

HeatWorks

HeatWorks 11 | February 2014 | www.ceramicx.com

COMPOSITES

*a growing
public profile*

HeatWork
in Aluminium
Foil Production

SPECIAL K

K 2013 Experience

c2i2

Ceramicx Centre for Infrared Innovation

“ ...the purpose of
science is to **correct**
rumour, **black arts** and
superstition... ”

UNDERSTANDING IR HEATING
GREEN ENERGY

XU SHAN
CHINAPLAS 2014

GROWING THROUGHOUT INDIA
ELMEC

First and foremost may I wish you – the reader – a very Happy and Prosperous Year ahead for 2014.

This is the 11th edition of the Ceramicx HeatWorks journal in which we explore various facets of IR heating and IR technology.

Looking through this Winter issue puts me mind of three things; investment, innovation, and internationalization.

Some of our investment stories concern the resources put behind the new Ceramicx Centre for IR heat development and the exciting new work being done by Dr Gerard McGranaghan via our Herschel IR heat measurement system. I am delighted that both Gerard and Herschel have played a role in the team led by Marcin and Patrick that has led us to new product and new manufacturing. The full case study is on Page 12, featuring new steatite based products – exactly the kind of application that was envisaged from the start.

Innovation puts me in mind of the new work Herschel will also be helping facilitate in the design and manufacture of composite based products (GRP, Reinforced Plastics and related materials and structures). 2014 will see Ceramicx give the composites sector a special boost via the special properties in our IR based heat work; drying and curing these materials, further enabling the cost-effective production of lightweight and strong structures for our modern world; building and construction components; automotive, transport and aerospace and many other demanding applications.

Internationalism and a global marketplace has always been key to Ceramicx business: this magazine sees us reporting further on that global growth, including coverage of our successful presence at the K 2013 show exhibition and also news from growing markets for Ceramicx technology in Africa, India, Turkey and the Middle East and also in the Far East where for the third year running we shall be exhibiting at Chinaplas.

In summary, the New Year finds Ceramicx with at least as many plates spinning as the old one – here we call it a high-grade problem. We are grateful for the opportunities and the challenges and, as ever, we look forward to doing good business with you over the coming months.

Our thanks above all to you our customers for a very successful year at Ceramicx. We look forward to another happy and prosperous new year in your company!



Frank Wilson
Managing Director Ceramicx Ireland

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Talk to us today about your infrared needs

HeatWorks

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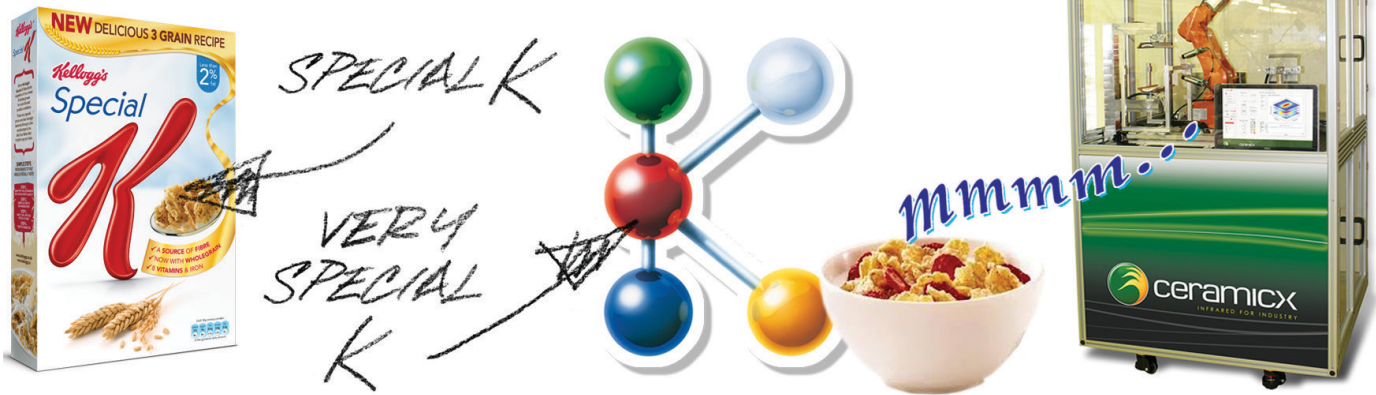
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Success in Plastics!



Ceramicx returned from the triennial world-leading K 2013 plastics exhibition 16- 23 October 2013 with several major positives to report

The K 2013 exhibition experience proved itself to be successful for Ceramicx on a number of major counts.

Increased global enquiries – especially in the area of quality technical sales.

Increased quality contacts for Ceramicx distributorships/dealerships around the world

Increased awareness of Ceramicx IR heating within the German speaking markets; including machinery builders and processors of plastics and plastic components.

Raised awareness – via the Herschel IR heat measuring instrument – of

“...the K Show always serves to strengthen our existing friendships and relationships ”

Ceramicx as a leading provider of quality scientific information and services for plastics manufacturing.

Says Ceramicx Director, Frank Wilson, 'The K Show always serves to strengthen our existing friendships and relationships and it also adds greatly to them. We expect to find new customers, new distributors and new collaborators each time we exhibit

there. This is our fourth such show and indeed we had the satisfaction of consolidating many good trade relationships during our time there. We also experienced many positive new leads and enquiries over the course of the nine days in Düsseldorf. These contacts will form part of our fuel for the future this coming year, which, thus far, looks extremely promising.'

Although K 2013 visitor levels were slightly down on the 2010 show the quality of such visitors was markedly increased. OEM companies returned to the fray in numbers, especially in automotive, healthcare and other high value added sectors. And if 2010



The Ceramicx Herschel IR heat measurement system was the undoubted star of the stand - and the presence of the scientists - Dr Tony Robinson (Trinity College Dublin) Dr Karl Brown (Trinity College Dublin) and Dr Gerard McGranaghan (Ceramicx) - really brought the show alive and made the IR heat technology sing.

was characterized by the power of Chinese purchasing, 2013 saw a much greater level of European investment returning.

The global plastics processing audience was also there in numbers and was characterized by a readiness to buy equipment rather than to simply window shop for solutions.



Dr Tony Robinson (Trinity College Dublin) and Dr Gerard McGranaghan (Ceramicx) with the Herschel Test Machine at K2013.

For Ceramicx, the undoubted star of the stand was the new Ceramicx IR heat measurement system, the Herschel, together with its scientific co-creators and attendants, led by Dr Tony Robinson of Trinity College Dublin.

Frank Wilson says that 'in all walks of life, including, dare I say it, plastics exhibitions there has to be some excitement; a bit of a wow factor. I am very happy to say that our scientific team and the Herschel provided that in spades at the K 2013 show. It's one thing to provide a new machine for the world. It's quite another to provide a world first. Both Tony and I are extremely proud of what is being achieved. The Herschel is a significant platform opening new doors in IR heat science and in IR heat applications; both for industry and for consumers. The K 2013 event gave us a great incentive and opportunity to make this happen. By the time K 2016 comes around, my guess is that the new Ceramicx Centre for Infrared Innovation (C²I²) will be ready to show yet another quantum leap in IR heat technology. We are already looking forward to it!'

Freek partners take the tour...

HeatWorks magazine took a little time out from the K 2013 exhibition to join the Friday bus trip to Ceramicx partner and associate Friedr Freek.

The company has been successfully developing and making electric heating elements at its Menden/Sauerland HQ since 1950.

Visitors were first given a comprehensive overview of the Freek product range and then a tour of the plant in smaller groups. This gave a real eye-opener to most; confirming the high degree of skill and know-how needed for quality, repeatability and reliability in industrial heating manufacture.



Wolfgang & Stefan Kaiser with production managers in front of extension at the Friedr Freek Factory, Menden, Germany .

Most of the Freek guests were simply unaware of the complexity and intricacy involved in many aspects of production and quality control. For example, up to 50 single process steps have to be accomplished before a Freek-designed HotMicroCoil heater passes the quality control test and is declared fit for purposes.

And since Freek continues to invest heavily in this 'high end' manufacturing; in human capital; skills training and retraining, it is perhaps unsurprising that the business continues to show high growth.

HotMicroCoil heaters for injection moulding nozzles for example are the most successful and fastest growing

business area at the company. They contribute nearly 50 percent to the current annual turnover of approx. 7.5 Million Euro and are expected to lead Freek over the 8 Million threshold very soon.

