



# Integrated thermal management for effective furnace lining solutions

We offer fully integrated approach starting from consultation, design, manufacturing to final installation, with extensive experience across wide range of industries and market sectors.



- 1

**Furnace Lining Assessment**

Use of infrared (IR) thermography inspection to analyse the outside temperature and identify hot spots
  
- 2

**Material Selection**

Selection of the best material based on experience and expertise and supported by heat flow analysis software

Calculation **New Ladle slag line**

	inside	outside	unit	(brick characteristics)	
Ambient temperature	1600	45	°C	8026 W/m (1751 W/m <sup>2</sup> )	Heat loss
Surface temperature	1538.0	325.6	°C	12240 MJ/m	heat storage
Heat transition coefficient	150	27.76	W/m <sup>2</sup> °C	8000 kg/m	weight
Diameter	2651	3277	mm	308 mm	total thickness

(1) Calculation method ASTM C160, issue 2004. Eurocode 9 EC - wall 1/m<sup>2</sup>

wall layers from inside to outside	Thickn. mm	Density kg/m <sup>3</sup>	Classif. °C	temperature			K.mean
				border	mean	°C	
Material							
1. MgO-C Brick	230	2950	1700	1538	1402	8.0	
2. SILLIMANITE BRICK 'S 70'	65	2650	1740	1281.6	1141	1.832	
3. Superwool 850D	13	850	1650	897.2	705	0.151	325.6
  
- 3

**Engineering Design**

Incorporate suitable lining hardware design with allowance for shrinkage, expansion joints for movement control and profile changes
  
- 4

**Proper Installation**

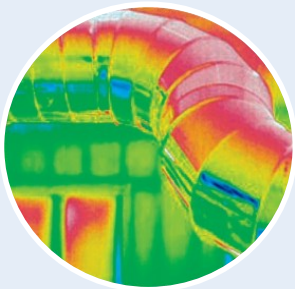
Ensure installation to specification with correct installation techniques
  
- 5

**Performance Verification / Energy Audits**

Infrared (IR) thermography inspection to verify initial design performance and conduct ongoing energy audits

## Application Engineering

Our capabilities before and after installation and servicing:



- Thermal Management Simulation and Analysis for:**
- Selecting the best material for the application
  - Lining optimisation to identify energy and cost savings
  - Design comparison modelling

### Thermal Simulation

- Steady state heat flow calculation
- Steady state with non-typical atmosphere
- Transient (time-dependent) calculation
- FEA/CFD 3D Simulation
- Slow Cool Heat Flow



- Lab technologies for testing materials including fibre and refractory product analysis**

### Thermal and Structural Finite Element Analysis

- XRF - Chemical Analysis
- XRD - Crystalline Structure Analysis
- Thermal Conductivity
- Abrasion, CCS, Shrinkage, etc.



- Onsite installation services and post-installation analysis and support**

### Failure Analysis - Fibre System

- Thermal Shrinkage
- Chemical Attack
- Mechanical
- Wind Erosion

For all enquiries, please contact our specialist sales and marketing offices:

**Americas**  
marketing.tc@morganplc.com

**Asia**  
asiasales@morganplc.com

**Europe**  
marketing.tc@morganplc.com

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