INDUSTRIAL OVENS AND Infrared Solutions
The Guide to Ceramicx Infrared Heating Solutions

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Some one hundred years after its discovery, the world of Infrared heating (IR) remains largely undiscovered and under-utilized.

Our communications mission
At Ceramicx we hope that the pages of this document and its companions (Product Guide and Research Guide) will help to redress the balance.

Ceramicx manufactures and supplies the three primary kinds of IR heat emitters. Our experience – with all kinds of industrialists and with IR heat applications - tells us that the best is yet to come.

When the time comes - in 2/3 years – to update this publication we expect a transformed landscape and many more IR heating applications at large.

Meantime I hope that you find useful information and creative prompts in the pages here.

We all have a part to play in the growth of our industry. Please do not hesitate to involve Ceramicx in your heating needs and enquiries.

I look forward to hearing from you.
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Reaching a moving target

Many Ceramicx clients need IR heat systems that can fit into pre-determined production lines, cycle times, packaging and palletisation.

Ceramicx therefore builds IR heating and conveying systems to match these needs. Ceramicx designs, builds, trials and supplies all of the components and the final system from under one roof.

- Ceramicx designs and builds IR heating conveying systems that:
  - Ensure accurate and efficient line production
  - Contain the highest standards of engineering and process control
  - Convey the best heat solutions to the target bodies/products in the right manner
The Processes - High Speed Thermoforming

Creating The Finished Package

Ovens and heat platens from Ceramicx have been transforming the in-line, high-speed plastics thermoforming landscape throughout the world for the past five years. Ceramicx thermoforming solutions are typically supplied here as a retrofit heat system for production lines making Fast Moving Consumer Goods (FMCG).

The popularity of the Ceramicx solution is growing, since average energy savings of 40% along with up to 20% productivity improvement are possible and payback time is measured in months.

Key Ceramicx customers include Linpac and many other major producers of food service items, supermarket and High Street food packaging.

Ceramicx in-line thermoforming IR heat platens enable:

- Pin point process control and process design
- IR based heat sources – for longevity, reliability and cost down.
- Average energy savings of 40% on line running costs – and speedy payback
- The preservation and rejuvenation of expensive capital equipment
Year after year the cut-sheet thermoforming industry continues to raise its quality game: Ceramicx IR heating solutions have helped this process.

Infrared-based heat systems are key in helping ensure shot-to-shot consistency and reliability.

For the cost-effective production of large plastic mouldings, the thermoforming process is hard to beat.

The Ceramicx customer list includes thermoforming machine manufacturers and businesses who are successfully making large mouldings for the automotive, aerospace, medical/healthcare sectors as well as servicing high demand in from the white and brown goods sectors.

Processes – Cut Sheet Thermoforming

Boosting quality in large plastic parts

Ceramicx IR heat platens for cut-sheet thermoforming allows:

- Elimination of costly legacy issues with tubular and conventional heating
- Pin point process control and process programming
- IR based heat sources – for longevity, reliability and cost down.
- The preservation and rejuvenation of expensive capital equipment
Ceramicx has a number of solutions to offer in the area of composites thermoforming.

Each composites material formulation will vary from client to client. The Ceramicx Herschel test instrument enables full testing of each heat/material interface. 3D measurements and maps of the forming process under IR heat can then be created before machine build takes place. Ceramicx is thus enabled to design and build composites thermoforming ovens for its customers, each specific and customized for particular materials.

- Ceramicx:
  - Can optimise heaters to composite materials
  - Design custom shapes for complex parts

Right angle curing
The Processes – Drape Forming

Opening up composites

New for 2017 will be volume manufacturing of the Ceramicx heat process solution for small to medium sized composite components.

The new Ceramicx Vector Drape Former will support production of composite objects from a bed size of 1400 x 1000 mm. It applies the company’s knowledge of IR heating to the business of composite prepreg heating. The new heater is aimed at companies who are seeing out-of-autoclave production and who are also seeking to minimize costs and energy consumption.