“50 single process steps have to be accomplished before a heater passes the quality control test ”

Success here has also spawned success in Freek's miniaturized HotMicoCoil heater range; which features cross sections as tiny as 1.0mm, necessitating extremely tight control of geometries and tolerances not to mention the very careful selection of materials. In this area, Freek visitors were able to witness at first hand the fusion of high-level craft skills with hi-tech manufacturing methods

Meanwhile, in the Freek laboratory, a number of tests were set up to demonstrate the destructive consequences of poor heater contact and thus poor heat conductivity. A variety of pass/fail parameters and means of heat and IR heat measurement and testing were also shown to the K 2013 guests as well as the effects of varied heater geometry and electric parameters on up-heating as well as steady state readings.

This feature alone was judged by many visitors to have made the Freek factory experience trip worthwhile. An everyday dealing with process heat applications has now been supported with an awareness of how exacting and delicate a business process heat can be.

Many thanks to our Freek hosts; Wolfgang Kaiser (MD), Stefan Kaiser (MD).and Michael Ablas (Auth. Rep.) for a very enjoyable day!.

Special K

Some positive thoughts on how we found the K 2013 experience



Partners in process heat - This shot of our stand taken from the balcony shows how the new design complemented both companies products.

New stand concept was judged positive by our own stand team and praised by visitors:

- Open to two sides without any obstacles such as steps or walls allowing for easy access
- Attractive eye-catchers (hotrunner exhibit, test centre and TV screen with company videos playing in endless loop)
- Abandonment of meeting room(s) to the benefit of a spacious kitchen & store room as well as an open plan big enough for the hotrunner exhibit and the prominent test centre plus a reasonable number of bar tables
- Aligned corporate designs successfully visualising the close cooperation of the two partners in process heat (colour gradient from Ceramicx green to Frieck red / aligned product presentation in showcases and on pictures)

■ Perfectly shaped and presented exhibits/products suggesting high value and quality, manufacturing excellence and technology leadership. Especially the Ceramicx range of IR heating elements has been expressively praised by visitors. Alone the visual impression of the current elements is no longer comparable with the former product generation.

Out of the Ceramicx product range Frieck has encountered a strong interest in quartz tungsten and quartz halogen heaters of which many market players apparently are still unaware that Ceramicx/Frieck also offer these.

The new generation of ceramic emitters and here especially the hollow ones has also attracted the German thermoforming elite. Promising contacts with leading thermoforming machine producers will be followed up soon.

The new Ceramicx test centre has been the highlight on the stand. Especially the accompanying presence of the scientific creators turned out to be a most valuable move. Visitors have had the chance to get explanations first hand and to discuss their own applications in a depth never expected. The scientists also have been a living proof of the possibilities Ceramicx has at hand by their Ceramicx Centre for Infrared Innovation C²IP.

The other side effect of having the IR scientists around has been a creative and fruitful exchange of ideas that

generated innovation stimulus for both partners. Frieck for example is going to launch new developments testing concrete ideas generated at the K show having the potential to improve their HotMicoCoil heater range in regard to heat-up performance and efficiency.

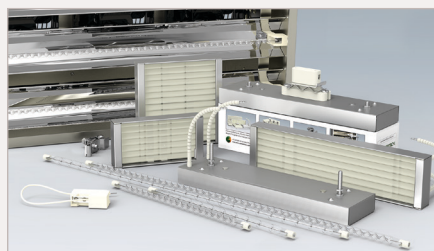
Out of the Frieck product presentation the novelty of the Super-flex caused a special customer crowd on the stand. The new alloy provides multiple advantages to the full section tubular heaters manufactured and promoted by Frieck. The attributes of the Super-flex alloy combine high formability, ductility, heat conductivity and corrosion resistance with a most attractive price. With the new sheath material option Frieck's tubular manifold heaters have the potential also to convince those customers who by now prefer sleeve covered competitor's products despite apparent electrical disadvantages and a higher price.

Frieck also succeeded in developing international markets by making promising contacts with new potential distributors for yet unexplored export markets.

Most visitors have been very positive regarding market expectations for year 2014. This perception matches the positive economic forecast reported by the media.

Frieck as well recognizes many more business chances than risks for the coming year and prepares for significant growth by building up production and engineering capacity. To quote Oprah Winfrey : Success is a matter of preparation meeting opportunity!

Special preparation for the expected significant growth in the German Infrared market will be agreed at the occasion of a next strategy meeting in Ireland in the middle of February.



Part of the Ceramicx's Quartz, Quartz Tungsten/ Halogen range that proved popular at K2013

Frank Wilson and Wolfgang Kaiser had a fruitful exchange of ideas that generated innovation stimulus for both partners.



University Challenge!

In February 2014 Ceramicx visits the University of Cambridge in order to continue its relationship and ongoing work with the Institute of Manufacturing (IfM) there.

Ceramicx took up its latest University Challenge in the middle of last year and HeatWorks magazine now follows the trail....

'To be the best you have to work with the best,' says Frank Wilson, Ceramicx founder and managing director, 'and Ceramicx is extremely happy to be reviewing its business and manufacturing processes within the Cambridge environment, and to be using such informed expertise and such powerful business strategy tools.'

“ To be the best you have to work with the best ”

The Ceramicx consultancy team at Cambridge is being led by Dr Derek Ford, Dr Nicky Athanassopoulou, and Dr Elli Verhulst and is part of the University's Institute of Manufacturing (IfM) Education and Consultancy Services (ECS).

The IfM ECS is there to disseminate the Institute for Manufacturing's (IfM) research and education outputs to industry and government through education, consultancy, events and publications. The IfM itself is a division of the University of Cambridge's Department of Engineering and is wholly owned by the University of Cambridge. It brings together expertise in management, economics



Dr Derek Ford,



Dr Nicky Athanassopoulou,



Dr Elli Verhulst

and technology to address the full spectrum of industrial issues.

The story began in July 2013 when the IfM ECS undertook a strategies development workshop with Ceramicx. This analysed the external environment in which Ceramicx operates, documented strengths and weaknesses and also addressed viable strategic options. As the next step IfM ECS organised an innovation workshop where key opportunities for the company were presented, prioritised and explored and firm action plans were also put in place to help the company to maintain its rapid growth.

Ceramicx and the IfM are now committing to ongoing work together through 2014 in order to consolidate the early gains and reach for further improvements.

Dr Cáthál Wilson of Ceramicx says that the IfM runs an extremely good process for any SME to put themselves through. Ceramicx as a company prides itself on a high degree of self awareness and self examination and yet the IfM team were able to open our eyes to a significant number of new opportunities - even oversights - that we hope now to turn into profit.'



The IfM work is in three key areas which, taken together, provide a unique perspective on the challenges facing manufacturers of all sizes, from start-ups to multinationals:



The University of Cambridge is rich in history - its famous Colleges and University buildings attract visitors from all over the world

•Management: Research themes include developing sustainable industrial practice, capturing value from innovation, optimising global operations networks and moving from product to service-based models. The IfM is also an international centre of excellence for road-mapping, a powerful technique for aligning business and technology objectives. Cáthál Wilson notes that 'just as businesses contain more than one product line; more than one competence so may a company be viewing more than one road map for the future. Horses for courses is the phrase that usually covers it.'

•Technology: The IfM is also a research hub; for example into inkjet and laser-based manufacturing process technologies, carbon nanomaterials, advanced information systems and automated identification technologies, all with a wide range of industrial applications.

•Policy: The IfM conducts applied research into programmes, processes and practices for translating publicly-funded R&D (in particular science and engineering research) into new technologies, industries and economic wealth. Education is also a big part of the remit - providing the next generation of manufacturing leaders with a thorough grounding in management and manufacturing technology, based on real industrial experience and communicating and applying IfM research to help organisations achieve their strategic goals.

The IfM's analytical tools benefit by being part of the University of Cambridge's Department of Engineering; one of the world's leading centres of engineering research and education.

To take up the Challenge...

