped 10.1°C, translating to an estimated USD50K energy savings per year per 1 torpedo continuous operation.\*

Our Customer was satisfied with the performance of the Superwool 1650SI Board performance and will expand the use to more torpedoes in more sites.

\* theoretical calculation methodology provided by customer

Figure 4 (right) — Thermography of torpedo with Superwool 1650SI Board backup lining

