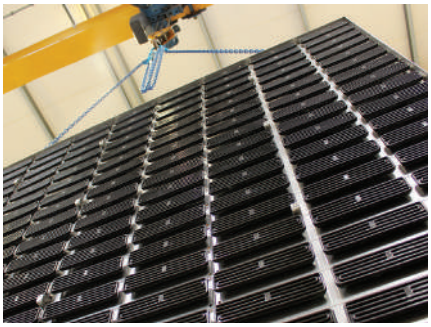
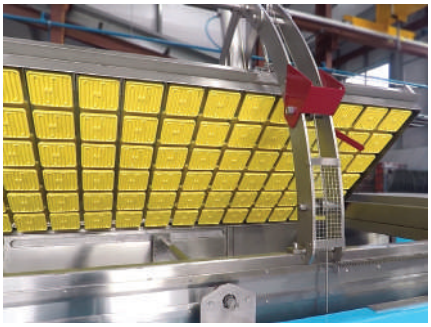
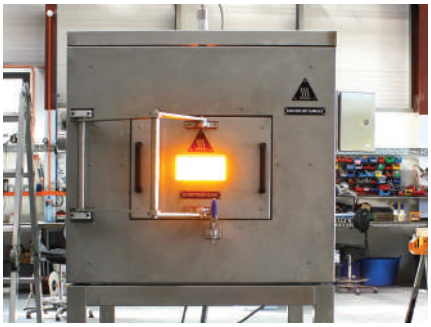
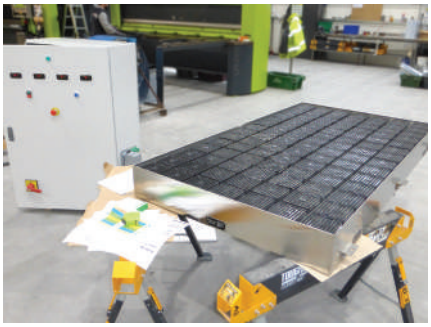
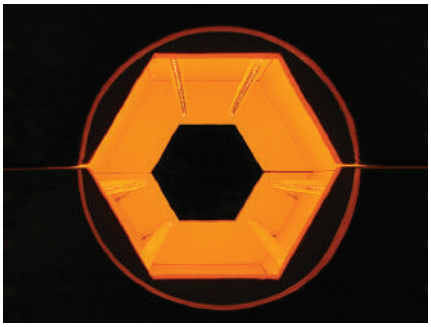
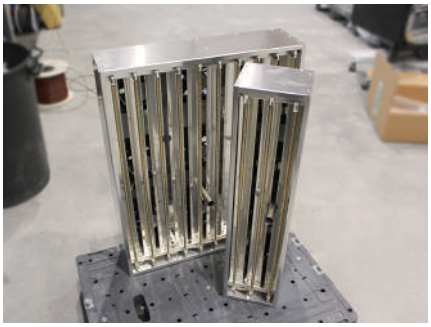
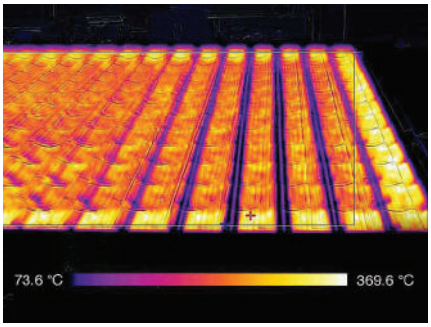




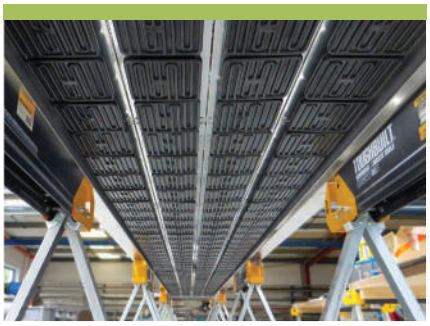



ceramicx

INFRARED INDUSTRIAL SOLUTIONS

Infrared Solutions Case Studies

CERAMICX INFRARED SOLUTIONS

Ceramicx infrared solutions

Ceramicx manufacture and supply infrared products and components to over 80 countries globally.

We are also a leading manufacturers of custom-built infrared industrial heating ovens, heating systems, and solutions. It's the solving of our customers infrared applications engineering difficulties where our knowledge and expertise are invaluable.

The combined knowledge, experience, and expertise of our engineering team means Ceramicx are capable of designing and custom-building a range of infrared solutions for any industry or sector. From infrared heaters for thermoforming to custom infrared ovens, infrared panel heaters, and heaters for industrial processing.

We keep everything under one roof too. So if you have a unique problem with the application of heat to an industrial process or product, we can design and build the heater and the solution in-house, from start to finish.

Industrial Ovens

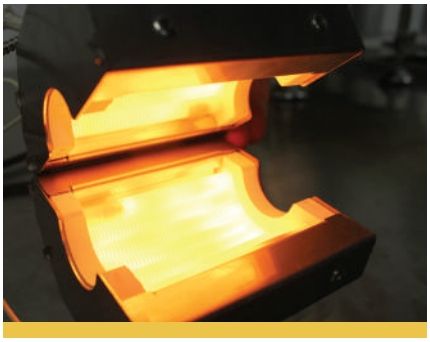
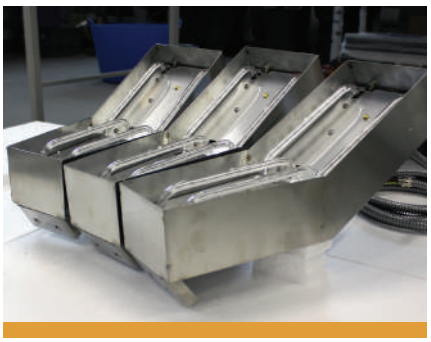
Through all our experience, we've built up the resources in applications engineering and heatwork development to custom-design and build industrial ovens to meet every customer's needs. Your choice of oven and its abilities will always be material and process dependant, but whether it's short, medium, or long wave infrared heat, we'll design an oven and control system that meets your individual requirements.

Processes

Infrared is a cost and energy-efficient method of heat application and is used in multiple processes, industry's and manufacturing sectors around the world. From the curing and thermoforming of composites and plastics to the drying and curing of paints, polymers, and inks, Ceramicx infrared heating technology is key to designing, developing, and building a custom system that provides controlled accurate and zoned-temperature control.

Industries

Working with many different industries, our engineered, infrared application solutions are built for a wide variety of applications processes. Our custom heating ovens and control systems are used extensively across the aerospace, automotive, construction, and packing industries.


CONTENTS

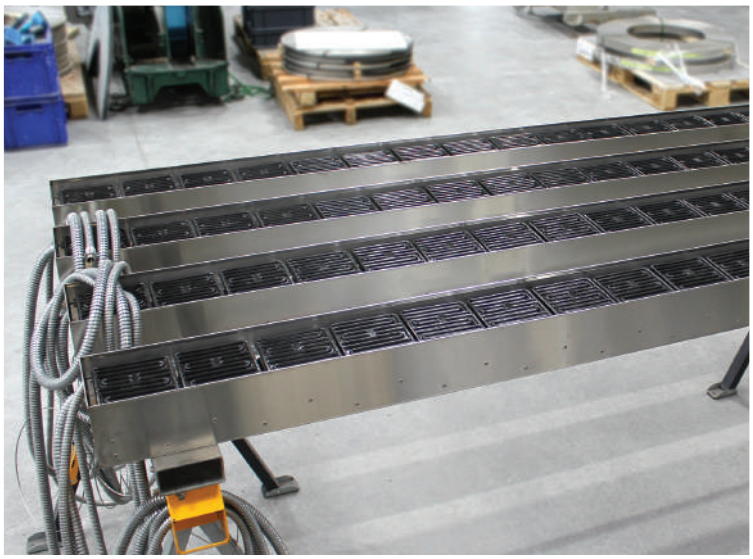
Here are some examples of the heating systems we have designed and manufactured in the past.

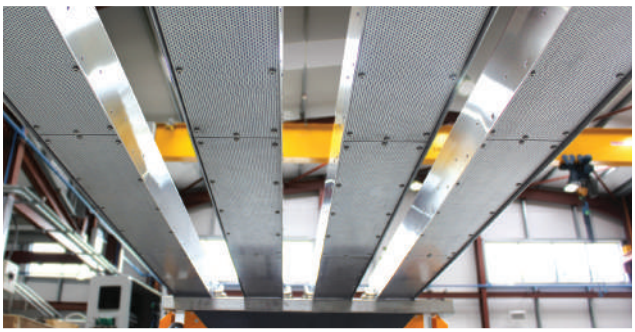
We welcome you to take a brief visit of Ceramicx through our short film presentation.

Ceramicx is an indigenous Irish company with an unrivalled knowledge of infrared in all forms and a proven success record of nearly 30 years. Over the last four years Ceramicx has seen many changes; cultural and environmental. We have made the pivotal change from a craft based production to a semi-automated industrial production line. This has resulted in continued improvement to our quality, processes, and consistency.

www.ceramicx.com/information/media/blog/2020/12/ceramicx-optimizing-infrared-for-the-future/

MSE LOOK TO INFRARED TO OVERCOME SYSTEM INEFFICIENCIES





Total power	10.8 kW
Element type	SFEH 600W 480 V x 18 (*1 with embedded TC/k*)
Reflectors	Polished aluminised steel reflectors
Back cover	Perforated aluminium
Control zones	1

> *"The new IR system provided by Ceramicx was delivered in a timely manner within budget. The pre-heating process improvements to our embossing equipment have increased production and reduced scrap within the extrusion process."*
>
> *– Mike Hengan | Mid South Extrusion*

www.ceramicxsolutions.com/industries/food-drink-packaging/mse-look-to-infrared-to-overcome-system-inefficiencies/

Mid South Extrusion has a strong history of reinvestment and is committed to developing customer relationships by understanding the needs of customers and offering creative solutions. Embracing the slogan “reduce, reuse, recycle and more”, they’re committed to helping customers discover practical, economical, and efficient ways to manage their costs and remove plastics from the environment.

With MSE’s growth over the years, came the opportunity to tap into new market sectors. And that brought with it an opportunity to invest in new technology to improve production efficiency. Supplying polythene films for packaging, lamination, construction, and pipe wrapping applications, MSE also has an impressive stake in providing film for the bedding, furniture, carpet, agricultural, medical, and industrial films markets.

Following the recent expansion of their current production facilities, MSE are now targeting new markets and customers in the food packaging sector. In order to maintain their service and commitment to the flexible packaging industry, they needed to enhance their manufacturing and production structure. Though highly adaptable, MSE’s use of electric tubular heaters were proving inefficient to their current system and processes. Searching for solutions, they were recommended the advanced technology and efficiency of infrared heat as a possibility to increase productivity and improve their operations.

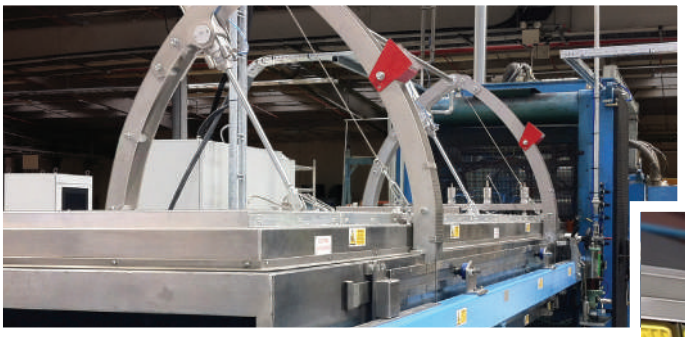
Once MSE had made the decision to explore the infrared heat option fully, they contacted Southern Heat, a long-time supplier and friend of the company. SH acted as a sales representative between MSE and our North American distributor, Weco International to give them the help they needed.

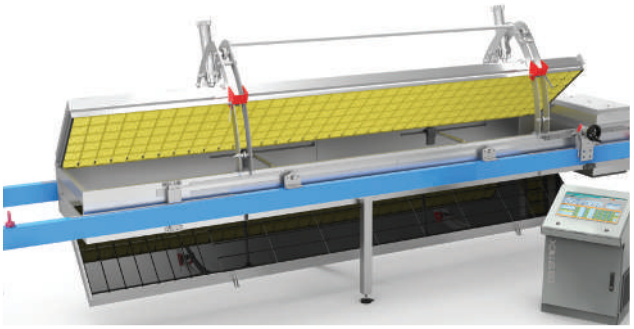
After discussions with Weco about MSE’s heat transfer problem, and following a detailed proposal, Ceramicx designed the full mechanical and electrical system specifications and production drawings. Once approved by MSE, we scheduled production to start as soon as possible.

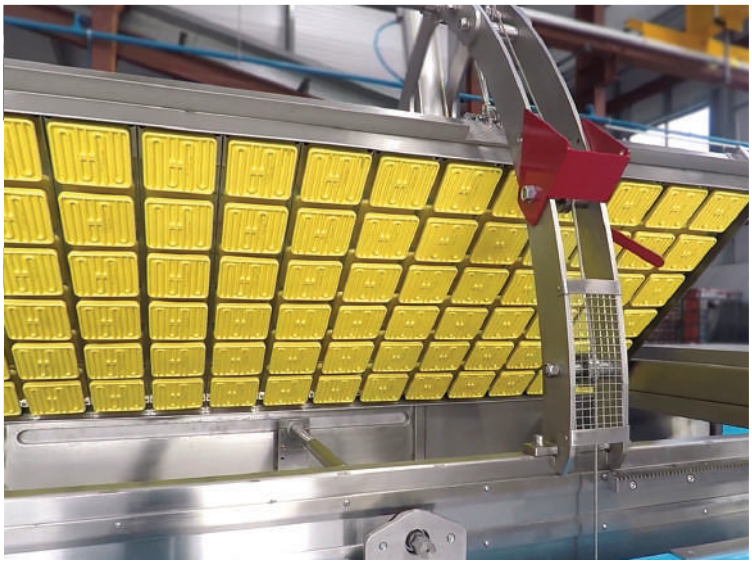
A key part of our recommendation was that their state-of-the-art machinery should be fitted with arrays of industry standard ceramic, square hollow elements (SFEH). With a flat body, these particular elements have a much shorter heat up time, increased energy efficiency, and have the ability to produce a diffused, radiant output-to-target distance.