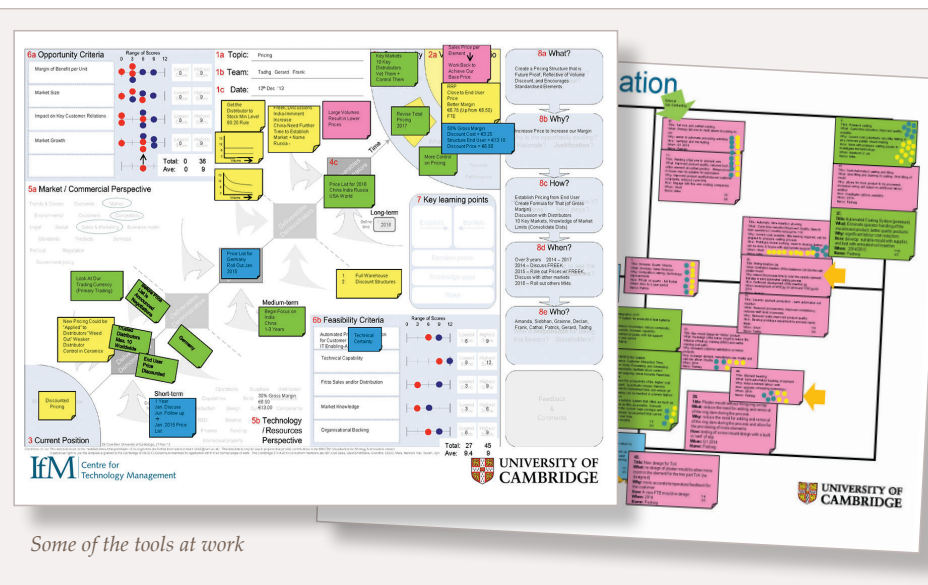
The IfM ECS is in business to support any manufacturing SME and any product or technology-based start-ups that want to grow. Simply apply directly to the Institute or browse the website in order to access the various IfM ECS services and programmes.

For a lucky few there is some support thanks to public funding: For example, the IfM currently enjoys a European Regional Development Fund (ERDF) program, called PrISMS that provides fully funded support for any manufacturing SME or product or technology-based start-up in the East of England, provided that the company meets the following criteria:

- Being an SME (small to medium enterprise)
- Based in the East of England
- Having ambition and ability to grow revenues and create jobs and
- Having potential for, and commitment to, reducing their resource and environmental impact.

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Some of the tools at work

Top tips for manufacturing SME's

HeatWorks magazine asked the Cambridge team for some pointers to success through 2014.

From their experience of working with smaller manufacturing companies, the IfM ECS team say it has become clear that only a small number of things really matter to the success of the business.

These are:

1. Focus on viable markets and products, and be clear how you are going to win orders.

2. Build your capabilities, such as quality, delivery and innovation to win and deliver orders successfully - and deliver a really distinctive customer proposition.

3. Manage carefully those factors that constrain business growth, such as demand, supply, cash, capacity and talent.

SME companies have little spare management resources, and this limits the number of improvement projects a firm can undertake. To identify where to make improvements, smaller firms need to understand their priority 'order winners' and business constraints.

Focusing efforts on the 'high priority-low performing' areas can deliver significant performance improvements. One advantage smaller companies often have (compared with larger businesses) is the agility to focus quickly on issues identified as critical. This can lead to dramatic improvements in revenues, revenue per employee and profitability.

Composites – a growing public profile

Members of the public are now becoming very familiar with composites thanks to their use in the aviation and high end automotive fields.

While their use is growing in these highly publicised areas, (the Boeing 787 contains over 50% advanced composites) a push is on for the deployment of rapid manufacturing techniques so as to integrate composites into mainstream manufacturing and away from the realm of the high end, high cost, specialist applications.

For instance, the BMW i3 urban vehicle will feature a high volume production passenger cell made entirely from carbon fibre reinforced plastic (CFRP). BMW states this is a first for a high volume vehicle. Of critical importance in this switch to high volume production are the processing methods. This is where the advantages of smart infrared (IR) heating can become a key processing aid to the composites producer.

Heat Work of the past

Traditional curing methods have relied heavily on the autoclave, especially for high quality or safety critical items such as aircraft wings. Inside the autoclave, high pressures are utilised to produce components free of voids or defects, and convective heating generally provides the thermal energy requirement for curing. However the autoclave can be large, expensive to purchase and run. Cycle times are also high. With an interest in moving away from large costly autoclaves, more composite processes are being re-examined for completion "out of autoclave"(OOA). As these methods are not in an enclosed chamber, conductive and convective methods of heat transfer are less suitable, and other forms of heating must be investigated. This is where the quick and directable advantages of IR heating comes into its own - smaller, lighter, controllable, cost effective, and also targeted on the precise area.



Fast medium wave modular heater
36 kW 1130 x 500 mm

The advantages of IR heat in industry

Firstly, IR heating is mobile, rapid and flexible. It can be easily adapted to intermediate steps in the composites manufacturing or curing process, as well as deliver major savings in energy and curing time. In one study (P. Kiran Kumar 2011), IR curing resulted in a cure time of 56 minutes as opposed to 236 minutes for a normal "thermal cure" in an oven. This is a saving of 75%. The study authors cited volumetric heating as a major factor in this fourfold increase, compared to a conventional heat which relied on thermal conduction through the epoxy and fibre matrix.

"...advantage of IR is that being a radiative source it requires no medium."

A further advantage of IR is that being a radiative source it requires no medium. IR should not be thought of as heat but as an electromagnetic wave which behaves similar to light. Therefore it can pass through

a vacuum. As the heating source is non-contact, contamination issues such as dust which may be a factor in convective heating are non-existent.

Infrared heating in the majority of cases does not require onerous safety requirements. At very short wavelengths, the intensity of the light may require goggles or screening.

When selecting an infrared emitter it is important to match the spectral absorption of the target material with the emitter. Many polymers absorb well in the mid to long wave regions. Although shortwave infrared heaters have the fastest heat up times, their high power density could lead to burning of the material surface. A lower power heater such as a ceramic or quartz heater may provide a more gentle, long wave heat thus allowing



Composite wing

time for penetration of the material to effect a thorough cure. The nature of the process also needs to be taken into account, whether it is a continuous or discrete process. Impurities such as dust or vapour also can hinder the absorption of infrared by the target material and provision may need to be made for its extraction or removal.

Summary advantages of IR heating

- Fast heat up and fast cool down times. Infrared can be switched on where and when it is required.
- High watt densities possible (subject to material limits)
- Higher production speeds
- Compact installations
- Low investment cost
- Adaptable and expandable
- May be the only option in some repair cases.
- Can penetrate into polymers giving a volumetric heating effect (as opposed to conductive and convective heating)

Applying IR heat in composite manufacturing

Radiant heat is of greatest benefit when used for the direct heating of a product. Infrared heating, for example, can be used in sheet forming of thermoplastic composites where a sheet of solid composite laminate is heated rapidly by infrared emitters and rapidly formed by pressing between two cooler tools which form the shaped mould. Such a process is associated with fast cycle times. For the three main types of heat curing resins used in composites (epoxy, phenol formaldehyde and urethane)

top of a former. A high watt density infrared lamp such as a quartz tube heats the area forward of the tape lay down. A precision robotically controlled head allows high repeatability and control. Several components on the Airbus A400M and A340 are produced in this way.

“.....it is important to match the spectral absorption of the target material with the emitter.”

The preheating of moulds can also be performed by IR heating. The surface of the mould may have to be treated in some cases to achieve a suitable reaction with the IR, resulting in fast surface heat up times.

Repair operations on damaged composite structures such as an airplane fuselage is another area in which infrared technologies are displacing conventional heating mats and conductive methods. For irregular shaped components, infrared lamps can be designed or used in conjunction with robotics to conform to the surface requiring the heat input. The repairs can be performed “in situ” and the curing apparatus is light, mobile, and doesn’t require contact with the repaired surface.

with certain fibres and polymer combinations. Infrared heaters are an ideal method of treating before pultrusion to flash off excess moisture.

An intermediate stage in the processing of composites is de-bulking. In this process, the composite lay up is carried out in stages before final curing. During these intermediates stages, vacuum and moderate heat can be applied to reduce problems such as wrinkling and void formation. Voids can cause interlaminar debonding by reduction the interlaminar shear strength, while regions of unsupported fibres can induce a local stress concentrations.

Putting it into practice

Many manufacturing sectors are increasingly realising that process heat issues need to be properly integrated into successful and cost effective projects from day one; even more so with matters of Infrared energy.

Ceramicx for one is seeing an increasing amount of business involving heatwork guidance and that consultative role; principally for its understanding of various IR heat types and their effect on target composite materials, also IR heat control systems and the surrounding architecture to reach a production solution that works. The company has lately been the only stop for a number of blue chip companies who could not find the solution elsewhere; from Automotive to Aviation industries and from smart phone producers to cutting-edge white goods producers.

