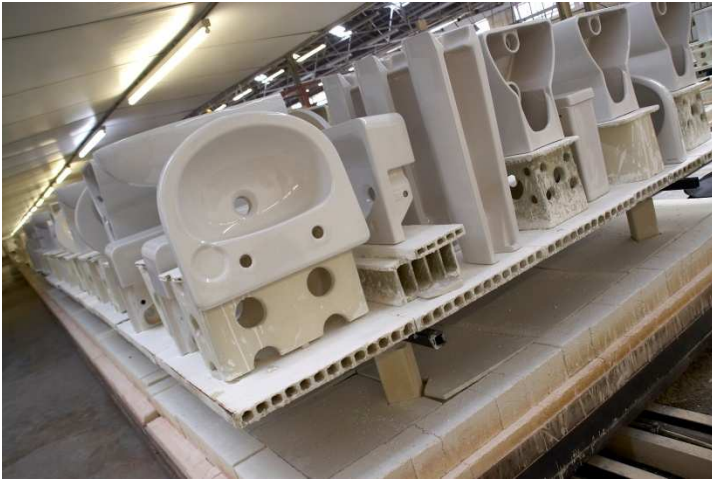


Case Study

How **Ultralite™** saved **energy**, improved **Health and Safety** and reduced **maintenance time** at **Ideal Standard International**.



What is Ultralite™?

Ultralite™ is a unique lightweight refractory material that has excellent thermal insulation properties. Its thermal characteristic is now proving itself within the Tableware, Sanitaryware and Brick Manufacturing industries saving significant energy and costs associated with the overall kiln operation.

Ultralite™ is designed to replace the more traditional insulation material within kiln car bases without any of the growing concerns about the health and safety implications of ceramic fibres. Ultralite™ is now a real alternative choice for the discerning manufacturer.

An Overview of Ideal Standard International



Ideal Standard International is a privately -owned company, operating independently within Europe, Middle East, Africa and Asia Pacific, with a presence in Central and South America. With bathroom solutions as its core

business, the company employs 18,000 people and is operational in over 30 countries. Ideal Standard International strives to produce the best quality Sanitaryware products from its global facilities and thus its production management

employ the best high-tech equipment and technologies available.



Ideal Standard International is committed to the **Health and Safety** of all its employees and strives to provide a healthy and safe workplace by operating a 'Be-Safe' safety campaign; the use of **Ultralite™** is evidence that it is constantly investing to improve its equipment, processes and procedures.

This Case Study focuses on the **Ceramic Sanitaryware** produced at **Ideal Standard International's Middlewich** facility in the UK.

The Middlewich facility utilises a variety of kilns in the manufacture and firing of its Sanitaryware, it is the Tunnel Kiln production process that has benefited from the use of **Ultralite™**.

Original Kiln Car Construction

The firing of the Sanitaryware takes place in a Tunnel Kiln, having a total of 130 kiln cars in the fleet, with 53 cars inside the kiln at any time. The original construction of the kiln cars incorporated a base layer of Rockwool to a depth of 50mm, on top of which was placed a layer of densely packed Bulk Fibre to a thickness of 175mm. On top of the fibre, was placed a layer of Cordierite tiles to a thickness of 12mm, supported by dense castable support posts, which extended from the base of the car.

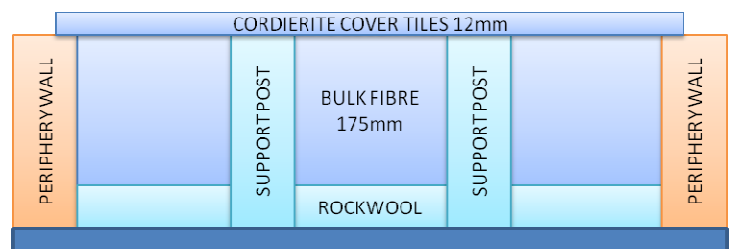


Diagram of Original Kiln Car Construction.

The original kiln car construction required routine refurbishment, so it was concluded that a program should be undertaken to re-construct the bases of the kiln cars using alternative insulating media and construction materials. The rationale behind this was to i) **totally eliminate** the use of **Ceramic Fibre** and ii) **improve the energy efficiency** of the kiln.