After full inspection and testing of all components and elements, MSE’s custom system was ready to ship to their manufacturing headquarters in Monroe, LA.

IN-LINE THERMOFORMING OVEN FOR LINPAC PACKAGING







www.ceramicxsolutions.com/industries/food-drink-packaging/in-line-thermoforming-oven/

The UK based company called Linpac Packaging provides rigid and flexible packaging solutions to customers around the world. They approached Ceramicx to design and build a new heating system that could integrate into their current machine. However, they wanted some 'REAL' energy savings and they did not want to undergo a large capital investment programme.

Ceramicx designed and built the infrared heating system for one of their thermoforming machines, an IRWIN 44 thermoformer. Ceramicx built the oven system, which featured both an upper and lower heating system with PLC control. The software and control panel were also built on site in Ceramicx.

The key features of the oven heating system included:

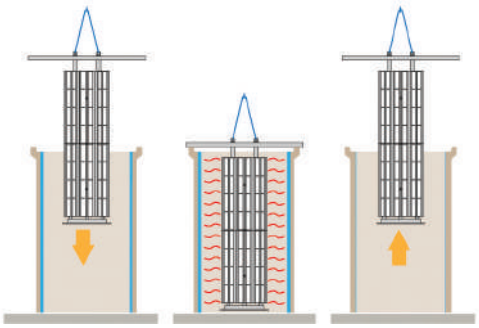
Oven Frame	Stainless Steel Box Section
Reflectors	Special Aluminised Steel
Upper Element Type	SFEH Yellow – longwave ceramic infrared element
Lower Element Type	Anodised Aluminium Panels
Controller / Control Type	Siemens / Open and closed loop
Control feedback	Type K Thermocouples integrated into ceramic element
Sheet Temperature monitoring	Pyrometer
Total Power	Approx. 164 kW
Oven Size	6.8 x 1.6 m (*267.7" x 63.0"*)

The oven has a total of 5 temperature sensors built into the system that can be selected individually or grouped for control purposes. Additionally, the heaters can be subdivided into as many as 114 separate zones, giving a wide range of control options. The oven is fitted with pneumatic cylinders, operated manually via two solenoid valves with the lower half used as a counterweight.

The heating system is vastly superior to those in use. An independent study was conducted by Dr. Robin Kent of Tangram Technology Ltd. that made direct comparisons between two thermoforming lines using identical tools, products, and cycle times. The Ceramicx heating system showed a decrease in the average power drawn from 56.16 to 32.85 kW.

This confirmed a **40% energy saving** for Linpac, by building their machine using infrared technology and building in a control system that would allow for cost-savings to be gained throughout their process.

DRYING SYSTEM FOR CONCRETE PIPES



www.ceramicxsolutions.com/industries/construction-built-environment/drying-system-for-concrete-pipes/

A Swiss Industrial company approached our distributor in Germany, Friedr-Freek, about a drying system for concrete pipes using only infrared technology.

Friedr-Freek spoke at length with the Swiss Construction company and provided Ceramicx with clear details of what they thought would be required. The internal diameter of the pipe was 1,400 mm (*55.1"*) with height of 2,300 mm (*90.6"*). The customer also wanted a control unit with IR temperature sensor to read the surface temperature of the concrete pipe.

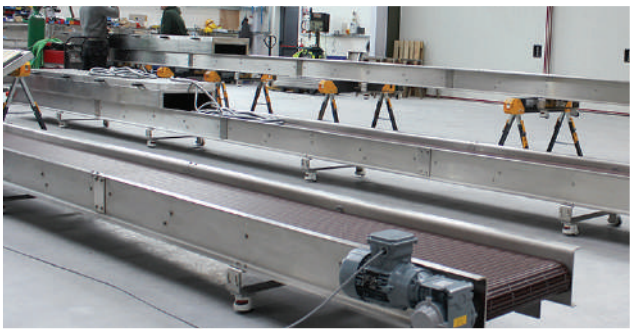
Friedr-Freek and Ceramicx collaborated on the design. The decision was to provide the customer with an overall octagonal shape in stainless steel frame, with the ceramic infrared heaters facing out to the heat internal section of the pipe. The system consisted of 3 control zones with feedback from Micro Epsilon pyrometers. During the design the customer came back to us with another inclusion in that they wanted the unit to be able to be lifted into the pipework using a crane hook.

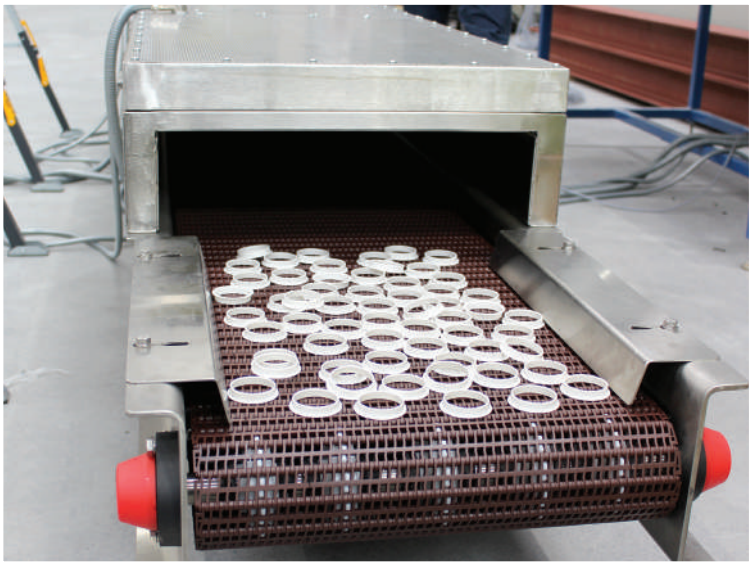
Ceramicx built the infrared heating system from scratch, all the work was done in house from welding, fabricating, ceramic heater manufacturing, terminal block manufacturing, wiring, and building the control panel.

Oven Frame:	Stainless Steel Box Section
Reflectors:	Special Aluminised Steel
Upper Element Type:	FTE White – long-wave ceramic infrared element
Controller:	KR1 Controller
Control feedback:	Closed loop feedback
Monitoring:	Pyrometer
Total Power:	Approx. 40 Kw
Oven Size:	1.4 x 2.3 m (*55.1" x 90.6"*)

Ceramicx tested the infrared heating system in house to ensure that the unit was properly calibrated before packing and shipping. Ceramicx also provided the system with an electrical connection via flexible metal conduit and a quick connect plug and play socket. We sent all drawings and operating documentation to the customer too. All of this ensures that Ceramicx doesn't have to do any unnecessary commissioning of the heating system therefore providing another saving to the customer.

ANNEALING AND STRESS RELIEF OVEN





www.ceramicxsolutions.com/industries/food-drink-packaging/annealing-and-stress-relief-oven/

Ceramicx supplied three conveyor tunnel ovens to a customer in the U.S. packaging sector. Ceramicx ceramic emitters paired with closed loop feedback systems meant that these ovens integrated seamlessly with the customer existing machinery. The conveyors employed are variable speed with 2-way drive and used a stainless steel belt system.

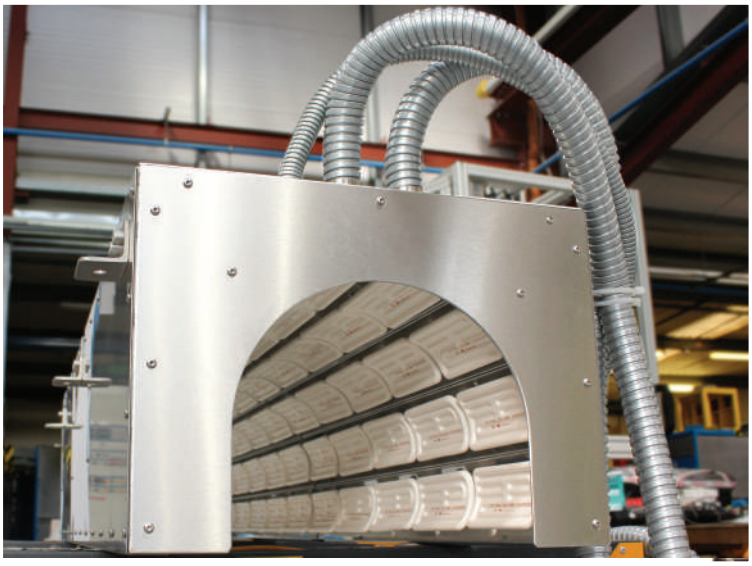
The conveyor length was specified by the customer but Ceramicx chose the belt material and specification that was heat resistant. Perforated aluminium was used for the back cover to allow ventilation in the wiring area. FTE and HTE type ceramic elements were used to achieve consistent heat across all of the designated heating area.

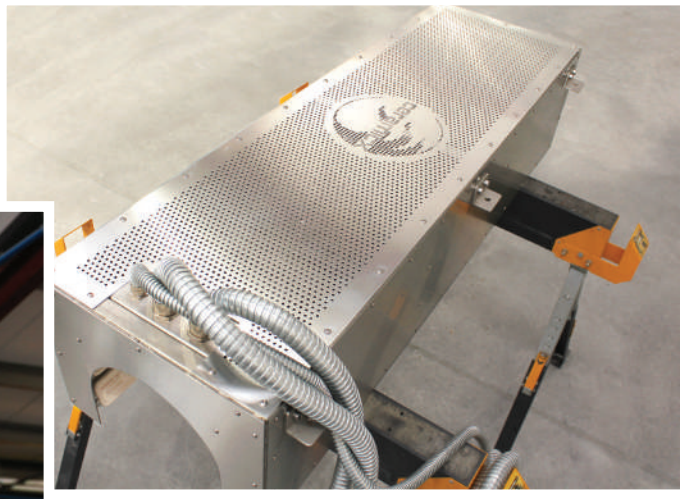
The conveyor oven sizes are as follows –

45 kW oven 9.15 m (*30'*) conveyor with a 3.05 m (*10'*) oven + control system.
45 kW oven 9.15 m (*30'*) conveyor with a 3.05 m (*10'*) oven + control system.
67.5 kW oven 12.80 m (*42'*) conveyor with a 4.57 m (*15'*) oven + control system.

Power Supply:	3 x 480V + PE
Maximum Current/Phase:	100A
Element Type:	Long Wave Ceramic FTE/HTE Elements
Control channels:	4
Control type:	4 zone closed loop control with embedded TC/K feedback
Controller:	Ascon KR1
Control interface:	Ascon KR1
Power control:	SSR
Control feedback:	Embedded TC/K
Opening mechanism:	Manual

CERAMIC INFRARED HEATING SYSTEM FOR PVC PIPES





www.ceramicxsolutions.com/industries/construction-built-environment/ceramic-infrared-heating-system-for-pvc-pipes/

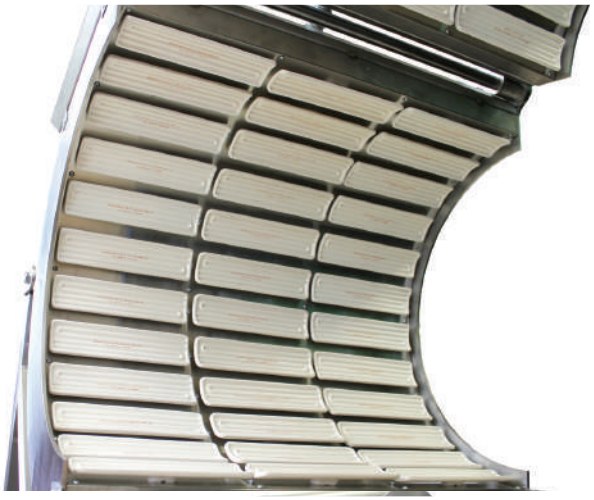
A European customer needed to heat different sizes of PVC pipes. They were looking for a complete infrared heating solution. The customer knew they wanted a frame with infrared elements mounted inside in a fixed position. This frame would encase the pipes. The critical part however was ensuring that PVC didn't melt. This created a challenge because the PVC pipes were different thicknesses and were 100mm (*3.9"*) in diameter size. They ranged in thickness from 4 to 10 mm (*0.2" - 0.4"*) and would also be rolling at the same time the heating elements would be operational.

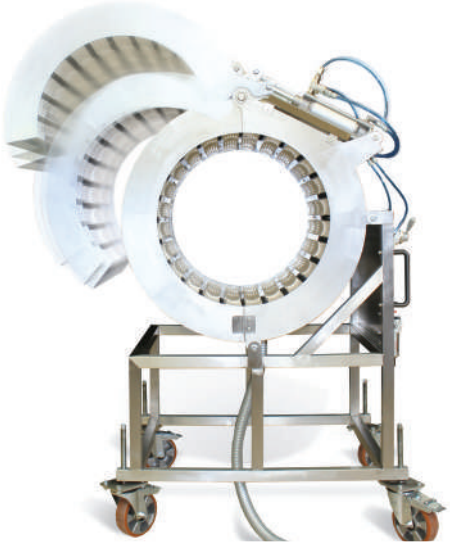
Ceramicx combined all the customer's variances and produced one heating system that could work on all the variations of PVC pipe. Temperature sensors were put into each of the 10 heating zones allowing the customer to ramp the heaters up or down based on the PVC thickness. An additional 100 mm heating zone was added to adjust for larger PVC pipe lengths. Our infrared HTE heaters targeted the PVC pipes to ensure that they could soften prior to the next process and smaller zoning could be used if necessary for temperature control.

Total Power:	40 kW
Element Type:	HTE 500 W, 230 V, White
Element Array:	80 heaters- 8 x 10 heater array
Control Zones:	10 control zones
Control Type:	Via embedded T/C k in elements
External Dimensions:	Approx. diameter 450 x 1200 mm (*17.7" x 47.2"*)
Electrical Connection:	3,000 mm (*118.1"*) flexible metallic conduit with quick connect plug.

Ceramicx completed the infrared heating system in approximately 2 weeks, including all the work from welding through to load testing every circuit.