Ceramicx is therefore ready and able to engage with those customers who are interested in ovens for composite curing. Much of the industry seems now ready for a tipping point that embraces process cost reduction; issues of energy and materials curing as well as temperature – in short an IR heat-based solution.

IR heat work involves more than new projects: The Ceramicx track record includes much work in retrofitting heating platens or oven mechanisms in older machines to enhance the heatwork and ensure that the energy being consumed is

“ as much as necessary but as little as possible ”

putting more profit in our customers back pocket.



Composite wind turbine blades awaiting installation

infrared heating can offer a faster heating time, reduce the oven length, and increase line speed when compared with traditional convective heating ovens.

Infrared also finds use in tape laying. In this process a “tape” of the raw material is heated and deposited on

Infrared heating also has a role to play in the drying of fibres. In pultrusion, for example, the fibres must be completely dry before the resin comes in contact with the polyurethane as excess water can cause blistering on the surface of the finished profile. Even moderate humidity levels can cause problems

Heat Work in Aluminium foil production

The Ceramicx applied engineering series of articles continues here in the shape of an interview with aluminium foil producer, Becromal



Becromal S.p.A. has manufacturing sites in Italy (HQ) and Iceland

Welcome to HeatWorks magazine. Perhaps we could start with some background on the Becromal business?

Becromal has over 50 years' worth of experience in producing aluminum foil for electrolytic capacitors. With our sophisticated etching and forming technologies, we are able to satisfy the most advanced foil requirements for automotive and industrial applications.

“ The combined length of all micro-tunnels etched into one square centimeter of foil is practically that of an aviation runway ”

Our special core type etching technology achieves the highest gains available in the market today. The combined length of all micro-tunnels etched into one square centimetre of foil is practically that of an aviation runway.

We are able to offer our customers the highest forming grades used for foils with high ripple current, low ESR (equivalent series resistance) and long life reliability, thus supporting the trend toward capacitor miniaturization.

At Becromal we design and construct our machine tools, incorporating our expertise in industrial foil and ground breaking research. We are therefore able to guarantee a higher performance of the foil from the beginning of the production process to the final quality control.

To meet top quality requirements, Becromal has been CECC certified and obtained the ISO 9001:2000 certifications in 2004 (Italy) and 9001:2008 in 2010 (Iceland).

We apply all the most important requirements of the ISO TS 16949:2002 which are regularly used in the APQP procedures, as well as FMEA, MSA, and SPC tools used in the automotive sector.

We are ISO 14001 certified, and our next step is the OHSAS 18001 certificate, to be obtained within 2014.

Describe if you can the opportunity that the Becromal engineers saw - to work with Ceramicx IR heating expertise.

We were looking for a cost-efficient way to replace the old resistance heating ovens that were previously used in the manufacturing of aluminum foil for electrolytic capacitors process. Ceramicx's products met our needs in terms of both price and quality.

Please describe the general role and importance of heat technology in the production at Becromal. What do you need to do and why?

The forming process is the last production step for the aluminum anode foils to be used in capacitors. It creates a thin and almost perfect oxide layer on top of the etched structure. Thermal treatment is used to remove defects in the oxide layer during the process, and to reorganize the aluminum oxide molecules into a more efficient and strengthened structure, which leads to improved overall electrical performance.

How did Becromal and Ceramicx get together on this particular project?

Ceramicx was originally contacted by engineers of our previous forming plant in Norway. Back then, Becromal Norway was looking for a new furnace to replace the first-generation ovens that were produced by our parent company in Italy. The Norwegian site tested some furnaces manufactured by Ceramicx and, after a very short trial period, realized that it was an affordable way to produce the homogeneous heat needed in the thermal process. In 2008, when designing the second-generation forming machine (3000B) for our new plant in Iceland, the Italian engineering team met with Frank Wilson and Tadhg Whooley of Ceramicx while in the design phase of the 3000B prototype. The prototype was fitted with Ceramicx furnaces made of zinc coated common steel. It was decided to construct the furnaces in stainless steel instead, with some other minor design requests. After an exchange of drawings between Becromal and Ceramicx, we got a definitive quotation for these furnaces. The first of the 3000B machine started production in the summer of 2009 in the Becromal Iceland plant.

What sort of opportunities were available for Becromal in working with Ceramicx IR heat expertise?

Becromal teamed up with Ceramicx when looking for solutions in the



Becromal plant in Iceland

thermal step of the forming process. When looking to upgrade from the resistance heating ovens, it was seen that Ceramicx infrared ovens allowed for a quick reaction to the foil and a more homogeneous displacement of heat, especially during the start-up phase of the production. The need for inexpensive replacement elements for old and outdated resistance heating ovens, and the need for a more homogeneous heating displacement were the main factors for choosing Ceramicx at this time.

HW. And what sort of performance was sought from the new IR heaters?

Several major factors were sought by Becromal in the infrared Ceramicx ovens: light weight of each unit, long life-time of the elements, and the overall cost of new units and replacement elements.

What sort of design criteria (new shapes - engineering etc.) were needed by to fulfil the project?

One very important design criteria that was needed to meet Becromal requirements was the orientation of the opening and the ability to stay open without any external parts. All of which were taken in consideration and implemented by the Ceramicx technical team, through feedback from us.

Please give us a flavour of the project timeline and critical path & how Ceramicx and the Becromal team worked together to achieve it?

After the initial trials on the newly constructed forming machines were successfully completed, Becromal retrofitted the old forming machines and the conclusion was quickly reached. The engineering teams of Becromal and Ceramicx had worked efficiently, proactively and with a results-oriented mindset prior to the first quotation being issued. After the first trial, the orders were placed quickly, and the retrofitting followed immediately after. This has been a successful partnership. The benefits have been reduction in replacement and maintenance costs, increased performance and reliability.

What next for the future with Ceramicx IR in Becromal production?

We have maintained a good standing relationship with the engineering department at Ceramicx. Based on this good collaboration we know that Ceramicx is a competent and reliable partner in the field of IR oven technologies and will play a role in the challenges to come.



Ceramicx ovens in process



Xu Shan, Ceramicx agent in China, is looking forward to helping once again represent Ceramicx at this year's Chinaplas exhibition in Shanghai, April 23-26, 2014.

Here he reflects on the history and recent growth of Ceramicx in China.

Ceramicx this year celebrates its 4th year of business relationship with Xu Shan, also known as Wei Wei, who graduated from Beijing University of Technology in 2004 with a Mechatronic Engineering bachelor degree and International Economics & Trade bachelor degree. After graduation, he was awarded the prestigious title of "Registered International Business Engineer of People's Republic of China", awarded by China's Ministry of Commerce in 2009.

Xu Shan's office and work is involved at the cutting edge of manufacturing growth in China; importing high-end spare parts to China and also exporting high quality Chinese made machines to Europe such as Germany, Austria, Poland, and Central Europe.

The relationship with Ceramicx was cemented when, with Xu Shan as his guide, Ceramicx founder Frank Wilson visited the Chinaplas 2010 exhibition in Shanghai. Both men visited many potential customers on this foundation

laying trip, building up a good base for future cooperation and business.

Xu Shan then recalls that 'in 2011 Frank and I met our good partner and friend Mr. Peter Li; a thorough going professional in China's growing heating industry. Together with Mr LI, we have now established an exclusive agent in Guangzhou China in order to introduce the high quality Ceramicx whole series IR heaters to the Chinese market.'

Since that time the name Ceramicx has become more and more familiar throughout Chinese industry. Besides the promotional and sales efforts from the China side, Ceramicx has also invested hugely in R&D and product improvements specifically for the Chinese market.

Xu Shan highlights three recent examples:

1. For FQE/HQE/SQE series of products, a ceramic flat bridge end has been added to both sides of the heater, thus increasing the heat dissipation and prolonging the service life of the heater. (see page 14-15)
2. SFEH series products feature newly

added fix tubes for power leads and T/CK leads. This has pre-empted any potential disturbance from moving leads.

3. Specially designed new ring terminations will be soon available for China with spot welding positions, thus increasing contacts with the wires and make the electrical signal more stable.

Xu Shan notes that 'I have to say, compared with many European producers I worked with before, Ceramicx Ireland is the most active and innovative producer I have ever seen.

In 2012 Ceramicx made its first exhibiting appearance in China at Chinaplas, beginning the detailed work of raising profile and reputation within the Chinese market. Xu Shan and Mr Li's team set to work and within one year Ceramicx sales were raised 150%

Today, long service life and high performance have been well established for Ceramicx IR heating products.