Summary

- The Ceramicx Vector Drape Former is a Siemens-controlled, 28.8kW optimised infrared system with five independently controlled heating zones and a high performance Becker vacuum system with automatic venting.

- Heater bed sizes and trolley options can be customized to suit client needs.
More than drying

Ceramicx designs systems and production lines for the Infrared drying of manufactured product.

Such systems involve the complex interaction of paints, polymers, and inks, with substrates of plastics, metals, stone and concrete, papers and other products.

IR drying systems typically involve pre-drying stages and sophisticated patterns of heat control, together with a ‘deeper’ heat exchange and subsequent chemical/bonding reaction.

IR heat drying can provide a more lasting and quality finish to many manufactured products.

Ceramicx designs IR heating systems for:

- Final stage production processes; finishing and drying of products.
- Greater process precision – ensuring a quality finish to many products.
Ceramicx IR heat systems can be applied in a stationary work setting in order to bond diverse parts together via complex glues and adhesives. This technology is in demand from the high value added automotive and aerospace industries.

Ceramicx IR heating can also be used in-line, in a manufacturing process to bond various materials together, such as plastic-to-metal or plastic-to-rubber. This creates strong and versatile products that are found in many sectors, including engineering and construction industries.

The infrared element heat/energy exchange is often able to produce bonding and material changes at a chemical level – outperforming the parameters of conventional heating.

Ceramicx IR heating for bonding and adhesion provides:

- Predictable and stable heat processes (provided by Ceramicx test instruments such as the Herschel)
- A deeper, more stable fusion between materials; involving both temperature and chemical reactions
Ceramicx has extensive experience in building high temperature furnaces for the manufacture of materials such as toughened glass and high-value composites.

The performance of such furnace elements is key – and Ceramicx has developed its own unique product for use in such applications.

The ribbon surface enables a radiant emissivity of 0.60 which is the same as steel. The background surface of ceramic insulation provides a value of 0.95.

Due to the High Watt density of the product it’s possible to provide a great deal of energy within a short space. The heat transfer capability of this heater is therefore best utilised when the energy output is contained in a ‘hot box’.

The furnace platen control is dependent on the control of the radiant IR energy. The exposed materials on the surface of the heater allow for high ambient operational conditions. Ceramicx does not recommend this heater for close control values with the application of radiant energy.

User Summary

Ceramicx furnace elements are ideal for manufacturing that demand high temperature, high energy performance systems.
Ceramicx builds a select number of Research and Development ovens in order to progress client opportunities and to further advance the development of particular heat work solutions.

These ovens can be set up to measure such process parameters as cycle times; cure; adhesion, flash off, shrinkage, forming and other material-based factors.

Ceramicx R&D ovens are available for purchase and technical services may be purchased from Ceramicx in areas of IR testing.

Ceramicx can

- Design and supply a test unit specifically for a process
- Supply off the shelf test units with interchangable long, medium and short wave modules
- Design and build test ovens for contract testing by Ceramicx R&D team or for purchase
Shield used to disperse infrared into a specific pattern
Composite structures are now the norm. Ceramicx has extensive experience of serving major producers in this industry and of rising to the technical challenges of part production.

The new Ceramicx drape forming oven – developed with Belfast Metropolitan College – is one instance of innovation that has been spurred by work with aerospace clients.

The aerospace production sector has always needed to solve production issues involving size and scale, particularly in wingspan and fuselage.

Ceramicx IR heat technology now gives the industry new options in plane design and construction.

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**Key Markets – Aerospace**

On wings of innovation
The age of metal has long passed for today’s aerospace industries.

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**Ceramicx works with aerospace clients to provide:**

- Infrared based production solutions, typically involving composite structures, new-oven build and bespoke drying/curing technology
The world’s automotive industries continue to drive down production cost and increase user performance. Light-weighted and stronger modern materials are enabling this evolution. Ceramicx is contributing to the new manufacturing processes that are driving change.

IR heat has several roles to play; in the forming, preforming, drying, bonding, and annealing of various automotive materials and components, and in the production of various automotive parts and structures. Ceramicx IR heat technology is involved in all areas.