CLAMSHELL PIPE INFRARED HEATING SYSTEM





www.ceramicxsolutions.com/industries/other/clamshell-pipe-infrared-heating-system/

Ceramicx designed and built this clam shell shaped heating system for a customer of one of our Danish distributors. The purpose of the shape was to heat the outside of Polypropylene pipes up to diameter of 400 mm. (*15.7"*)

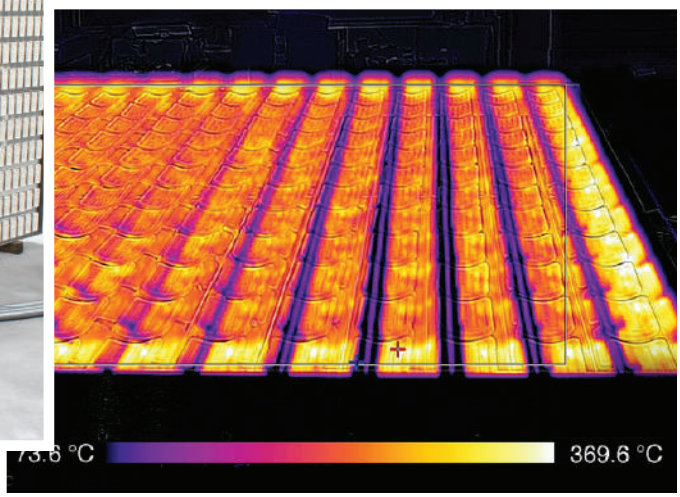
Total Power	46.8 kW
Element Type	FTE 650 W, 230 V (*×72*)
Frame	SS304
Electrical Connection	Cable exit via M32 × 3000 metal flexible conduit + 1 m (*39.4"*) leads.
Opening Mechanism	Pneumatic opening system
Control Zones	4
Circuits	24
Reflectors	Ceramicx polished aluminium clad steel reflectors
Height when closed	1,678 mm (*66.1"*)
Width	850 mm (*33.5"*)
Internal Radius	290 mm (*11.4"*)

Heating component used - Ceramic Full Trough Infrared Heating Element (FTE)

An industry-standard ceramic infrared heater, our ceramic full trough heater element is designed for long-lasting energy-efficiency in industrial, commercial and domestic applications where a high surface temperature is needed.
Available Wattage: 150 W – 1000 W Dimensions 245 x 60 x 34 mm
Useful wave-length range 2 - 10 µm (microns) long wavelength

www.ceramicx.com/products/ceramic-elements/trough-elements/full-trough-element/

CUT-SHEET THERMOFORMING OVEN



www.ceramicxsolutions.com/industries/automotive/cut-sheet-thermoforming-oven/

A UK based Tier 1 automotive supplier were having some productivity issues. Specifically, they were looking for uniformity of heat to ensure repeatability and consistency of product. They wanted to upgrade their current infrared heating system which consisted of large upper and lower panels.

Ceramicx developed and customised the infrared heating system to the material, temperature, power, and time requirements of the process. Top and bottom infrared heating was achieved using HTE long wave ceramic heaters. A total of 18 zones of control were outlined by the customer, and were used around the perimeter of each heating system to minimise edge loss. An upgraded control system was also supplied with the heating system.

The key features of the oven heating system included:

Oven Frame:	Stainless Steel Box Section
Reflectors:	Special aluminium clad steel
Element Type:	Long Wave Ceramic model HTE
Maximum Operating Temp:	250 °C (*482 °F*) Element Temperature
Controller:	Siemens S7 1500
Control type:	36 zone closed loop control with T/C k feedback
Control feedback:	Type K thermocouples integrated into ceramic element
Sheet temperature monitoring:	Pyrometer
Total Heating Power:	124 kW
Oven Size:	2.08 x 1.80 m (*81.9" x 70.9"*)

The process was a cut sheet process for the thermoforming of car interior liners – in this case the boot space. Black carpet onto black plastic sheet was robotically loaded onto a moving table and then moved across into the heated zone. Heating the top and bottom of the part for a specified time, the sheet then gets moved on to the surface where it is slowly pressed into the required shape. The component then cools down inside the mould, before it is removed and the trimming and finishing process takes place.

The result was that the customer was extremely impressed with how fast the ceramic heaters got to their required temperature, and the ease at which the IR heaters found and remained at the required temperature set-point. Ceramicx has since worked on another project with this supplier and supplied them with a second infrared heating system for a different manufacturing facility in the UK.

COMPOSITE PRE-HEAT OVEN

www.ceramicxsolutions.com/industries/textiles/composite-pre-heat-oven/

A UK based company specialising in the coating and laminating of complex textiles, and cutting of carbon composite materials, had issues with processing their materials which, due to their nature, needed very accurate control.

Ceramicx designed and built the heating system with 4 zones so that the infrared energy was transferred evenly. The overall dimensions were set by the customer but it was Ceramicx's decision to use the SFEH elements, which were best suited to supply the heat required.

This oven allowed the customer to pre-heat their composite materials, allowing them to process their materials more easily. The materials absorbed the infrared energy best from the SFEH black element. It provided significantly better results than any of the other systems. Finally, the ease of which the width can be changed by selecting and deselecting zones was a key aid to the customer.

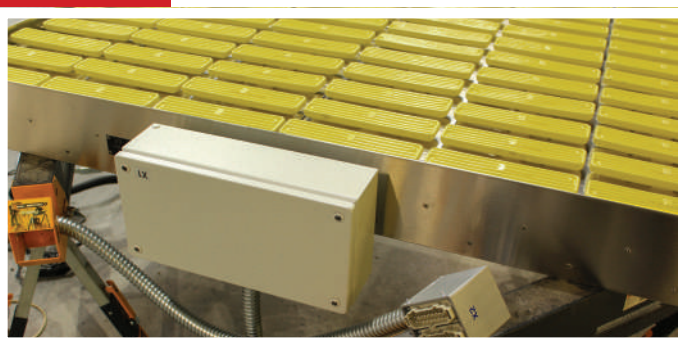
Power Supply:	3 x 400V + N + PE
Maximum Curr`ent/Phase:	85 A
Element Type:	Long Wave Ceramic SFEH Elements
Total Heating Power:	75.6 kW
Control channels:	4 Zone Closed Loop
Controller:	Ascon KR1
Footprint:	2.5 x 1 m (*98.4" - 39.4"*)

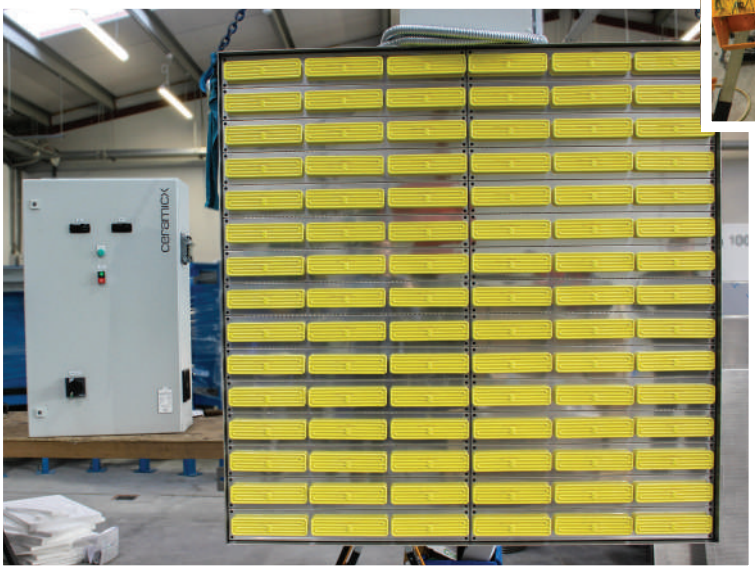
Heating component used - Ceramic Square Flat Infrared Heating Element Hollow (SFEH)

An industry-standard ceramic infrared heater, our ceramic square flat hollow heater element is designed for long-lasting energy-efficiency in industrial, commercial and domestic applications where a high surface temperature is needed. Available Wattage: 250 W – 800 W Dimensions 122 x 122 x 37.5 mm Useful wave-length range 2 - 10 µm (microns) long wavelength

www.ceramicx.com/products/ceramic-elements/hollow-elements/square-flat-element-hollow/

SANTA FE CUSTOM SKYLIGHTS





“With this new infrared oven we have not had a single day down since it was installed, and it runs 8 hrs. a day we can now easily dial in the temperature required and cook different gauges of plastics knowing that our products will come out right the first time, it has cut our production time by 2/3 compared to our old cal rod and gas system, it has greatly reduced the energy consumption and eliminated the plastic loss due to un proper heat distribution.’”

Jeff Apodaca – Custom Skylights owner

www.ceramicxsolutions.com/industries/construction-built-environment/santa-fe-custom-skylights/

To upgrade an ageing and energy-costing plastics thermoforming line to effective infrared based heating – while remaining well within the power constraints for the local electricity grid.

In the case of Custom Skylights, energy going through a used incoloy emitter produced less energy as infrared directional energy compared to the Ceramicx element. The remaining energy was convection (rising heat energy) and light energy. Directional energy (Infrared) is especially important when heaters are located above the target. Without moving air it would be impossible to utilize the convection energy of an incoloy-based heater when it is above the target. The convection energy rises and is lost to the surrounding environment. With infrared heating the directional energy is always “directed” towards the target and absorbed – thus effectively using the customer’s energy costs.

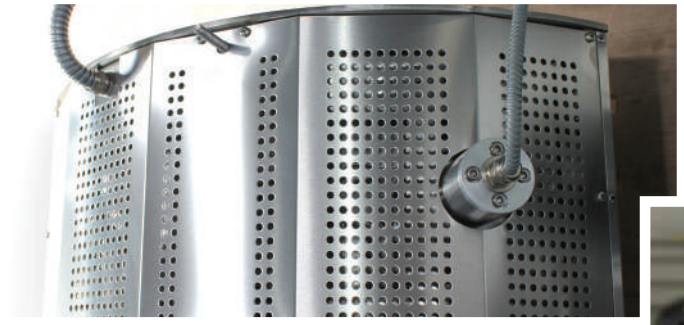
In terms of physical size, incoloy heaters are typically long, spanning the width of an oven. This provides very little zone control. The heaters are typically slow to reach set temperature and the surface temperature will vary significantly across its entire length. A ceramic-based heater has a much smaller surface area and can be individually controlled or grouped to create multiple heat control zones within the oven.

The job also presented Weco International and Ceramicx with the challenge of a limited 208V - 200A power supply. A typical oven design of 2.4 x 2.54 m *(96” x 100”)* would normally use 600 W elements and require over 400 A to power all the heaters.’ WECO and Ceramicx therefore chose to create a 300 Watt hollow ceramic infrared heating emitter mounted in polished aluminised steel reflectors.

The Ceramicx of 2.4 x 2.54 m thermoforming heating system was designed with 12 individual control zones for maximum flexibility and production options. The entire oven and control system was pre-tested at Ceramicx and shipped to Weco International and then Custom Skylights. The oven was installed with predetermined mounting locations, power was landed to the control enclosure and the system was running. The aluminised steel reflector provided better strength than aluminium, comparable reflectivity and a higher tolerance to heat than stainless steel. The 300 W hollow ceramic emitter stayed within the power requirements, the amp draw of the whole system was kept below 200 A, and the new system provided the maximum directional energy to the material.

Custom Skylights products are designed to allow transmission of visible light. The clear and transparent materials such as acrylic and polycarbonate can pose difficulty in absorption of energy. Weco and Ceramicx were mindful to best match the IR wavelength to the given materials. Short IR wavelengths were found to provide very little energy absorption and therefore a longer wavelength emitter, the Ceramicx brand Ceramic emitter would provided the maximum absorption for his range of polymer materials being thermoformed.

TEST EQUIPMENT FOR AEROSPACE



www.ceramicxsolutions.com//industries/aerospace-defence/test-equipment-for-aerospace/

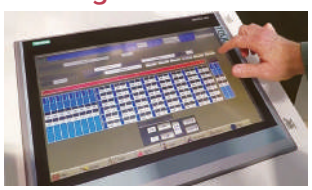
Amba Projex, a client based out of the UK, approached Ceramicx to find a solution for their customer. The aerospace customer wanted some test equipment built to a small scale on a small budget just to see if they could get a result. Basically, they wanted to heat carbon material onto a metal drum to 150 °C (*302 °F*), and they wanted to only heat the material from the top of the drum. They wanted a single temperature controller and wanted a very lean price.

Ceramicx proposed a design that followed the curve of the drum using FTE heaters, this was to suit the design and the amount of material that the customer wanted to heat. The design included:

Oven Frame:	Stainless Steel
Reflectors:	Polished aluminium clad steel
Element Type:	FTE 600 W, 230 V
Zones	1 Zone
Total Power:	Approximately 3 kW
Oven Size	540 x 270 mm (*21.3" x 10.6"*)
Controller:	KR1 controller
Control type:	Open loop or closed loop via pyrometer

Ceramicx built the system end to end in 3 weeks after receipt of design approval and provided the customer with all the necessary drawings and documentation.