Xu Shan also notes that 'now Ceramicx also has the most advanced IR heat testing machine via "the Herschel". Chinese industry knows that this instrument can test the IR specifics of target materials as well as the performance of IR heaters.'

Xu Shan adds that 'now we have proof that Ceramicx IR heaters are at least as good as any other and also in some aspects even better. We believe that with these R&D tools Ceramicx will have faster developing speed for China both in products and in sales.'

In terms of recent manufacturing news in China, the words "Haze

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Peter (Pingqiang) Li, Frank Wilson and Xu Shan join forces on the Ceramicx stand at Chinaplas 2013 Guangzhou.



weather" are often seen. This is a pollution consequence of the rapid development of industries there. 'In the past, many industries use coal heavy oil and diesel oil for heating without completing any pollution discharge system. These have created a big burden on our environment.'

Accordingly the clear power of electronic and the most efficient heating way of high-end IR heater has become more and more popular in the Chinese market. For example, the Chinese sales teams have lately been successful in promoting Ceramicx products in the painting industry and in the glue curing industry which have huge demands in heat energy. 'In the second half year of 2013, we built 3 production lines for 3 painting companies and also two production lines for 2 plastic curing companies in Shandong province. These customers learned the big advantage of IR heat from the messages from our sales teams and also via IR heat testing data from Ceramicx products and experience. Consequently they made the decision to go forward with IR heating for their huge production lines.'

Throughout this coming year Ceramicx and its Chinese team will provide renewed support for the demands of machine builders for IR heat know-how and hardware; in the plastics sector (thermoforming machinery) and other manufacturing sectors.

'We shall input more knowledge and technical support in heating plans and drawings for customer, and will support customer in oven making and service of installation and adjustment. This will give our customers more efficient heating results, which will lower the production costs and will increase economic benefit,' says Xu Shan.

Chinaplas® 2014
国际橡塑展

23 - 26 April 2014. Shanghai New International Expo Centre, Shanghai, PR China.

PLASTINDIA 2015

05 - 10 February 2015.
Pragati Maidan, New Delhi, India

Elmec Heating and Ceramicx grow throughout India

Mumbai December 12th-16th was the place and time for Plastivision 2013, India's leading plastics exhibition, was the event that saw Ceramicx IR heating come further to the fore in India

Elmec Heaters and Appliances has been key to Ceramicx development across that continent.

The relationship began at the K 2010 exhibition in Düsseldorf. A succession of steady orders followed on and as Elmec has expanded its ambitions; product range and offices so has the spread of interest in Ceramicx IR heating.

Proprietor Mr. Sundar Sundarraj made the initial contact with Frank Wilson at the Düsseldorf exhibition. He recalls that 'my father started this business in 1973 and we have aimed for steady expansion ever since. Coming to the K show and working with Ceramicx was all part of that.'

Fast forward three years later and both companies had an effective presence at Plastivision India and are also planning joint activities for the next big plastics event in the Indian exhibition calendar, Plastindia, Feb 5-10, New Delhi.

Plastivision is one of the 10 largest plastics exhibitions organized globally and last December, the ninth such event played host to a total of 1500 exhibitors. Raju Desai, event chairman said on the eve of the show that 'the quantity of plastic which we consumed in the last 65 years is equal to the amount we will consume over the course of the next 6-7 years. We believe Plastivision will be the technology window for the Indian plastics industry.'

Mr. Sundar Sundarraj says that 'we enjoyed some very good enquiries indeed from the exhibition.' In recent weeks we also had some

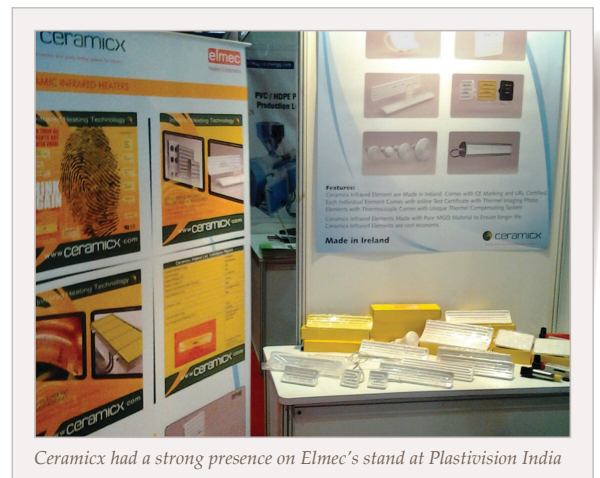
good orders not only from the plastics industries but from fields such as bio-medical, kitchen equipment and leather finishing industries.

Aside from its imports of Ceramicx IR heat technology Elmec designs and manufactures a number of other heaters for industrial purposes including hot runner nozzle heaters, micro coil heaters, hot runner controllers, temperature controllers and many others.

Elmec represents both the industrial and Comfort IR side of the Ceramicx business. 'One of our customers manufactures Hotel & Kitchen equipment, including Kebab making machines. For a change I recommended him to use our Infrared heaters. After a few days he came to me and said that he had found some special tastes by doing so. He is happy now with the idea given by me and he has started promoting his machine featuring Ceramicx IR heaters.'

Elmec Heaters will continue to expand through 2014.

Distributorships have recently been established in Bangalore, Mumbai, Delhi and Gujurat.



Ceramicx had a strong presence on Elmec's stand at Plastivision India

The proof of the pudding



Ceramicx Centre for Infrared Innovation

The new Ceramicx Centre for Infrared Innovation, C²I², has enjoyed a breathless start to life over the past three months. Operations Manager Dr Gerard McGranaghan picks out the highlights...

Unsurprisingly enough, our new Herschel instrument has been at the heart of everything at the new Centre since we began. We have been extremely busy since Day One with the bread and butter of the Centre remit; 3D IR heat mapping and testing.

The Herschel is a world-first, built in Ireland by Ceramicx and Trinity College Dublin and launched at the K 2013 plastics exhibition in Düsseldorf.

“ ...the purpose of science is to correct rumour, black arts and superstition... ”

If the purpose of science is to correct rumour, black arts and superstition then the world of infrared heating is an ideal place for the Herschel to start. Guesswork, rule of thumb and 2nd hand know-how have for too long been the yardsticks of this industry. The time is right for change and the Herschel instrument offers a scientific basis for that change.

Product performance testing

Our first task at the new Centre was to measure and to set the facts straight regarding comparative performance of IR heating products.

A number of manufacturer products were evaluated and a study programme was designed and selected. A Ceramicx component was compared and tested together with a number of competitor components from Europe and from the USA. The Centre also made use of the valuable research work conducted 2005-2010 by the University of Duisburg-Essen. We were aiming to produce an inclusive and comprehensive study, drawing upon all the known knows of the industry over the past ten years or so.

In a comparison of the warm up times, it was noted that variations in temperature can occur due to the various measurement methodologies used. However, despite these potential variations, the graphs indicate that steady state is achieved around the

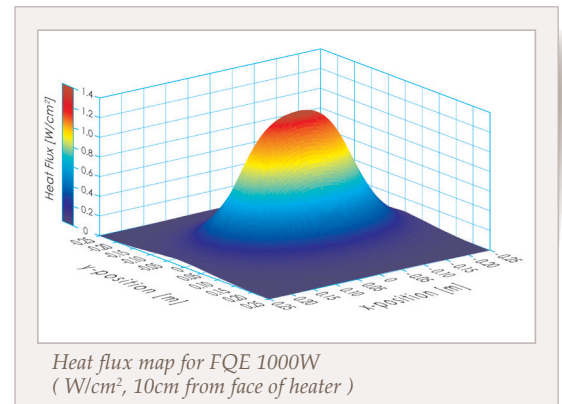
same time as the leading European competitor elements. Ceramicx warm-up times for elements are as fast if not faster than our competitors.

Our programme also involved 3D Heat flux mapping tests. In this automated system an infra-red sensor is robotically guided around a pre-determined coordinate grid system in front of the heater element under test. IR in the band 0.4-10 micrometres is measured. The incident radiant heat flux is saved and then post processed to give a 3D representation of the infra-red heat flux emission of that heating element. At present the measurement coordinate system is a 500mm cubic grid, however further coordinate systems are in development. This system not only allows visualisation of the complete infrared field, but also provides a mathematical measurement of the energy radiated from the heater surface.