In Europe, as in many parts of America, Ceramic Fibre is classified as a Class 2 Carcinogen and therefore regarded as dangerous to the operative's health. Health and Safety considerations for employees are becoming a major concern for all employers on a global basis with Ideal Standard International leading the way. With these issues in mind, the company made a decision to **re-construct its kiln cars using Ultralite™** ROK loose fill insulation media.

New Kiln Car Construction

The diagram below shows the Ideal Standard kiln car re-construction, with **Ultralite™** as the main insulating media. The construction comprised of a 5mm layer of Ceraboard, followed by **Ultralite™** ROK loose fill media to a thickness of 220mm, capped with 12mm thick Cordierite tiles and brick periphery wall.

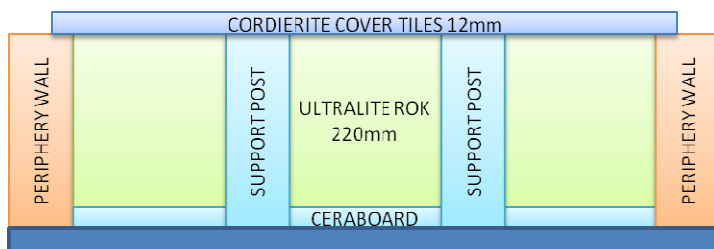


Diagram of new construction

Whilst carrying out the kiln car modification initiative program, additional improvements were made alongside the installation of Ultralite, including the use of Silicon Carbide supports in lieu of cordierite and the removal of some support structure.

Benefits resulting from the use of Ultralite™

The **fibre-free environment**, created by the use of **Ultralite™**, was a major improvement to the kiln car construction. Unlike ceramic fibre, it was felt that there were **no Health and Safety issues with Ultralite™**. The elimination of a potential health risk makes using **Ultralite™** a

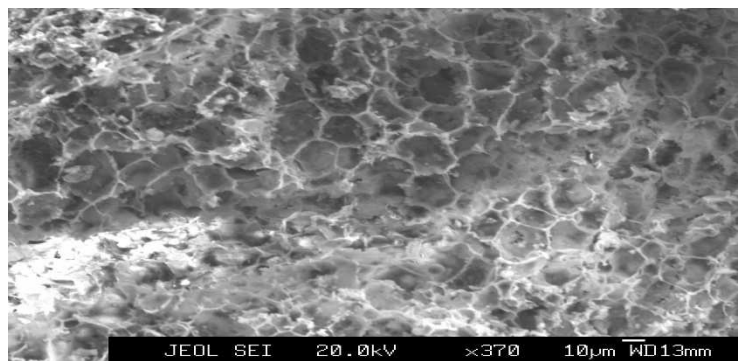
shrewd decision for employee welfare within the factory environment, **whilst also benefiting from the energy savings.**



Photo showing the Kiln Car base now filled with Ultralite™ ROK

The use of **Ultralite™** resulted in far less energy being stored within the kiln car base together with a correspondingly lower heat flow through to the underside of the kiln car. The **benefit** to Ideal Standard International was the **amount of energy “previously wasted purely to heat the kiln car”** being **significantly reduced by the deployment of Ultralite™**.

In a traditional kiln car, heat transfer occurs naturally through the base of the car at a constant rate. The degree to which this occurs is dependent upon the **insulation material**, the **hot face temperature** and the **base construction**.



Air is a good thermal insulator, so materials that trap air like **Ultralite™** are excellent for insulation. As clearly shown by the micrograph of **Ultralite™** (above), there is a high proportion of air open space within the structure, resulting in low solid density. This means that the heat transfer through

the material at elevated temperatures is **significantly less** than that of traditional insulation materials.