Ceramicx can provide:

- IR forming, preforming, drying, curing, adhesive and bonding solutions for automotive companies in all major materials – plastics, glass and metal.
- Design and build ovens – drape forming or thermoforming - for production of larger automotive parts.
Environmental and cost-saving

Ceramicx supplies award-winning IR heat technology to the world’s leading packaging companies.

The reason is simple: IR heat sources reduce both running cost and carbon footprint. A retrofit system from Ceramicx typically reduces energy consumption on a production line by some 40% and can increase production by as much as 20%.

The world of packaging is fast-changing as company’s become more responsive to consumers, more conscious of energy-cost and environmental needs.

Key Markets – Packaging

Ceramicx can help:

- Redesign and rebuild packaging production systems
- Provide superior heat sources for packaging materials
- Provide fast turnaround and payback improvements
Ceramicx IR heat technology is used in situations as diverse as medical operating theatres, sauna and treatment environments and in animal and livestock care.

Ceramicx Infrared technology is enabling the development of many process sectors, including food technology (heating and cooking) and printing (drying and curing). Manufacturers in sports and leisure sectors have need of IR thermoforming technology in creating new products. Construction, building and utility industries use Ceramicx IR heat technology in creating both new products (composite based) and in heating and bonding diverse materials together – such as metal/plastics combination.

Ceramicx IR heaters also offer the electrical and electronics sectors many improved methods of drying, curing and producing sensitive products such as printed circuit boards (PCBs) and other components.

Key Markets – other sections

Ceramicx can

- Assist in the research and development surrounding your project
- Supply conveyor solutions to fit your needs
- Program in Siemens, Allen Bradley and multiple other control platforms
- Facilitate access to Siemens finance for your project
OUR MARKETS

GLASS

CONSTRUCTION

INDUSTRIAL

ELECTRONICS

MEDICAL

FOOD

OIL, GAS, AND MINING

SPORT AND LEISURE

PRINTING

Curing a graffiti resistant concrete coating

Removing evaporated damp from a climbing wall

Keeping food warm on a delicatessen counter

INDUSTRIAL OVENS AND Infrared Solutions
Let Ceramicx partner you in these. Ceramicx combines an open and friendly approach with advanced IR heat know-how that can provide ready answers.

The Ceramicx technical team cover multiple engineering disciplines between them up to doctorate level, we also have expertise to draw on from our university network contacts; in Cambridge, Trinity College Dublin, Dortmund and elsewhere in Europe.

The Ceramicx website – and our HeatWorks Magazine series – contain a great deal of useful information, with case studies of IR heat use and with more detailed White Papers on the science and application of IR heat, the workings of Planck’s law and many other topics.

If you have any questions about IR heat sources, or any aspect of your IR heating system – remember that Ceramicx is here to help.
With over 40 years’ experience of providing finance to businesses, Siemens Financial Services (SFS) has been helping finance the future of manufacturing with its innovative and competitive financial solutions.

Initially focused around office technology and healthcare equipment SFS has more recently aligned itself closely with the engineering and manufacturing heritage of the broader Siemens. SFS is now placing a focus on delivering credit to customers of machine tooling and plastics industry manufacturing equipment - (whether OEMs or resellers).

SFS offers a selection of tailored asset finance options for manufacturing businesses* - including Hire Purchase, Finance Lease and Operating Lease.

So if you are an established business with a strong business plan purchasing an infrared solution from Ceramicx, there is a financing solution for you.

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*Finance for businesses and other non-consumer opportunities only, subject to credit approval. This is not an offer to provide finance or any other terms. Quotations are subject to changes in funding costs, tax assumptions and credit policy. Any offer to provide finance will be subject to credit approval by Siemens Financial Services Limited and subject to terms and conditions. Provision of finance is subject to Service, Administration, Facility and Annual Services Fees.

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The course is divided into four modules that set out the basics of Infrared from an Industry perspective.

Each module will take 60-90 minutes to complete and finishes with a short online test. The modules can be taken online, or taught as part of a classroom course.

Further information can be found inside on pages 8 and 9.

The course is now available online at www.ceramicx.com/applications-training/