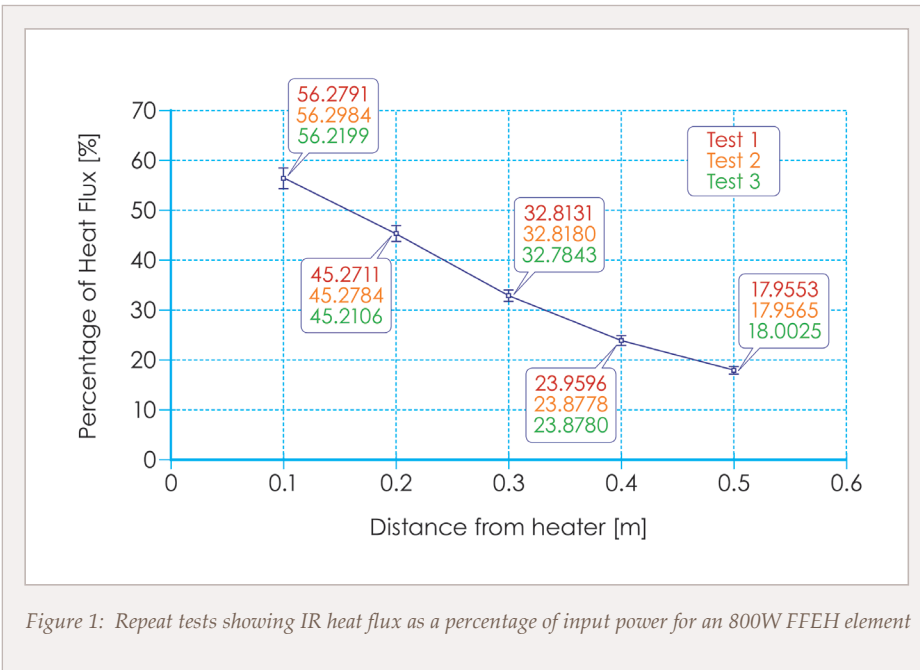


The Herschel 3D IR Imaging Machine

We are all extremely proud of its capabilities. It now gives Ceramicx an exceptional opportunity to lead the industry in the proveable and scientific-based methods for IR heating and IR heat design.



Tests were performed on Ceramicx heating elements with comparisons on competitor's elements. The range of elements tested were Square Flat Element Hollow (SFEH), Full Flat Element Hollow (FFEH), Full Quartz Element (FQE) and Full Trough Element (FTE). Differing body material was also compared in the case of the FQE elements, which can be ordered with stainless steel or aluminised steel bodies. In addition, some independent test results performed by Trinity College Dublin are also included.



- 3. Materials development
- 4. Repeatability of 3D Test Machine

Repeatability of the Herschel

A consideration arising from the recent testing of several elements was to verify the repeatability of the 3D mapping machine. This was ascertained by three repeated tests on a single element. The results are plotted in Figure 1. This figure shows that for the same test repeated three times on an 800W element, all three plots are virtually concurrent.

Figure 1: shows the percentage difference between each result, and it can be seen the maximum variation between results is 0.34% which is sufficiently small as to give a very high level of confidence in the repeatability of the 3D IR Mapping machine.

Integration of a new sensor into the Herschel robot arm.

A new sensor was also purchased to complement the abilities of the Herschel. This is a non-contact IR thermocouple with a spot size of 1.5mm diameter. This small spot size enables us to carry out a robotised scan of the ceramic element surface allowing determination of rib and trough temperatures. Correlation of the temperature profile of the emitter face along with the heat flux from each emitter will provide another step in completing the IR signature from our element family.

Our completed study offers what I believe to be a powerful affirmation in these matters; offering hard evidence data to our customers and distributors about the actual performance of Infrared heaters. Ceramicx products outperform some competitors by a consistent strong margin. Ceramicx are firmly in the league of leading producers and Ceramicx is also the only supplier to provide IR heat solutions across the three principal type of IR radiation; short, medium and long. Our company strategy and performance continues to develop along the right trajectory and I am happy to share the results of this work with enquirers on application.

Herschel at K 2013

After only a few weeks of beginning this testing programme at Ceramicx, the Herschel found its way back into its shipping crate en-route for the K-Show in Düsseldorf, Germany, the leading triennial plastics exhibition for the worldwide industry. At the K-show, the machine generated a lot of interest from new and existing customers especially in relation to the high tech nature of the measurements and the technical capability it offers Ceramicx and its customers.

The Herschel was extremely well received at the K show. Enquiries varied from the testing of arrays, continual product development, the heat testing of various polymers and other requests for project work, too many to mention. Three examples come to mind just now:

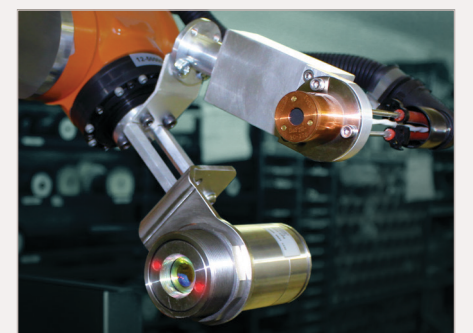
1. **On the thermoforming front** - An American thermoforming engineer for example wanted the Herschel, to give an optimal array spacing as against a given electrical wattage.
2. **On the materials front** - A materials provider was interested in how the Herschel could help them with the testing and thermal evaluation of their new materials.
3. **Lastly, in a more unusual application** - A designer of infant support systems (incubators) was interested in how the Herschel could assist him in complying with legislation regarding the maximum heat flux that the baby would be exposed to as per EU Safety regulations.

Ceramicx production benefits

A huge advantage for Ceramicx is that the Herschel can now evaluate and compare any proposed product change in relation to its earlier versions (see over the page for a worked example). The Centre has already tested ceramic elements in relation to precise positioning of the heater coil and also with regard to different surface finishes and treatments. These prototypes can now be swiftly evaluated for emitter performance issues before committing to production.

The Centre is helping Ceramicx with a testing programme that includes:

1. Test the most representative sample of Ceramicx product line
2. Test arrays to determine optimum spacing



New dual head since the K Show, heat flux and non-contact IR thermocouple.

Additionally, a high end thermoforming company has contacted us seeking to gain a more precise picture of the temperature field across small heater elements when used in arrays. We are currently carrying out these tests utilising the new non-contact thermocouple.

IR Training

Last but not least the Centre has been involved in devising a complete IR training syllabus; for distributors; suppliers, customers, associates and the world at large. This will become a major part of the online training programme launched with our partners in comfort heating "Green Energy" (featured elsewhere in this magazine).

The online syllabus will be available by the end of February and will be hosted on our webserver from February. The classroom training can be performed here at Ceramicx or at the customer's location. It be divided into comfort and industrial heating and will feature:

- Fundamentals of infrared,
- Types of emitter, materials, and infrared emitter selection
- Industrial processes using infrared
- Using infrared for comfort heating
- Sample calculations
- Control of infrared
- How the Herschel can help solve clients problems with unique solutions

In short, the Centre has enjoyed a very active first quarter. We look forward to bringing you a raft of new developments in HeatWorks Spring 2014 – and please do not hesitate to get in touch with Ceramicx in order to discuss any matter of your IR heat work needs. Nothing breeds success like success. And having the new Ceramicx Centre for Infrared Innovation (C²I²) right beside the Ceramicx production doorstep has opened several new doors. The result is an influx of ideas from the Ceramicx production team, many of which will develop into new componentry and new products.

'The beauty of our new Herschel test instrument,' says Dr Gerard McGranaghan, C²I² Operations Manager 'is that it gives us the instant ability to verify and back our hunches.

If, for example, we have a theory as to how Infrared energy might behave – in new product design; reflection or absorption – we can immediately test that theory with empirical testing on the Herschel machine. The Herschel's all seeing Infrared 'eye' tells us how the new idea or component will actually work in service. It's actually an indispensable aid for product innovation.'

Dr Gerard McGranaghan

Senior Development manager

Gerard.McGranaghan@ceramicx.com

Putting the cap on it

At Ceramicx a major new improvement was recently incorporated into the end cap of one of the quartz cassette ranges produced by the company.

The brand new component is now a one piece "flat bridge" that eliminates four other components per cassette end, thus a total reduction of 8 pieces per part.

Despite the proper performance of these components, further improvements were still sought at the end of last year in several areas as Ceramicx owner Frank Wilson saw an opportunity to penetrate a number of new markets with the technology.