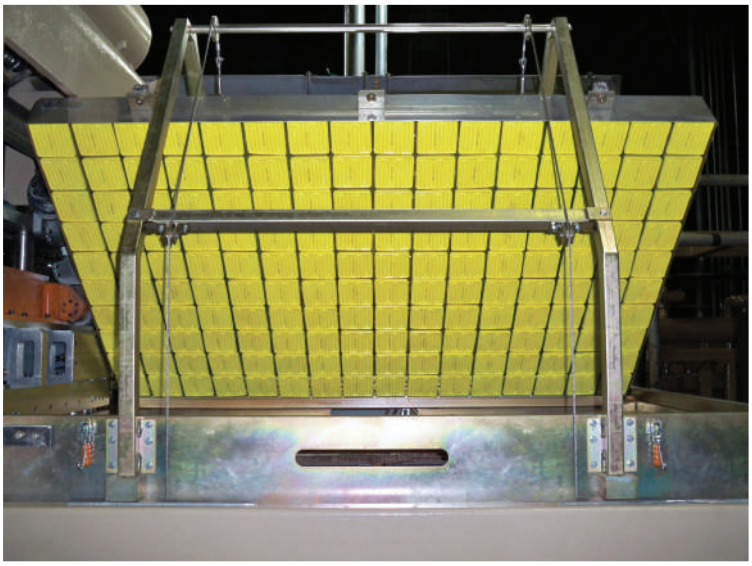
Heating Process Control Systems

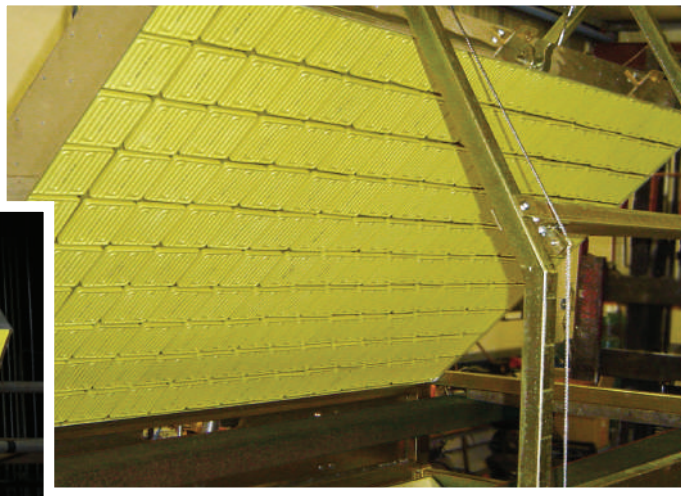


By providing customised controls to suit specific heating applications, Ceramicx offer control solutions that vary in size, from simple, single zone open loop systems to larger, complex multi-zone installations with temperature feedback and closed loop control.

www.ceramicxsolutions.com/heating-solutions/control-systems/

UPGRADING FOOD PACKAGING THERMOFORMING LINES





"We are more than pleased with the professionalism, know-how and expertise displayed in this project. More than that, the results have been truly world class. Just imagine the ability to improve your current operation using only half the energy!"

Brett Wehner,
WECO International Founder and Director

ceramicxsolutions.com/industries/food-drink-packaging/international-food-service-packaging-producer/

The client required a complete upgrade on one of its main plastics thermoforming lines – manufacturing consumables for the food service industries. The project scope included removal of the existing calrod oven and control system and the replacement of it with an efficient ceramic-based top and bottom panel heater infrared oven clamshell style opening frame work. Ceramicx products, components and design input were integral to the success of the project.

Ceramicx infrared heat consultants worked with long-term associate and USA heating expert Weco International to provide the client with the necessary systems, design and infrared heating hardware. Weco engineers succeeded in reducing the client's overall plastics thermoforming oven length by half – resulting in immediate energy savings. **Shots per minute were also increased by some 50%** making the upgraded line not only the fastest machine within the factory – but within the client's international organisation as a whole.

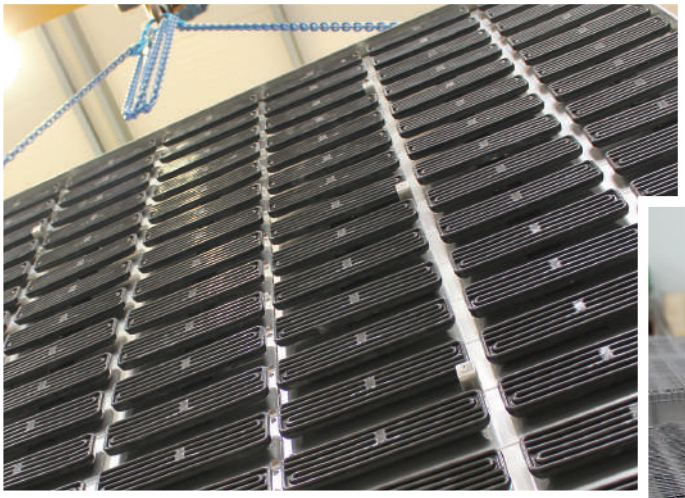
Weco International also upgraded the client's complete extruder control system; chrome roll; dancer bar accumulator – and also supplied and commissioned a 3 axis servo motion controller for the sheet index and tool systems. The motion control package included the first ever Ethernet communication In terms of operations the machine operator was complete machine visibility through two 15" touch screen monitors.

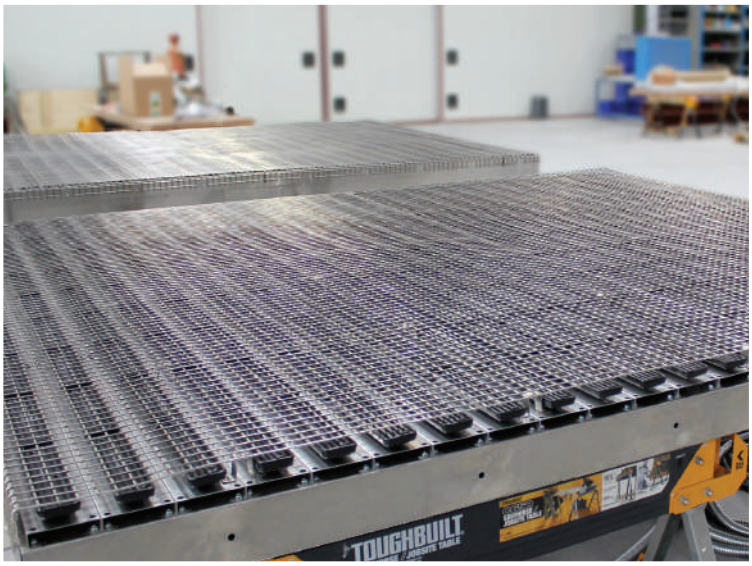
Quality infrared-based heaters combined with best-in-class heat control systems have all but nearly eliminated maintenance at the client's US plant – with only four component replacements in some 26 months of new operation to date. In addition; downtime, scrap and heat-up times at the client factory have all significantly decreased; resulting in a very quick return on investment.

For this client, the Weco/Ceramicx Infrared technology and improved heater design made increased profit from the thermoforming line a reality.

"In many ways, the USA is still the proving ground and test-bed for good ideas. American industry is often the first to see and grasp the realities of commercial opportunity. Energy saving and energy-per-part will be the defining issues of the next decade – for the US and the World."
Frank Wilson, Ceramicx Managing Director

VACUUM FORMING OVEN





www.ceramicxsolutions.com/industries/aerospace-defence/test-equipment-for-aerospace/

A major Canadian company that makes hot tubs, contacted our distributor in the United States to help them build one section of their machine. They were in process of building a machine to mould hot tubs and they wanted us to do the heat work for the section of their vacuum forming machine.

We specified the design of the heating system for them to fit into the space that they needed. They also needed additional design considerations as the oven had to ship in 2 sections due to the size of the overall oven. The two sections would then be assembled together in the customer's facility.

The thermoforming ovens were then fitted into their machine, which went into their new fibreglass manufacturing process plant. They have since been running these ovens and have experienced some significant savings in both time and energy.

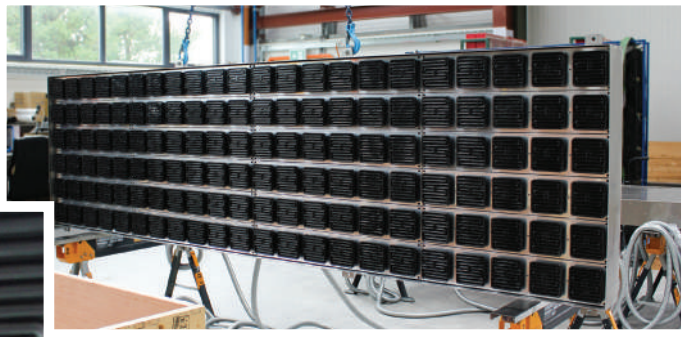
Oven Type:	Forming Oven
Total Power:	280 kW
Power Supply:	3 x 480 V + PE
Maximum Current/Phase:	85 A
Element Type:	Long Wave Ceramic FFEH Elements
Control channels:	10 Zone Closed Loop
Total Size(per section)	6.2m^2 (*66.7 sq ft*)

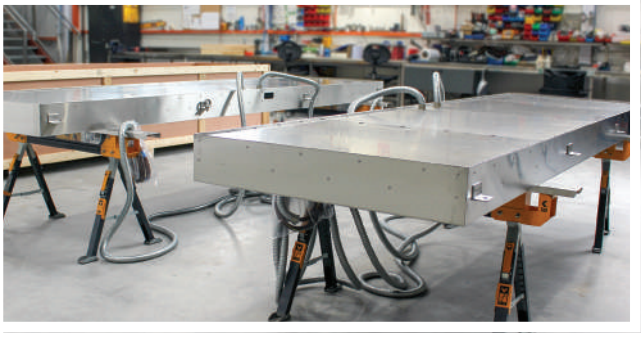
Heating component used - Ceramic Full Flat Infrared Heating Element Hollow (FFEH)

An industry-standard ceramic infrared heater, our ceramic full flat hollow heater element is designed for long-lasting energy-efficiency in industrial, commercial and domestic applications where a high surface temperature is needed.
Available Wattage: 250 W – 800 W Dimensions 245 x 60 x 37.5 mm
Useful wave-length range 2 - 10 µm (microns) long wavelength

www.ceramicx.com/products/ceramic-elements/hollow-elements/full-flat-element-hollow/

THERMOFORMING SYSTEM UPGRADE FOR INSULATION PROVIDER





www.ceramicxsolutions.com/industries/construction-built-environment/thermoforming-system-upgrade-for-insulation-provider/

A leading manufacturer of thermal insulation in the UK and Ireland, Xtratherm needed a more productive system for their thermoforming processes. Supplying the construction industry with a comprehensive range of insulation materials, the need for quality and efficiency led Xtratherm to choose Ceramicx for a more reliable and effective custom-built system.

Since launching in 1986, Ireland-based company Xtratherm has led the way in developing and manufacturing high performance insulation products and systems. As a key part of their on-site manufacture, Xtratherm are reliant on a thermoforming process to achieve a preformed finish on certain products.
As a major part of their manufacturing for these products, Xtratherm has a heavy reliance on their in-house thermoforming process. With ongoing quality and maintenance issues with their current set-up leading to costly delays and downtime, they approached Ceramicx to propose and custom-build a replacement system.

As continued suppliers for many of Xtratherm's spare and replacement infrared heating elements, the foundations of a successful partnership with Ceramicx were already in place. Working directly with their team, we were able to identify the key problem areas in their current system and generate drawings and full specifications to create a new thermoforming system. After some development, final functional system specs and production design drawings were submitted for approval. With full optimisation across the client's efficiency and process specifications, the plans met the high standard required for Xtratherm's production output.

No strangers to Ceramicx infrared technology, Xtratherm's choice of x 132 industry-standard Ceramicx square flat hollow ceramic elements, arranged in 22 x 6 heater arrays, was key to their new set-up. Producing a shorter heat up time, SFEH elements are more energy-efficient and produce a diffused radiant output. To enhance this output, each array used Ceramicx polished aluminium clad steel reflectors for maximum radiant heat efficiency.

Total power	52.8 kW
External dimensions	3,330 x 900 mm
Element type	SFEH 400 W, 230 V Black x 132 (*22 x 6 heater array*)
Frame	SS304
Reflectors	Ceramicx polished aluminium clad steel reflectors
Electrical connection	Via 10 m (*32' 10"*) flexible metallic conduit with additional 500 mm (*19.7"*) leads

While retaining the production capacity and set-up similarities they required, the new and bespoke thermoforming system now gives Xtratherm the quality, reliability, and efficiency they need. Crucially, the prospect of both ongoing maintenance and downtime has been drastically reduced, allowing for continued and increased production.

PAINT CURING ENCLOSURE DESIGN & BUILD

www.ceramicxsolutions.com/industries/construction-built-environment/paint-curing-enclosure/

Heating solutions company Firebird is on an upward track: As part of the redesign of the workplace and the up-skilling of production Firebird decided that the work of spray painting its boilers needed to be automated. The paint curing time on the sprayed boilers also then needed to be optimised in order that the products could be regularly shipped at a predictable rate. Paint curing time also needed to be freed from reliance on ambient temperature and weather conditions in order to help guarantee finished production.

After some research Firebird realized that the best and most effective heat source to use in these instances was Infrared heating. Not only was IR heating reckoned to be more cost-effective and cleaner energy than alternatives in gas or oil, the highly targeted nature of the infrared heat source and its transmission meant that a high degree of predictability could now be built into the Firebird production process.

IR heating manufacturer and specialist Ceramicx was accordingly called to the table to assist in the design and build and supply of a new IR-based heating line for Firebird. The timing of this project also coincided with Firebird's decision to use water based paints in its production process. The new IR heat process was therefore helpful in eliminating Firebird's use of solvent-based paints; reducing VOC emissions and also reducing the carbon-footprint of the boilers generally.

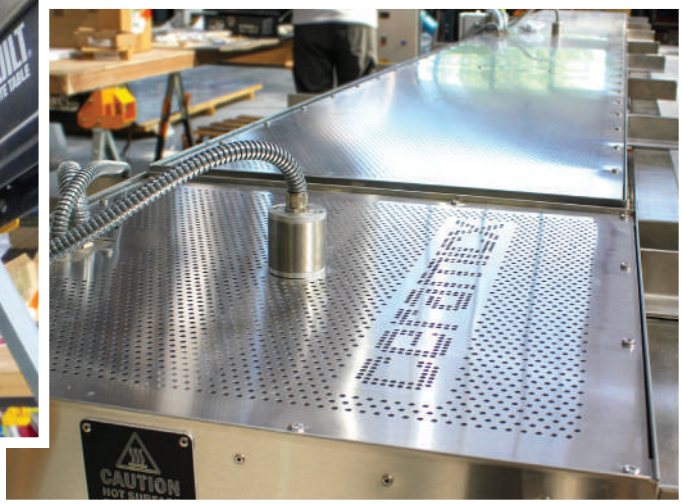
After some initial assessment at the Firebird factory Ceramicx was commissioned to design and build:

- Firebird paint spray booth with IR heaters, extraction and control
- Firebird Infrared curing oven
- Equipping the spray booth with IR pre heating was an important first step in helping the general paint adhesion and in preparing the products for the IR oven proper.