In order to quantify the amount of energy saved in the kiln car base, '**Static Heat Flow**' calculations have been carried out using industry standard computer programs, which have been specifically developed by **The Institute of Materials** in conjunction with **Ceram**. Comparisons were drawn between the original kiln car construction versus the **Ultralite™** ROK loose fill material and the results are shown in the following table:

| SHF Calculation Results | Original Construction | Ultralite™ Construction |
|--|------------------------------|--------------------------------|
| Cool Face Temperature | 127.7 °C | 100.7 °C |
| Total Heat Flow Per Car Per Firing Cycle | 131.226 M Joules | 88.016 M Joules |
| Total Heat Stored Per Car | 219.609 M Joules | 148.604 M Joules |
| Total Combined Heat | 350.835 M Joules | 236.620 M Joules |
| Percentage Energy Saving | | 33% |

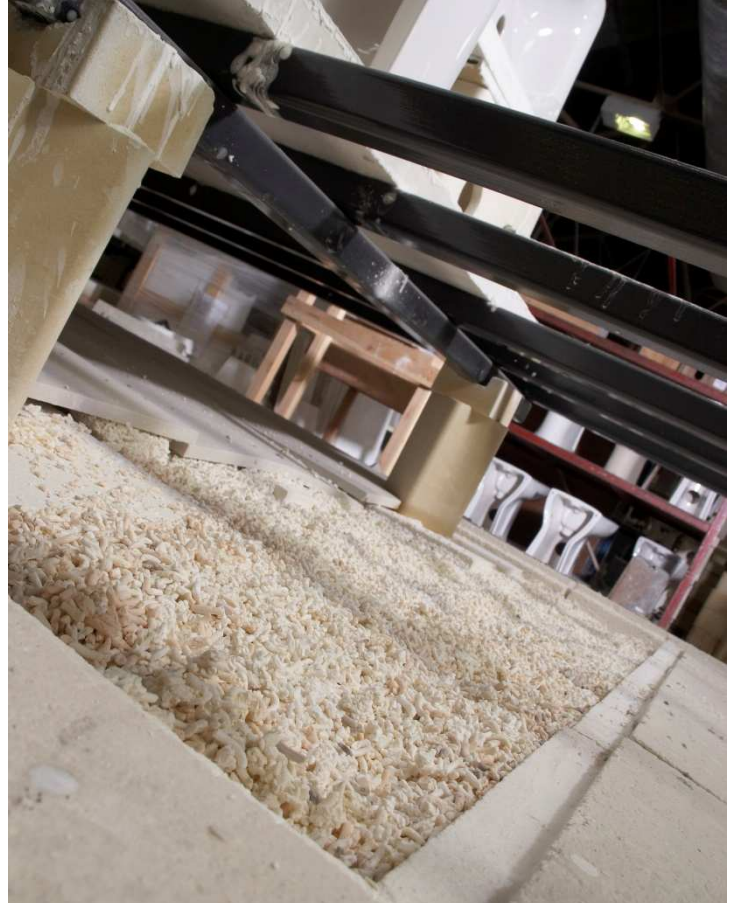
As can be seen from the above table, the amount of heat stored in the kiln car base, combined with the heat-flow through the base is **33% less with the Ultralite™** construction, resulting in a corresponding energy saving to the kiln car base.

The final kiln car modification initiative presented Ideal Standard International with an **overall energy saving of around 17%**. The installation of **Ultralite** as a functional part of this initiative **contributed significantly to this saving**, with the added advantage of providing a fibre-free environment for its employees.

Performance

Ultralite™ has now been installed at Ideal Standard International since the Year 2000. During the first year, the loose fill required some minimal topping-up, as is normal due to car vibration, however following this initial period the material has remained stable and maintenance free allowing Ideal Standard International to benefit not only from the

health and safety aspects of its installation, but the **energy savings** as well.



Experience suggests that the typical time between maintenance programs for a kiln car utilising traditional materials is 2 to 3 years. Using **Ultralite™**, this interval can be extended typically to 4 to 5 years. This not only saves money in terms of down-time and maintenance costs, but also in terms of the disposal of any hazardous material, as would be the case with bulk ceramic fibre installations.

Summary

The use of **Ultralite™** as an alternative insulation media to the traditional ceramic fibre has resulted in a *safer environment for Ideal Standard International's employees, whilst saving a significant amount of energy and reduced down-time and maintenance costs.*

If you would like to benefit from the use of **Ultralite™**, please contact Mantec Technical Ceramics Limited or visit our website.