The present component utilised fibre insulation matting, which could sometimes be of concern in medical or food applications due to possible contamination via loose fibre migration. Eliminating the fibre issue would thus open up opportunities for users manufacturing to FDA guidelines or similar. The product redesign also offered an opportunity to consolidate the bill of materials for the part.

A taskforce was assembled and the improvements were spearheaded by Ceramicx Production Manager, Patrick Wilson. Regular and quality collaboration between various

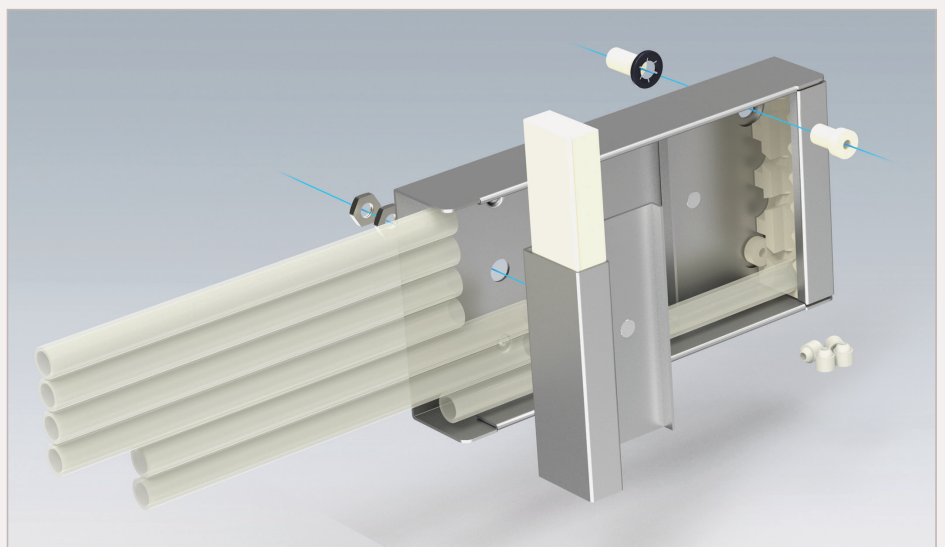
Ceramicx departments - Quartz Production, Engineering, and Management - helped obtain a winning result.

The old construction involved using five separate pieces,

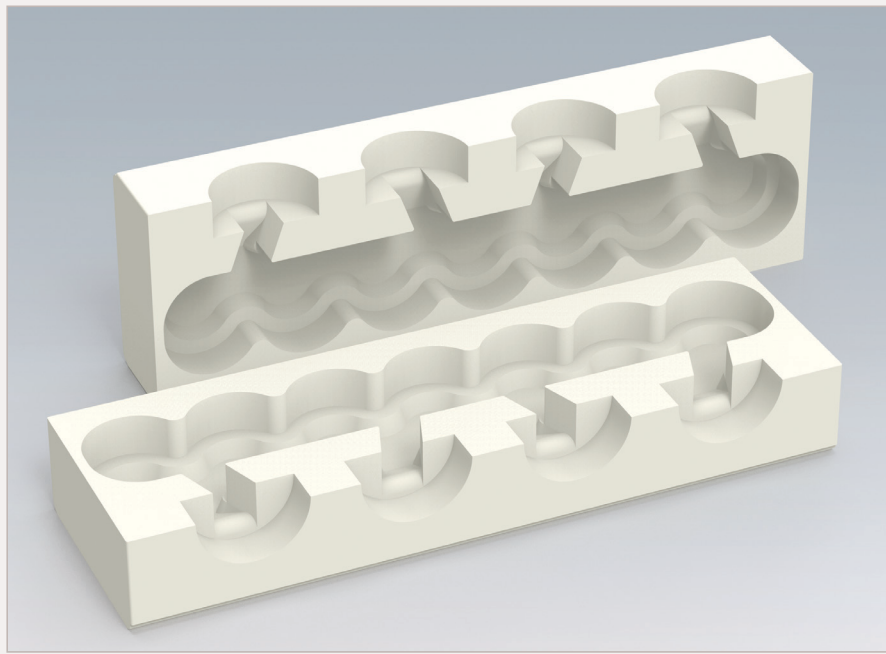
Flat ceramic insert, Bridge, Bridge holder, Rivet and Insulation wool.

These five pieces have now been integrated into one new ceramic component. The one piece part was envisaged by Frank Wilson and Marcin Milczarczyk, Engineering Manager. A steatite dust pressed component was identified as a possible vehicle for the entire application. Not only would the new part have to fit in the existing cassette with minimal redesign, it would also have to fulfil the demands of wiring, tube location, tube security, thermal insulation, and electrical insulation.

The new dust press production capacity was identified as an ideal way to manufacture and supply the part; falling into line with the supply of dust press parts for various other components throughout the Ceramicx business.



Ceramicx HQE, half quartz element components (resistance wire excluded)



The new dust pressed steatite flat bridge developed and manufactured by Ceramicx for quartz cassette production.

Ceramicx Engineering Manager Marcin Milczarczyk worked on the new design and created several prototypes for the new end cap. Initially a general mock-up design was dust pressed on prototyped tooling, and modifications such as removal of material, or creating wiring cut outs were performed after pressing, but before firing while the component was still "green".

This procedure enabled a low cost evaluation of several designs. In addition, problem areas could be highlighted as changes in component features or material removal can cause shrinkage and warping during firing. In this way, a general shape of the new component could be made at low cost with minimal investment in expensive tooling.

Each one of these prototypes was evaluated by Patrick Wilson in consultation with staff in the quartz assembly area. After final selection of a suitable design, the completed proposal was presented by Patrick to management staff for discussion, modification and then production trialling.

The selected component was then declared fit for evaluation in the new Herschel test facility. Says Dr Gerard, 'compared to the creativity and hard work shown at the head of the project the contribution of the Herschel to the whole project was relatively slight. However, its input was essential: Via Herschel we were able to directly measure and compare the actual performance in situ of the new

cassette construction against the old cassette construction.

Dr Gerard says that 'once it was confirmed that this new modification did not affect performance - the road was clear for introduction.'

The new dust press tooling was then ordered and production began as soon as it was delivered. In November 2013, the new component was introduced and Ceramicx began shipping out the new design to customers.

In summary the new steatite part

1. Eliminates the possibility of loose fibre migration
2. Reduced the Bill of Materials, one new component replaces five components.
3. May be considered more suitable for medical and food uses
4. Performs to equivalent high standards of replaced components
5. Simplifies assembly work
6. Is aesthetically improved
7. Capitalises on the 2013 investment in dust press technology

Frank Wilson, Ceramicx founder and director notes that 'this part, while small, in many ways represents what we do best at Ceramicx, namely identify and deliver a great solution that has benefit of all disciplines such as engineering, production, research and development, and marketing.

Wilson adds that 'as well as opening up new markets such as medical and food, we hope that the redesign gives yet more service and value to all our distributors and customers; highlighting that Ceramicx competes against the best on the world stage of infrared heat know-how and technology.

Heating our world

Tony Robinson's Top Tips for 2014 -16

1. Thermoelectric power generation:

The physicists and material scientists are very busy working on new materials that can convert heat directly to electricity with higher conversion efficiencies than is afforded by current Bismuth-Telluride, the material of choice for the past half century. When conversion efficiencies approaching 10% are achieved, the solar and heat recovery markets will explode.

2. Thermal storage:

Storing off-peak electrical energy as heat simply makes sense. However, our current methods of doing this i.e. water thermal stores and electrical storage heaters, are just too low-tech. I am seeing a lot of traffic about new thermal storage concepts (phase change materials, reversible chemical reactions etc.) that have the potential to give a lot more bang for buck.

3. Insulation: Again, the physicists have been busy but here looking at new ways of 'blocking' heat. Now that they are exploring materials at the nano-scale, technologies that take advantage of core thermal energy transport physics, such as phonon-scattering, are being developed. This has the potential to decrease the effective thermal conductivity of insulating materials to below that of air, which is basically the lower limit of almost all insulating materials.

Taking the temperature

Teaching, Researching, Consulting, Engineering, Project Management, Machine Building, Overseas Volunteering..... it's all in a day's work for

Dr Tony Robinson, Ceramicx associate and lecturer at Trinity College Dublin.



Frank Wilson, Amanda Murphy and Tony Robinson at the KShow 2013

HeatWorks magazine caught up once again with Dr Tony in the aftermath of the K 2013 exhibition, during which he played a leading role in explaining the art and science of IR heat technology to an industrial audience.