The new spray booth is a small steel-clad room; fabricated and fitted with infrared heaters modified from the Ceramicx industrial range. The booth has one air inlet and one outlet fan, lighting and a single control panel on the outside. Firebird's spray booth uses a paint-spraying robot and has a conveyor passing through it, carrying the unpainted boilers from the production area and then on into the curing oven. The robot paints the boilers as they index through the booth. After the spray booth the boilers enter the curing oven where they are moved into position according to the production programmes. The IR curing oven is heated to some 60°C (*140 °F*) and the dwell time in the oven is some ten minutes before visual inspection and end-of-line palletisation.

Firebird's infrared curing oven heats and cures the painted surface of the boiler unit as it passes through on the conveyor. It does this using a combination of infrared and convection heating. Ceramicx designed the Firebird oven to heat the target product primarily by infrared heat transmission, using radiant heaters mounted on the sides, top and lower area of the oven. The main infrared heating system is divided into 2 control zones: side heaters and top heaters. The bottom heaters are switched manually on and off if or when required. The infrared heating process is also assisted by a ceiling mounted extract air fan which helps reduce the humidity level inside the oven by removing warm, 'damp' air through the top of the oven.

PRE-HEAT AND MAIN-HEAT SYSTEM



www.ceramicxsolutions.com/industries/leisure/pre-heat-and-main-heat-system/

These were used to produce an artificial turf type material for sports grounds in the US.

There were 2 heating systems: Pre-heat and a Main heat system to be positioned over a conveyor system. Longer angle brackets were included per the customers specification.

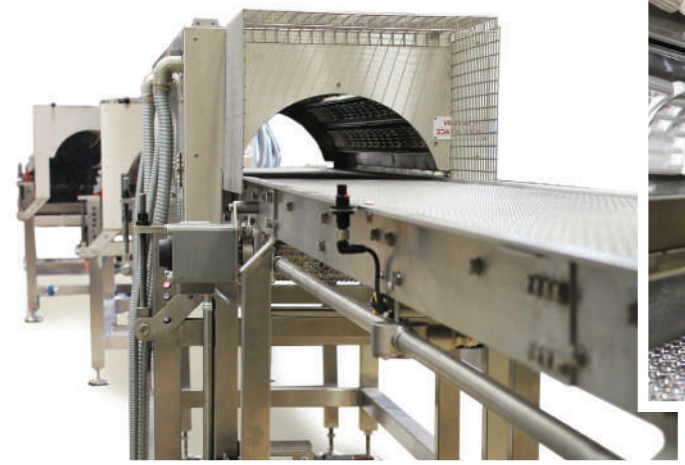
Pre-Heat System

Oven frame	Stainless Steel, Perforated aluminium back
Element Type	SFEH 600 W, 480 V × 16 (*4 with embedded TC/k*)
Control Zones	4
Total power	9.6 kW
Oven Size	Approx. external dimensions 610 × 610 mm (*24″ x 24″*)
Element array	16 heaters - 4 × 4 heater array
Electrical connection	6,096 mm (*20′*) flexible metallic conduit with quick connect plug.

Main Heat System

Oven frame	Stainless Steel, Perforated aluminium back
Element Type	SFEH 600 W, 480 V × 192 (*4 with embedded TC/k*)
Control Zones	4
Total power	115.2 kW
Oven Size	Approx. external dimensions 6,096 × 610 mm (*240″ x 24″*)
Element array	192 heaters - 4 × 48 heater array
Electrical connection	3,048 mm (*10′*) flexible metallic conduit with quick connect plug.

42KW CURING OVEN



www.ceramicxsolutions.com/industries/leisure/42kw-curing-oven/

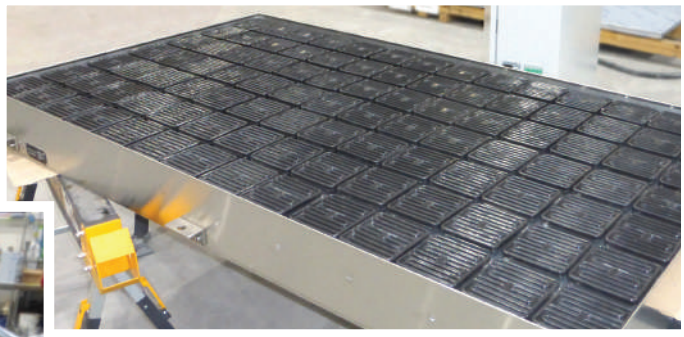
Ceramicx designed and built a 42 kW infrared long-wave tunnel oven for a USA based consumer electronics customer which was supplied in two sections.

The infrared oven system was curved to ensure optimal and uniform heating of the customers material. As standard, the frameworks of all components (*oven and conveyor*) were made from stainless steel. Integrated into the control system (*via HMI*), the conveyor speed as well as oven power could be controlled. HTE type elements were chosen by our engineers to allow an increased number of zones within the oven for better temperature control. The clamshell design means the oven is easily accessible for parts replacement and maintenance in the future.

The system was designed to cure foam on the back outer edge of polycarbonate speaker baskets at an accelerated time rate. The system consists of 4 primary components: The infrared oven, conveyor 1 (*load conveyor*), conveyor 2 (*unload conveyor*) and a control panel.

Total Power:	42.5 kW
Power Supply:	3 x 480 V + N + PE
Maximum Current/Phase:	100 A
Element Type:	Long Wave Ceramic HTE Elements
Total Heating Power:	42 kW
Control channels:	24
Control type:	24 zone closed loop control with embedded TC/K feedback
Controller:	Allen Bradley CompactLogix
Control interface:	Allen Bradley HMI
Power control:	Hetronik HC 500 Controller
Control feedback:	Embedded TC/K
Footprint:	6.6 x 0.8 m (*259.8″ X 31.5″*)
Oven length (entry to exit):	2.2 m (*86.6″*)

INLINE MATERIAL PROCESSING OVEN



www.ceramicxsolutions.com/industries/textiles/inline-material-processing-oven/

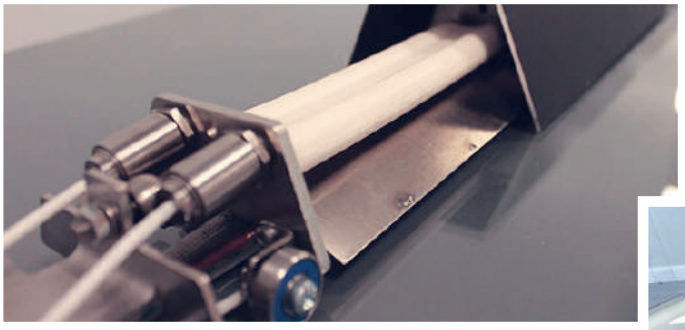
Ceramicx designed and built an infrared oven system for a UK based customer. This customer specialises in the coating and lamination of complex textiles as well as the cutting of carbon composite materials. The infrared oven was designed with 4 zones evenly spread throughout which allowed the heat to be evenly spread throughout the material giving an end result of a high quality material finish. Each zone was capable of being controlled to within 2°C (*3.6 °F*) of the specified set point which allowed for a fast heat up time and extremely accurate set point control.

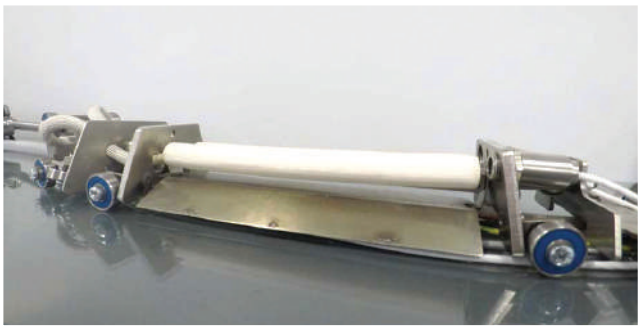
Total Power:	59 kW
Power Supply:	3 x 400 V + N + PE
Maximum Current/Phase:	100 A
Element Type:	Long wave ceramic model SFEH
Total Heating Power:	58.8 kW
Control channels:	4
Control type:	4 zone closed loop combined with open loop control of 132 channels
Controller:	Ascon KR1
Control interface:	Ascon KR1
Power control:	SSR
Control feedback:	Type K thermocouples integrated into ceramic element
Footprint:	1,800 × 1,050 mm (*70.9" x 41.3"*)
Oven length (entry to exit):	1,800 mm (*70.9"*)

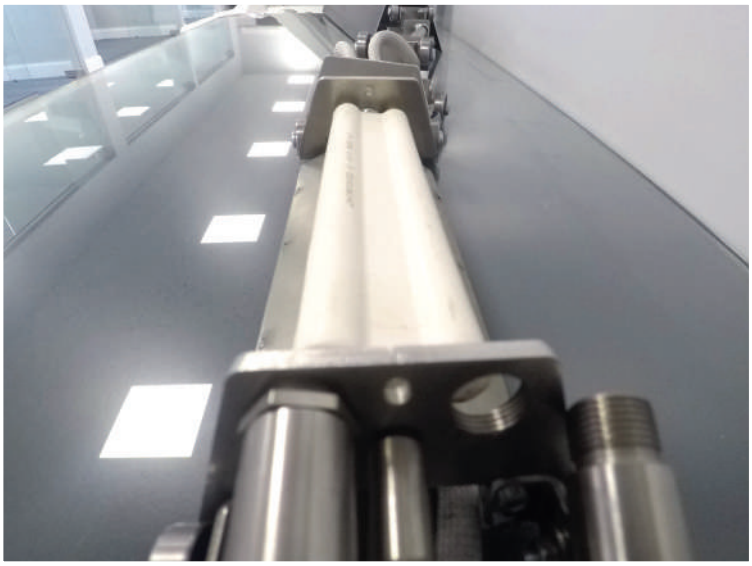
These case studies and more can be found on Ceramicx Solutuions website -

www.ceramicxsolutions.com

INTERNAL CURING OF AIRCRAFT STRINGERS







www.ceramicxsolutions.com/industries/aerospace-defence/internal-curing-of-aircraft-stringers-using-the-rat-system/

Ceramicx have developed a novel heating system for the curing of thermoset resins in the manufacture of composite aircraft stringers.

Stringers are widely used in aerospace to increase stiffness in thin structures such as wings and fuselages while keeping weight to a minimum. An 'omega' or 'hat' is a common shape used in stringer design. In composite structures, carbon fibre and epoxy resin are typically laid onto a male stringer cure tool, many of which are made from invar and then subjected to heat. There are a number of ways to achieve this finished structure:

- Stringer and skin cured in one shot
- Stringer cured separately and 'co-cured' to skin when skin is being cured
- Skin cured separately and 'co-cured' to stringer when stringer is being cured
- Skin and stringer cured separately and 'co-bonded' afterwards

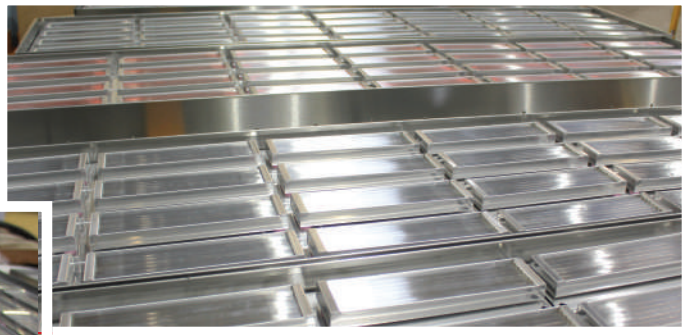
As could be envisaged, there are advantages and disadvantages of all approaches but from the perspective of reducing cycle time, manufacturing everything in one shot is the most favourable option. One complexity arising in pursuit of this approach is even heating. Autoclaves or out-of-autoclave (*OOA*) ovens that use convective heat are standard for this. However, if we analyse such a structure, it can be seen that geometrical thickness can vary considerably in locations; for example, in the unsupported region, there is just the skin itself and around the stringer, there is the skin thickness + stringer thickness. If such a product is being placed in a convection oven at a set temperature, it is very clear that there will be considerable variation in the temperature profile at areas of differing thickness. As the cure creates the physical properties of the finished part, even heating is essential.

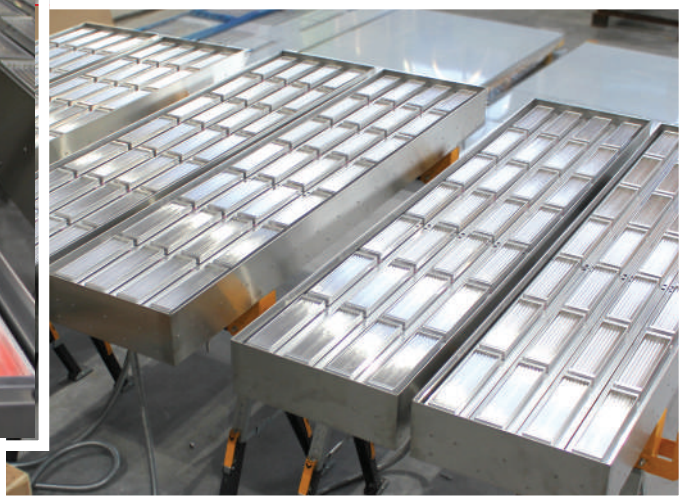
Ceramicx's RAT was developed primarily for out of autoclave (*OOA*) curing of composite stringers. The RAT is a low-profile Infrared (*IR*) emitter, with specially designed reflectors that travels up inside the stringer tool and cures the stringer from the inside out.

The development of the RAT means that even heating of the stringer and skin can now be achieved in one curing operation. The drawbacks of curing in a conventional oven have been documented extensively in the past but can be greatly reduced with this approach. When combined with Ceramicx's under-tool heating systems in traditional egg-box tool designs or with bespoke overhead IR curing systems, the potential benefits are significant. The system can also be modified for use with resin infusion and for consolidation of thermoplastic composites.

