



**Industry:** Iron and Steel  
**Application:** Ladle Back-up System  
**Product Solutions:** Superwool 1650SI Board and WDS® Microporous  
**Location:** India

**April 2022**

## The Challenge

In the face of heightened carbon footprint awareness and rising energy and raw material costs today, more efficient use of advanced thermal insulation materials is significant in energy-intensive industries such as iron and steel.

The steel ladles are currently lined with silica ramming mass and high alumina bricks. The ramming mass requires replacement every 6 months, resulting in high heat loss and energy costs for the plant.

## Application Overview

A thermal analysis and discussion with the customer to understand expectations for ladle improvement, Morgan recommended the use of Superwool 1650SI Board, our best-in-class 1650°C classification temperature low biopersistent structural insulation board.

Thermal Profile Calculations	Without Lining	With Lining
Silica Ramming Mass	117mm	117mm
70% Alumina Brick	50mm	50mm
Superwool 1650SI	-	13mm
WDS Board	-	7mm
<b>Total Lining Thickness</b>	<b>167mm</b>	<b>187mm</b>
<b>Heat Loss</b>	<b>10,713 W/m<sup>2</sup></b>	<b>3,939 W/m<sup>2</sup></b>
<b>Cold Face Temperature</b>	<b>362°C</b>	<b>187°C</b>



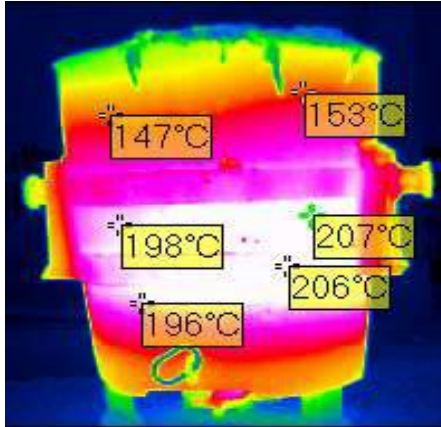
The improved system design for the ladle is a 20mm thermal insulation comprising the Superwool 1650SI Board (13mm) and WDS Microporous Board (7mm).

The preliminary thermal profile calculations showed that the cold face temperature was reduced by half - from 362°C to 187°C - achieving as much as 63% in heat loss reduction.

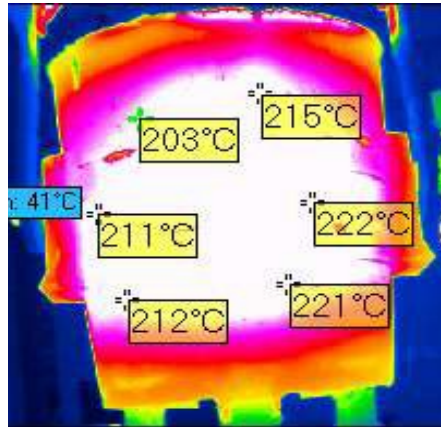
# Steel Ladle Back-up System with Superwool<sup>®</sup> 1650SI Board



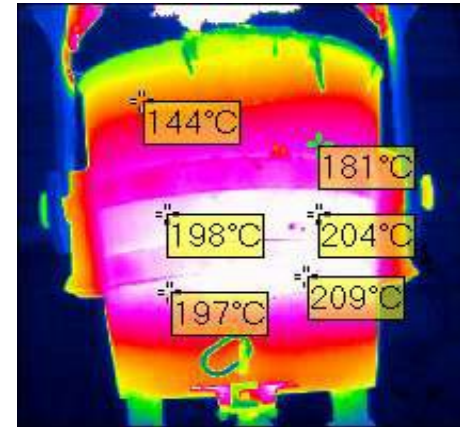
## BEFORE - Thermography images of ladle lined with existing design



Empty ladle before tapping

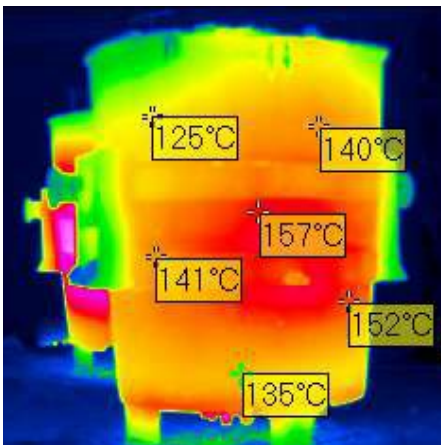


After tapping

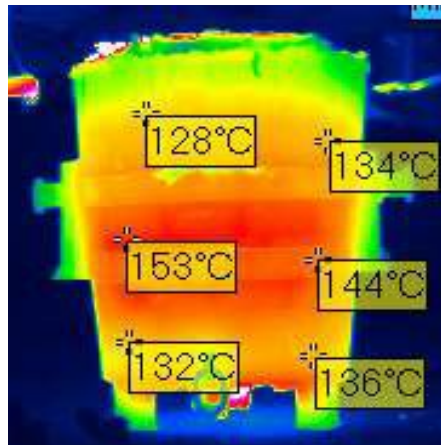


After purging and before casting

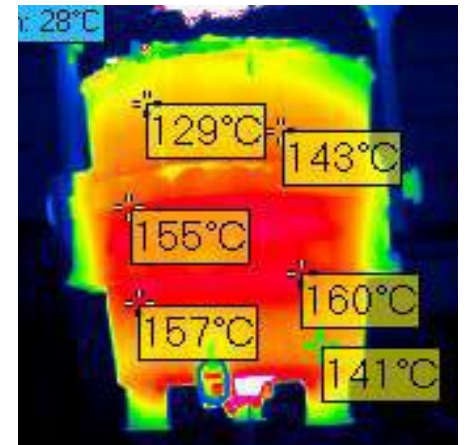
## AFTER - Thermography images of ladle lined with Superwool 1650SI and WDS system



Empty ladle before tapping



After tapping



After purging and before casting

## Customer Impact

- 60-80°C reduction in cold face temperature based on IR thermography after installation of thermal insulation lining
- Tapping temperature was reduced 15-20°C, resulting in energy savings of 100 units per heating cycle at INR 700 (USD 9) per heat-up.
- Considering 300 days and 9 heating cycles per day, approximate cost savings per year is ~INR 1.9m and the payback is less than 3 months .

Due to the use of better thermal insulation materials, the ladle temperature drop is reduced, which improves the ladle holding time before and during casting.

By exposing the steel ladles to lower temperatures, Morgan's thermal insulation system helps to improve the safety and working lifespan of the ladle operations significantly.