For approaches where stringers are cured separately from the skin, the RAT offers the potential for no tool movement to curing ovens, no excessive energy usage from convection curing systems and no potential bottlenecks associated with the oven thus considerably reducing cost. Although primarily for curing of stringers, the RAT can also be used for curing of filament wound vessels and tubes, curing of underground drainage liners and forming of thermoplastic composites.

INFRARED HEATING PANEL REPLACEMENT





www.ceramicxsolutions.com/industries/textiles/infrared-heating-panel-replacement-oven/

A frequent UK based customer contacted Ceramicx to do a proposal for 6 replacement infrared heating panels.

The panels are used on a lamination line to melt various powders with a set maximum melting temperature.

The mounting frames for the heaters were variable in height. The main issue for the end user was that they were using a specific infrared technology and they were having issues with it.

We proposed two designs to the company. One with ceramic elements and one with quartz elements. The customer decided to go with the option of using our full quartz element heaters, to best match the previous panels in power and size. The FQE heater is built differently to our competitors in that it is almost sealed. An advantage meaning they will perform better in the harsh environment.

Another concern for the customer was to establish what type of control they wanted to employ for these 6 new panel heaters. Ceramicx solved this by providing a wide-ranging number of control options to the customer so they could make an informed decision.

Ceramicx built the 6 panels in-house with Ceramicx FQE elements. Each panel has a power of 14 kW.

Ceramicx built an 84 kW single zone open loop control system to go with the infrared heating panels.

Oven Frame:	Stainless Steel
Reflectors:	Polished Aluminised Steel
Element Type:	FQE 500 W, 230 V
Zones	1 Zone
Total Power:	Approximately 14 kW
Oven Size	1,880 x 440 mm (*74" x 17.3"*)
Controller:	KR1 controller
Control type:	Open loop control
Power Supply:	3 x 400 V + N + PE

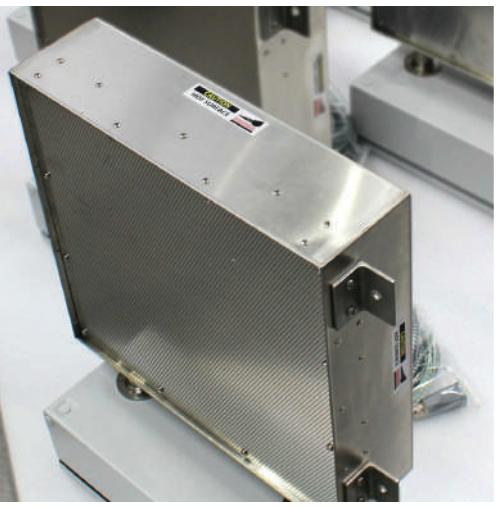
QUARTZ INFRARED HEATING MODULES

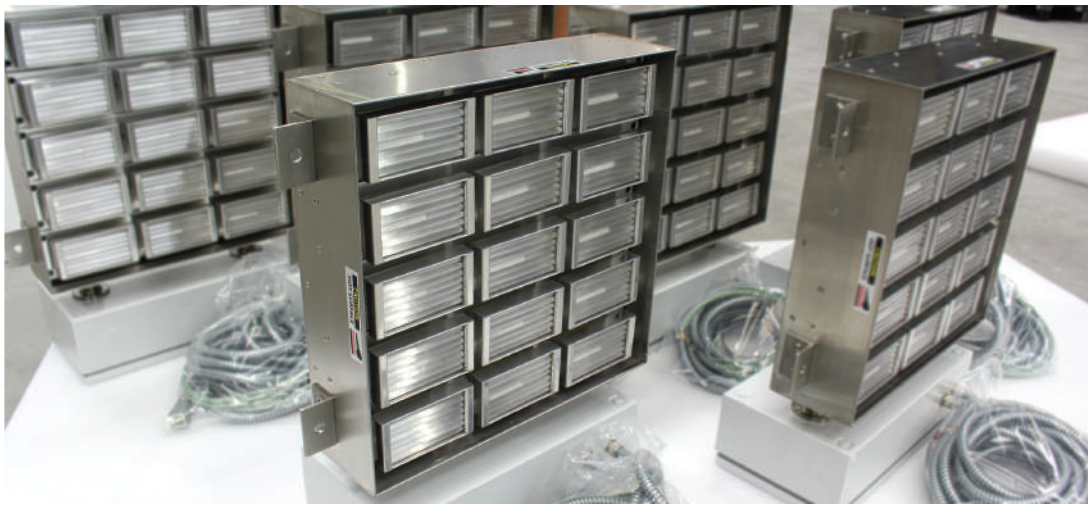
www.ceramicxsolutions.com/industries/textiles/quartz-infrared-heating-modules/

These modules were manufactured for a global sports brand manufacturer.

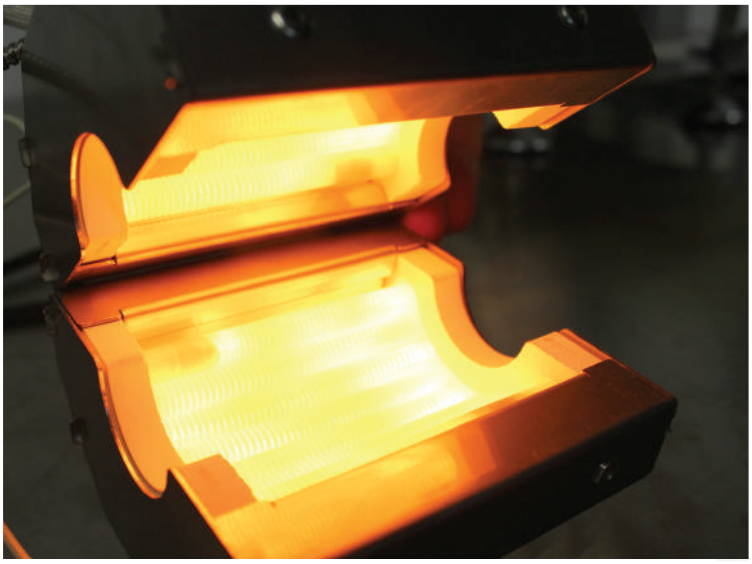
Ceramicx manufactured and assembled these modules in house using Ceramicx PHQE elements (Pillared Half Quartz Element). They were each pre-wired to specifications given. The perforated back cover is perforated as Ceramicx standard to ventilate the wring area. Each element included a thermocouple connection for precise temperature monitoring.

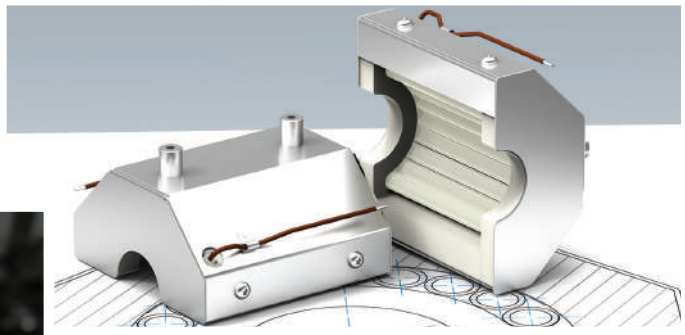
Module Power	3.75 kW
Element Type	PHQE, 250 W, 230 V, TcK x 15
Overall Dimensions	590 x 475 x 200 mm (*23.2" x 18.7" x 7.9 "*)
Reflectors	Polished aluminium clad steel
Back Cover	(Removable) manufactured from perforated aluminium sheet
Frame, brackets, and side wall	Stainless steel 304
Electrical Connection	Via junction box with M16 x 3 m (*118.0 "*) flexible metallic conduit

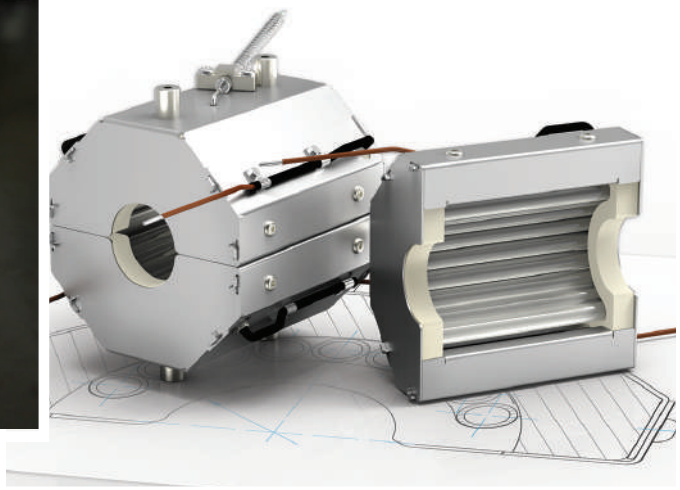




HEATSHRINK CLAMSHELL APPLICATION







www.ceramicxsolutions.com/industries/other/heatshrink-clamshell-application/

Portugal-based engineering company, Mecalbi, have become key players in the development and production of heat shrink systems and are widely acknowledged as global specialists in heat shrink solutions for the worldwide automotive industry, as well as the design and development of custom projects.

Their Shrinking Tube Control Systems (STCS) offer a complete range of high quality products where it's possible to choose from standard products as well as custom/application-specific products.

While infrared delivers the higher temperatures, it also has a higher pre-heating time to achieve the desired process temperature.

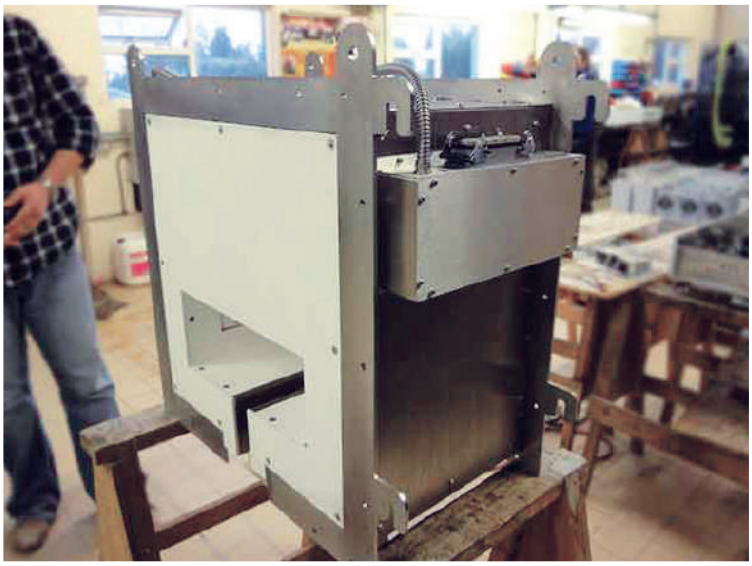
After a visit from Mecalbi to see us and our in-house capabilities, we discussed the finer details of their requirement.

- Their STCS-CS19 and STCS-RT machines needed a more robust form of heating.
- They needed a small infrared oven for the workbench STCS-IR500 and STCS-RCM machines to process smaller parts one at a time.

With two infrared heat solutions needed, both had strict specifications in terms of power, temperature, dimensions, and reliability, and both were developed using our infrared quartz heating elements. The clamshell shape was a natural consideration and Ceramicx worked on this using quartz infrared elements components.

The conveyor-based STCS-CS19 machines were fitted with an array of custom quartz clamshell infrared elements with glass protection, while the movable oven of the STCS-RT machine now provides fast-response heat using the same elements. The STCS-IR500 and STCS-RCM machines again use infrared quartz technology and now give the stability and energy efficiency required.

GLASS FORMING OVEN



www.ceramicxsolutions.com/industries/glass/glass-forming-oven/

Ceramicx designed and built a single infrared oven heating module for a prominent customer in the United States glass industry. They wanted an R&D oven so that they could test whether they could heat up a specific glass, and afterwards form it so they could create a curve in the glass. This was so they could achieve more complex shapes of glass to be used for future assembly.

It was new territory for both Ceramicx and this customer. They required a heat output of 900°C (*1652 °F*) with a very tight tolerance in order to get the required results. Ceramicx designed 9 heated modules and 2 access modules. They were installed in line to provide the process temperature that they wanted.

Each heated module contained specially designed fast medium tungsten heaters providing a total heat output of 11 kW per module. Target moulds were indexed through modules to provide the required heating curve.

Ceramicx built the oven on site and used specialised insulative materials to be able to create the necessary environment for the glass product to stay so close within tolerance.

Oven Frame:	Stainless Steel
Heater Type:	Quartz Tungsten tubes 1,000 W, 240 V
Length of 11 modules together:	4.947 m (*195.8"*)
Heat Output:	11 kW per module, 99 kW total

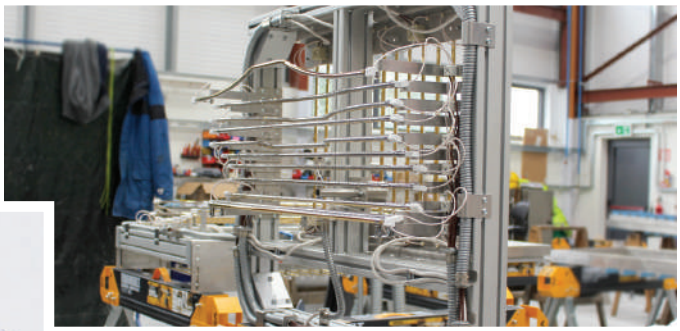
Once the oven was built, the customer visited our factory with 4 individuals from the United States to do a factory acceptance test on site. After this the project was shipped out.

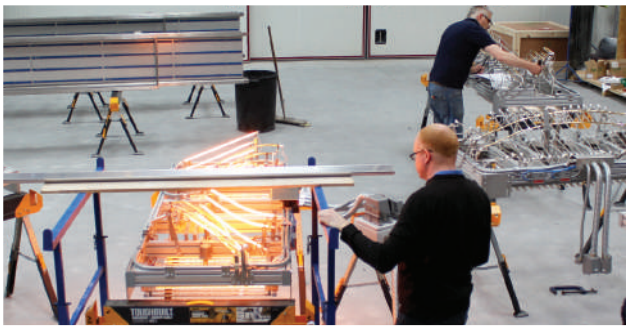
Heating component used - Custom Shaped Quartz Tungsten Tube Heaters

Our infrared quartz tungsten or quartz halogen custom shape heaters provide uniform heat for curved or irregular shaped materials. By using a unique heater geometry, matching the profile of the part or target material, allows consistent heat in every area. Custom shape heaters are available with a choice of reflective coatings of ceramic or gold.

www.ceramicx.com/products/quartz-tungsten-elements/quartz-custom-shape-heaters/

BONDING AUTOMOTIVE INTERIORS





www.ceramicxsolutions.com/industries/automotive/bonding-automotive-interiors/

One of the biggest US automotive companies were looking for a more automated solution to their production process. Their Tier 1 supplier made contact with our business partner in the United States, Weco International. They wanted specifically an infrared heating system to bond leatherette materials to the interiors of automotive passenger doors for the cars that they were producing. They had multiple parts, so they needed multiple heating systems.

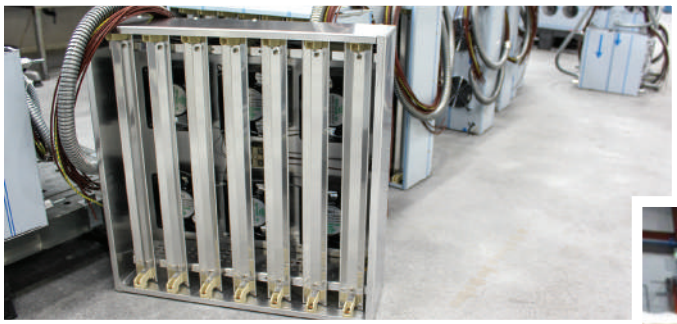
Ceramicx designed and built the infrared heating system to suit this automotive thermoforming application. Ceramicx designed a one-of-a-kind heating system that consisted of 37 custom heaters that suited the shapes that the customer wanted. This ensured uniformity of heating over the entirety of the part. Ceramicx designed these custom fast medium-wave, Quartz Tungsten Tubes, to suit the material that the customer was processing to ensure it was the most efficient way of heating the material. An additional benefit incorporated in to these heaters was the incredible speed at which they reached temperature to minimise further loss of time for the customer. Ceramicx built 8 different systems in total and ensured all the systems could fit in the one machine.

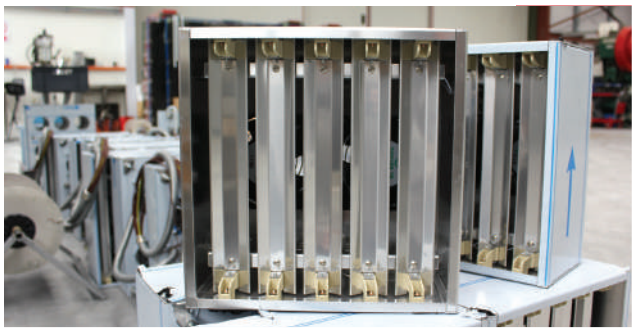
Oven Frame:	Aluminium Profile
Reflectors:	None
Upper Element Type:	Individual Custom Quartz Tungsten Tubes
Lower Element Type:	Quartz Tungsten Tubes
Controller:	Siemens S7 1500 PLC
Control type:	48 Zones
Control feedback:	IR Sensor
Total Power:	148.5 kW
Oven Size:	8 heating systems with footprint 2.2 x 0.80 m (*86.6” - 31.5”*)

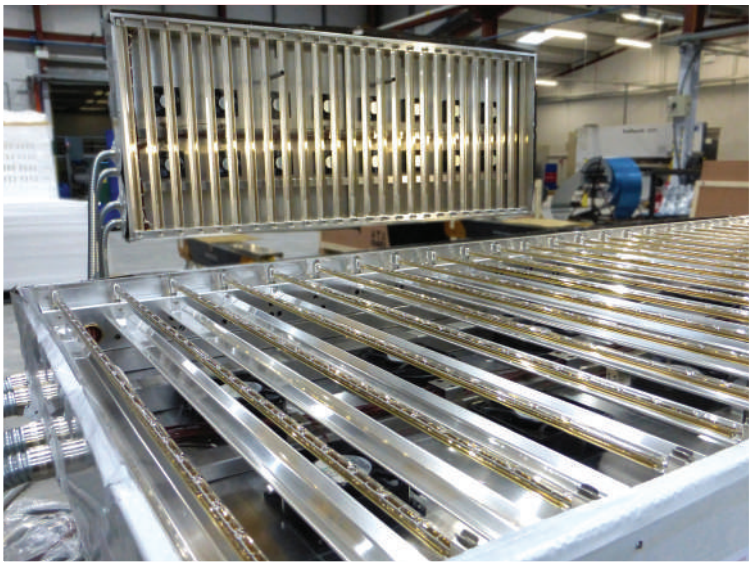
The construction of the systems was made in aluminium profile, and custom stainless-steel brackets were made on site in Ceramicx to hold each heater in place. One frame of the heating system consisted of a lower bank of heater that simply consisted of straight quartz tungsten heater that were primarily used to heat the leatherette fabric. The upper heaters were all different to exactly match the surface shape of the part being heated. Finally, one control panel was supplied for all 8 heating systems. A standard connecting point was run off each machine so each system could be changed over easily.

Currently this fast medium-wave infrared heating system has been in production for over 1 year, and the report so far is that the end user is satisfied with the result. Our custom built system fit into the footprint that they had available, each system can be changed out easily, the heaters heat the required part uniformly, they are efficient both in response and heating the targeted material, and lastly it is clean energy.

SHORTWAVE INFRARED FOR PRE-HEAT & CURING







www.ceramicxsolutions.com/industries/consumer-white-goods/shortwave-infrared-for-pre-heat-curing/

With over 40 years' experience, QS Group are national and international leaders in integrated automation engineering. Based in Cerreto d'Esi in eastern Italy, with manufacturing plants in Milan and Ancona, QS builds industrial components used by white goods manufacturers, together with systems and moulds for sheet metal, and plastic and foam processing. But it's their work in white goods manufacturing that is key to their success, helping them to expand their presence on a global scale. As part of their component manufacturing procedures, QS relies on fast and consistent heat processes. Ceramicx' long term relationship with QS Group, formed through another Italian heating company, has seen us deliver heating solutions to meet their needs, with standard or custom-made components to increase speed and efficiency to their operations.

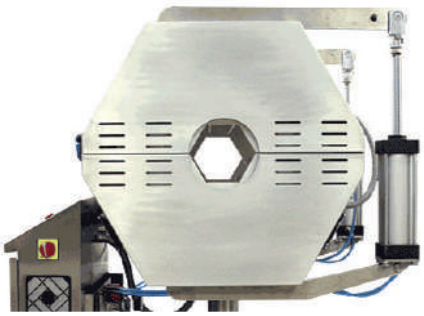
In the past year, QS Group has increasingly turned to Ceramicx to manufacture short wave custom-built pre-heat and various curing heating systems. QS needed a larger, custom-designed pre-heat oven system for the plastics division of their foaming plant. As leaders in their sector, QS Group's experienced design and engineering team knew exactly what they required. Providing all their technical specifications in the supplied design drawings, the oven would achieve increased consistency in heating times, raising the temperature of two different materials by an increased speed of 20 - 30 °C (*68 - 86 °F*) over the norm.

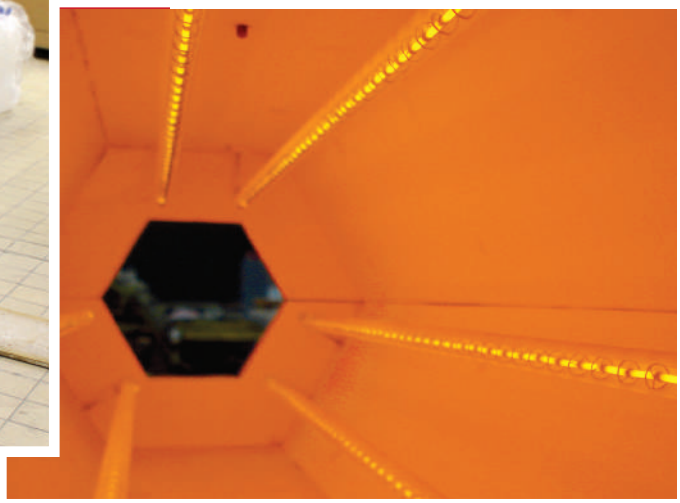
Knowing Ceramicx' infrared technology capabilities, QS opted for an array of custom short wave quartz halogen tube elements with 180° gold coating across two panels. The inclusion of custom aluminium clad steel reflectors would also maximise their radiant heat efficiency. Our Ceramicx engineers then worked with the detailed drawings to custom-build the oven, with full production and manufacture scheduling, and testing, ready for QS Group's final approval.

Number of panels	2 (*upper and lower*)
Power	91 kW per panel
Elements	Short wave Quartz Halogen Tube, 3500 W, 400 V, 800 and 870 mm (*31.5" - 34.3"*) 180° gold coating
Element termination	FCB termination
Frame	Stainless Steel
Outer case	Aluminium
Weight	120kg

Ceramicx are also regular suppliers of infrared components to QS. Over the years, we've supplied and continue to supply custom and standard-sized infrared Fast IR system components for more efficient drying and curing processes. Fitted with quartz halogen heater tubes as specified, the short wave Fast IR assemblies ensure QS has the precision heat needed to cure bitumen-based noise dampeners for dishwasher production. We've supplied custom variations on our FAST IR 305 and FAST IR 500 products over the years.

CLAMSHELL OVEN





www.ceramicxsolutions.com/industries/other/clamshell-oven/

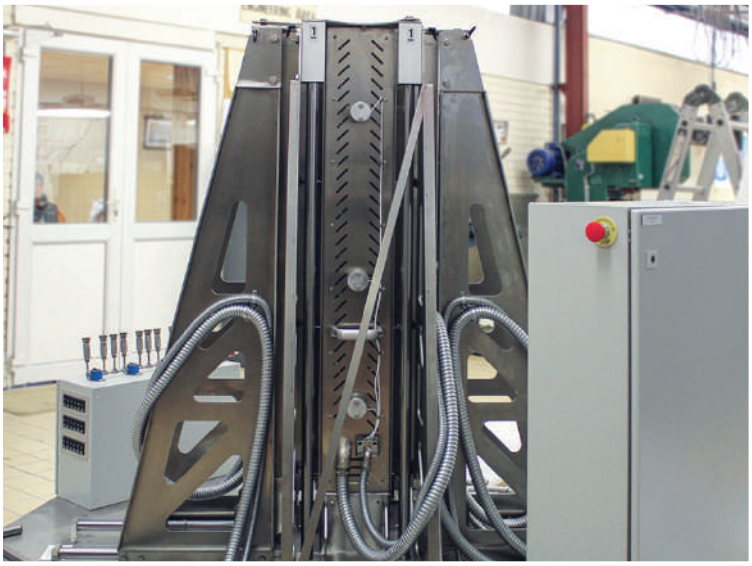
Ceramicx industrial heat consultants not only provide solutions for custom infrared ovens. We have constructed a clam shell oven as part of our standard production offering. This 12 kW+ unit is controlled through a HMI interface using control hardware and software from Cannon Automata and Ceramicx.

Fans and ventilation slits were used to keep the back of the insulation and wiring cool.

The oven shown in these images was bought via our US distributors Weco International. The clamshell shape was ideal for curing the outside layer of a synthetic material used in the drinks industry, where it was supplied to.

Total Power	12.1 kW
Power supply	3 x 400V + N + PE
Maximum current/phase	18A
Maximum operating temp	650 °C (*1,292 °F*)
Element type	Short wave quartz halogen
Control zones	3
Control type	3 zone open loop (*with optional single zone closed loop*)
Control interface	Touchscreen HMI
Power control	Phase angle
Temperature measurement	Single type K thermocouple (*measuring air temp.*)
Footprint (oven closed)	1153 x 991 mm (*45.4" x 39"*)
Footprint (oven open)	400 x 991 mm (*55.1" x 39"*)
Overall height (from floor)	1,350 mm (*53.1"*)
Oven length (entry to exit)	991 mm (*39"*)
Effective heated length	740 mm (*29.1"*)
Entry/exit Ø	150 mm (*5.9"*)
Maximum product Ø	100 mm (*3.9"*)

FOUR COLUMN VERTICAL CURING SYSTEM



www.ceramicxsolutions.com/industries/aerospace-defence/four-column-vertical-curing-system/

To meet our aerospace, defence, and security client's requirements, our custom-designed, 22 kW heating system needed the capability to precision cure composite materials. Producing temperatures of between 37 - 182 °C (*100 – 360 °F*) with a 185 °C (*365 °F*) fail safe shut-off, the system features 12 control zones, incorporating 88 quartz halogen tubes (*250 W / 240 V*) with polished aluminium reflectors.

To heat four separate, composite parts, vertical heater columns were fitted with 22 infrared emitters and 3 pyrometers for precise, non-contact temperature measurement at 25 mm (*1"*) increments along the material. With an in-built display countdown for curing time, the system also notifies the system users when the cure profile is complete.

With every custom heating system project like this, Ceramicx always integrates a heating control system, providing every project and customer with a complete heating and control solution. This project was no different. By integrating a Siemens SIPLUS HCS4200 control system, the client would have absolute precision temperature control.

Total power	22 kW
Frame	SS304
Element Type	Special quartz halogen heater 250 W, 240 V (*x 88*) 180° gold reflective coating
Reflectors	Polished aluminium clad steel
Control Zones	12
Power Control	Siemens HCS 4200 system

Siemens, in developing their SIPLUS HCS systems for industrial heating applications, has perfected a range of flexible, and modular heating control systems. Depending on the requirements of the heating process, each has the capability to activate and switch between industry-standard infrared heating elements for precision heat wherever it's needed.

Classed as 'the flexible solution', the SIPLUS HCS4200 is a control system featuring different output modules, I/O modules, and racks. Used for any compact or modular concepts with low to medium levels of power output, the HCS4200 provides precision control for heating elements up to 20 A at different voltages. Together with integral voltage diagnostics for detecting internal and external faults such as tripped fuses or wire breaks, intelligent and detailed diagnosis of heating elements, and quick installation with reduced cabling work, the HCS4200 was the ideal cost-effective heating control solution for their requirements.

CARBON FIBER HEATING SYSTEM FOR AEROSPACE

www.ceramicxsolutions.com/industries/aerospace-defence/case-study-carbon-fiber-heating-system-for-aerospace/

As an independent, national centre for the world-class manufacture of composites, our client's testing production capabilities were already meeting multi-sector demands. With the growth of dry fabric infusion in the aerospace industry, they needed an innovative solution to increase composite testing, offer significant savings, and set new industry benchmarks. In the industry, there has been a move away from traditional prepreg and autoclaves, to dry fabric infusion. An essential step in infusing dry fabrics is 'pre-forming' – a process using heat to activate a binder in the dry fabric to produce a semi-structural 'pre-form'. This method has seen increasing growth in aerospace structures, specifically in the manufacture of stringers, the structural supports within an aircraft wing that prevents buckling and bending under compression.

As an industry leader in the design and manufacture of infrared heating systems, Ceramicx have developed an extensive knowledge of the aerospace industry, with the necessary experience of heating composite products, including the curing of thermoset resins. Working closely with our client, Frank Wilson, Managing Director here at Ceramicx, comments, "When undertaking a project of this nature, we always understand the specific requirements of the process. Geometry, nature of the control, anticipated processing speeds, and budget all play a big part in the formation of a bespoke solution".

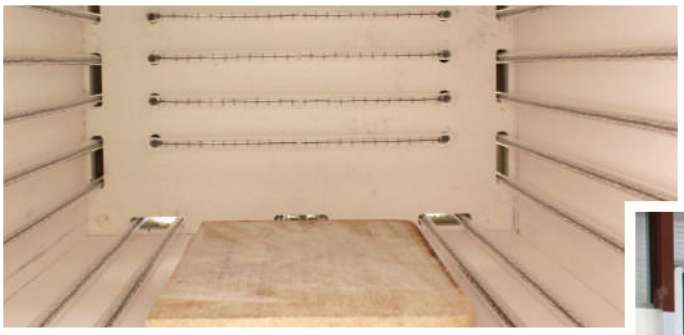
With infrared offering consistent and notable advantages over traditional convection ovens, we demonstrated how infrared can offer significant savings in the heating of stringers during the 'pre-forming' process, and how a bespoke control and system design would prove crucial to our client's success.

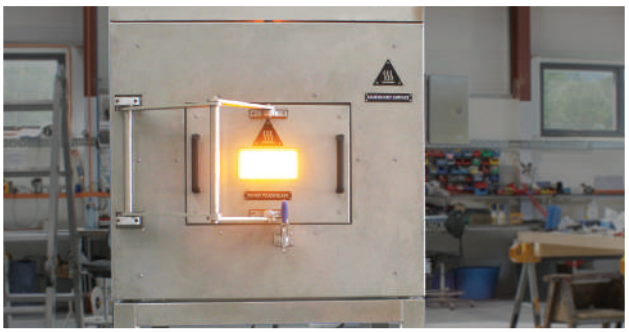
Following a process of further R&D our designs and plans were approved. We then custom-built the IR oven and its own 12-zone heat control system–optimising the oven for efficiency and appropriate processing parameters–all to the client's specifications. The trapezoid shape created by the reflectors matches the composite pre form shape. Fast-response, quartz halogen heaters were chosen for their emitter type due to the extensive data generated by Ceramicx with them for heating carbon composite materials. Their geometric and relative arrangement was based on R&D of heating composites to give the best performance.

Total Power:	56.8 kW
Heaters	Custom Quartz Halogen tubes (*400W x 20 pcs, 850W x 24 pcs*)
Zones	6
Electrical Circuits	2 per zone
Pyrometer	6 x pyrometer CT -SF 15, one per zone

The result of this infrared oven is a process that is **3 to 4 times faster** than that of a convection oven, with a much smaller footprint and the ability to move the oven to the work piece. That in itself has made significant energy savings. The heating arrangement has been optimised to set an industry benchmark in the through-thickness heating of composite structures.

AEROSPACE INDUSTRIAL R&D FURNACE OVEN





www.ceramicxsolutions.com/industries/aerospace-defence/aerospace-industrial-rd-furnace-oven/

A private aerospace manufacturer required the ability to test materials at their own facility under the same conditions as atmospheric re-entry.

Weco International, our business partner in the United States introduced us to the client. The client needed a heating system that could replicate the conditions of atmospheric re-entry in a controlled setting. The system would enable them to undertake in-house research on various materials to see which ones can withstand the extreme conditions.

Ceramicx collaborated with Weco International in helping to design a custom industrial research and development furnace for the client. The main challenge was getting the furnace oven to reach 1,100°C (2,012°F) to replicate the re-entry conditions from space. The client was provided with various design concepts, that through consultation were developed over many months into the final furnace oven and control system.

The Ceramicx team built the stand-alone oven completely in stainless-steel, with short wave quartz halogen heating elements. The elements were mounted on each wall of the oven, and specifically above and below the target material. The oven was lined with specialised high-temperature insulation, with fabricated stainless-steel housings locating everything in place. Two observation ports, built in thermocouples and pyrometers (*non-contact infrared sensors*) allow the client to fully see the process and have accurate control of the oven's temperature. The control system was designed and built by Ceramicx to suit the client's requirements.

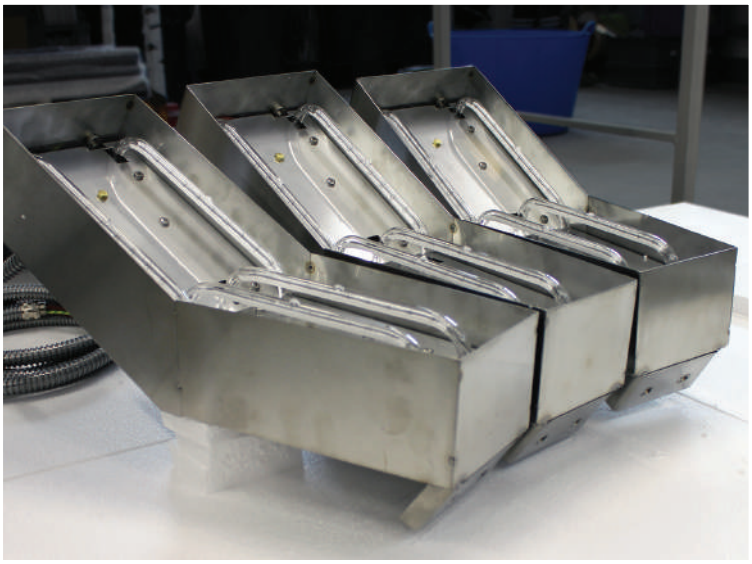
Ceramicx completed the infrared heating system in approximately 6 weeks, including all the work from welding through to load testing every circuit.

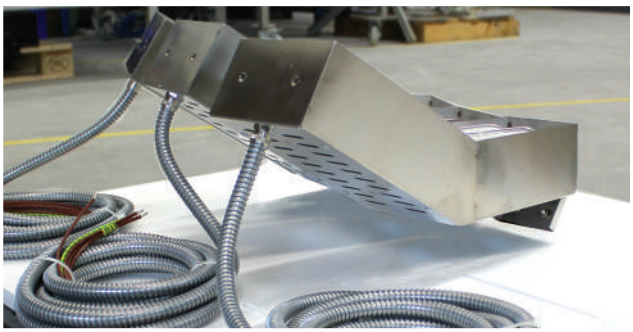
Ceramicx fully tested all the components and pre-programmed the control system, which along with the dedicated manual and video allowed the oven to become operational in a short time frame.

The client's aim was to protect an orbital module from extreme heat. Prior to our collaboration, the ability to test the efficiency and durability of materials in-house was lacking. Before contacting Weco International, all experimental components had to be outsourced to a specialty-testing laboratory during the R&D phase.

This created a large hurdle in minimizing cost and improving production efficiency. The absence of a high-temperature furnace oven hindered their research and development. Therefore, the most important result gained by the client was giving them flexibility and capacity to quickly heat test the durability of new materials.

HALOGEN INFRARED HEATING SECTORS





www.ceramicxsolutions.com/industries/construction-built-environment/halogen-infrared-heating-sectors/

These units were designed for a Norwegian customer for the offshore construction industry. Forming a circle when placed together, they were made using stainless steel housing, perforated backing, and custom halogen tubes.

Power	2.4 kW
Element Type	Special Halogen heater 600 W, 230 V (*x 4*)
Element reflective coating	Ceramic
Circuits	2
Total number of sectors	30
Overall Dimensions	423 x 181.3 x 142 mm (*16.6" x 7.1" x 5.6"*)

Ceramicx manufactures and builds all infrared systems in house, allowing any unique components to be designed and manufactured quickly. Short lead times for customers is one of the many perks of this process we pride ourselves on.

Heating component used - Custom Shaped Quartz Halogen Tube Heaters

Our infrared quartz halogen or quartz tungsten custom shape heaters provide uniform heat for curved or irregular shaped materials. By using a unique heater geometry, matching the profile of the part or target material, allows consistent heat in every area. Custom shape heaters are available with a choice of reflective coatings of ceramic or gold.

www.ceramicx.com/products/quartz-tungsten-elements/quartz-custom-shape-heaters/

MATERIAL TEST OVEN

www.ceramicxsolutions.com/industries/other/material-test-oven/

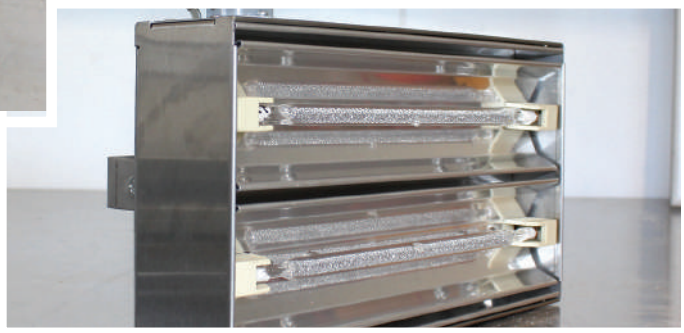
Ceramicx designed and built and infrared test oven system for a Chinese customer. This oven has a series of removable drawers which contain the different heating elements. Long wave ceramic elements, medium wave quartz elements and short wave halogen allowing heater versus material type evaluation.

Control is achieved via closed loop SSRs in conjunction with a non-contact sensor. The unit was designed to be small, highly mobile yet contain a large amount of technology to allow the customer to evaluate, on-site, the effectiveness of Ceramicx infrared heating technologies.

Oven Type:	Test Oven + Control
Total Power:	6.2 kW
Power Supply:	1 x 230V + N + PE
Maximum Current/Phase:	26 A
Element Types:	Ceramic, Quartz & Quartz Halogen
Total Heating Power:	6.0 kW
Control channels:	1
Control type:	1 zone open loop control
Controller:	Siemens S7 1211C
Control interface:	Siemens KP300
Power control:	SSR
Sheet temperature monitoring:	IR Sensor
Footprint:	0.92 x 0.6 m (*36.2" x 23.6"*)
Oven length (entry to exit):	0.92 m (*36.2"*)

PORTABLE TEST STAND

Please contact us on sales@ceramicx.com
to enquire about this item.



Power Supply:	230 V
Maximum Current:	7 A
Maximum power output:	1.6 kW
Ceramic Element	2 x SFEH 800 W
Quartz elements	2 x FQE 750 W
Tungsten tubes	2 x QTS 750 W

www.ceramicxsolutions.com/industries/other/portable-test-oven/

Ceramicx' Portable Test Stand allows for quick and consistent testing of materials. Various long, medium, and short wave Infrared emitters are fitted in a modified PAS, which is easily attached to the test stand.

The emitters face down and heat a material that is placed on a stainless steel mesh. Distance between emitter and material can easily be adjusted between 50 and 200 mm (*2" and 8"*), in 50 mm (*2"*) intervals.

This test stand allows the user to quickly determine the most suitable type of emitter and heating distance for a specific material, with consistent results due to the simple, repeatable test set up.

CONSIDERING IR HEATING?

Ceramicx can offer advice on a high-quality solution for you application,
from infrared heating elements to customised heating systems.

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INFRARED FOR INDUSTRY

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ENGINEERING TEAM

Frank Wilson, Managing Director
frank.wilson@ceramicx.com

As the founder and Managing Director of Ceramicx for over 30 years, Frank is an expert in the field of industrial infrared technology and applications engineering, combined with previous experience in other industries including plastics, composites and automation. He also has widespread knowledge and experience in project undertakings, commercial negotiations, and international partnerships.

Tadhg Whooley, Technical Sales Manager
tadhg.whooley@ceramicx.com

While heading up and supporting our Technical Sales team, Tadhg also plays a significant role in several key areas for Ceramicx. Heavily involved in the design and development of custom infrared heaters and systems, he also oversees temperature measurement and control.

Mark Billing, Business Development Manager- UK Territory
mark.billing@ceramicx.com

Located in central England, Mark is perfectly placed for managing our UK customer base. With wide-ranging experience of engineering based project sales, Mark is on call to support customers, both existing and potential, to ensure we offer the most cost effective, fit for purpose solutions. Managing customer relationships and working closely with our Technical Sales team, he helps us respond to enquiries efficiently by ensuring we understand the requirement(s) and are able to meet expectations.

Liam Maddock, Electrical Engineering
liam.maddock@ceramicx.com

Leading our engineering projects for different sectors, Liam project manages the processes in complex infrared heating systems for our global customers. He also oversees specific electrical sales enquiries and quotes while developing electrical control and automation solutions.

Padraig Courtney, Engineering Manager
padraig.courtney@ceramicx.com

As part of our process engineering and product development strategy, Padraig is key to the design and manufacture of custom-built long and short wave infrared heating elements and systems. With advancing technology, continuous product development plays a crucial role in our success.

Patrick Wilson, Production Manager
patrick.wilson@ceramicx.com

As Production Manager, Patrick plans, organises, and oversees our overall product manufacture. While making sure our manufacturing schedules and processes run reliably and efficiently, Patrick also carefully manages relationships with our global distributors.

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