Hello again Tony. How did you find the big plastics exhibition in Düsseldorf?

The K2013 exhibition was quite extraordinary. It was like nothing I have ever experienced before: overwhelming in fact. Being a mechanical engineer it was like a technology playground: robots, massive machines, scientific equipment...everything you could think of was on display and for sale.

“ It seemed like there was always someone gawking at it, trying to figure out how it did what it did. ”

When I reached the Ceramicx-Freek stand I was immediately put to work: Our Herschel innovation was perfectly located there and quite an attention-getter. It seemed like there was always someone gawking at it, trying to figure out how it did what it did.

This is where we would step in and explain Herschel. The K 2013 show was a perfect venue to really show how academic research can be very relevant to industry, which I think is something that needs to be expressed more in the world today and we have some great opportunities in Ireland to do so. If you get the right team together and you give us the right project, we can and will deliver something that has a direct line of sight towards making money for companies.

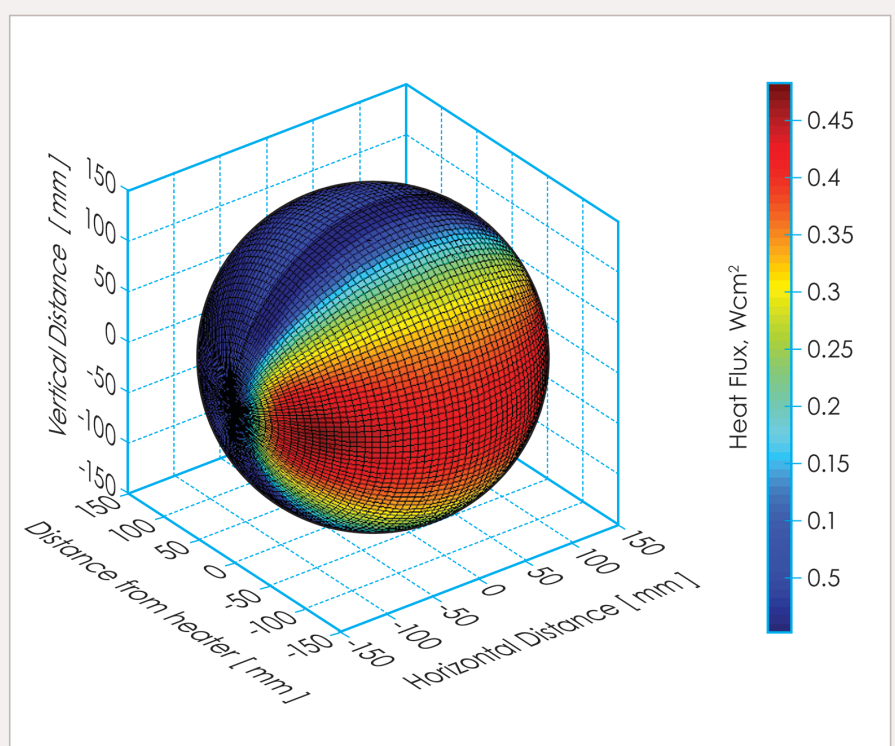
Looking back to earlier in the year how was your experience in building and project managing the Herschel instrument?

The Trinity engineering team worked some long days and managed to deliver Herschel to Ceramicx on time and fully functional. Herschel is a scientific tool for characterizing the infrared heat flux spatial distribution in three dimensional space. It utilizes a robotic arm, linear stages, control and acquisition software and infrared heat flux sensors to map the heat flux distribution. It is an extremely sophisticated piece of machinery and is the only one of its kind in the world and we at Trinity are very proud of

it. The feedback from Ceramicx has been extremely positive – and that tells us that we have done our job well. Herschel was boxed and shipped to Düsseldorf Germany in very good time for the K2013 exhibition.

We've reported a little previously on your heat work consultancy, Confluence. It seems to us that industry is picking up more and more on the need for detailed and accurate heat solutions in manufacturing. How has Confluence been faring?

Confluent Research, the heat transfer consultancy of which I am the director, was very busy over the past 10 months since we first opened for business. We have done projects for a broad range



Spherical heat flux map around an IR heater



Trinity College, Dublin, front square

Dr. Tony Robinson with some locals during his recent visit to Malawi



of industries ranging from automotive to telecoms, with a centre of gravity very much towards the latter.

Our clients have ranged from multinationals to small tech start-ups. It has been really engaging and we are very happy with our company's success at such an early stage. However, and from our interactions with such a diverse cross-section of industry, it has become quite apparent that thermal design is not being performed anywhere near the level of sophistication that it can and should be.

“ thermal design is not being performed anywhere near the level of sophistication that it can and should be. ”

Indeed in almost every case the thermal design is almost an afterthought and is then being done by electrical or manufacturing engineers, and this is the principal reason why they are then getting into trouble.

I think as word gets out that there are heat transfer experts for hire who will cost less than trying to do it yourself and get the job done right, we will see a continuing escalation of thermal problems that industry will want us to solve.

We know that you maintain a busy teaching schedule at Trinity College Dublin (TCD) to both graduates and undergraduates and that TCD continues to be a nexus for research funding for heat transfer work. What news here?

My research team have secured funding from Irish Aid in order to continue the Energy for Sustainable work that we have been performing for the past few years in the developing world. We are developing an ultra-low cost technology that generates electricity from cooking stoves, providing lighting and phone charging in rural Malawi, one of the world's least developed countries.

The technology works by generating electricity from the heat of efficient biomass cook stoves. Approximately 2.5 billion people living in the developing world burn biomass as a primary energy source. Over half of those who burn biomass lack access to grid electricity and large numbers have no access to night time lighting, often resulting in complete darkness once the last cooking fire goes out. The technology that my team is developing has recently been field tested with very positive results and the focus of the next phase is to figure out how to build hundreds of thousands of them.

Thank you again for your time Tony – good luck for 2014!

Confluent Research

info@confluent-research.com
www.confluent-research.com

Dr. Tony Robinson. arobins@tcd.ie
Trinity College Dublin, College Green, Dublin 2.

ENTERPRISE IRELAND

The unique Herschel project and its launch at the triennial K 2013 plastics exhibition in Düsseldorf Germany was made possible through Enterprise Ireland's Innovation Partnership Programme.

Enterprise Ireland Programme Manager Tom Bannon explained why the agency supported the project:

“ The Innovation Partnership programme seeks to support Irish companies and academic groups who want to collaborate and develop innovative, world-beating products and services. It was clear from the start that Trinity College and Ceramicx had designed a project to develop technology that would place Ceramicx right at the leading edge of their industry, far beyond many of their larger and more established foreign competitors. The tool in development will enable Ceramicx to offer unique and high value IR services to some of the worlds most iconic manufacturing companies. The company already had a strong track record of delivering on all of its stated ambitions in the fields of product quality, client service and innovation. Consequently, Enterprise Ireland was delighted to offer its formal support. ”

Already the new instrument has proved us right; earning much more than its keep, and with a 2nd generation build already in the wings.

Export-orientated manufacturing success of this kind is just what Ireland's economy needs right now. We look forward to further such projects generally, including more from the successful Ceramicx/TCD team.



Tom Bannon, PhD.

Senior ICT Commercialisation Specialist
Research & Innovation Business Team
Enterprise Ireland



Jonathan Howard, Commercial Director and Michael Howard – Managing Director Green Energy

New Partners in Green Energy!

HeatWorks magazine is pleased to extend a very warm welcome to Green Energy (eu); Ceramicx's new UK partner in Comfort IR heating and in all matters of IR heating promotion and training.

Green Energy (eu) claims UK leadership in the Infrared Comfort heating market and has risen to prominence there because of its deep product knowledge, customer service, training and commitment to quality.

Created in 2008, Green Energy (eu) serves trade, commercial and domestic customers with an extensive web presence and with a network of dealerships and trade outlets.

Green Energy (eu)'s portfolio also includes Energy Control Systems, a Solar PV capability and other energy-saving systems together with a company operation in Scandinavia.

Green Energy first came to Ceramicx in 2013 with a particular problem they felt only Ceramicx could solve, namely a sudden hiatus in the reliable supply of quality zone or IR heating for various UK markets.

With expertise growing in commercial heating using FIR and a number of projects already in full flight, this gave Green Energy a problem which they turned to Ceramicx to help solve.

Green Energy (eu) then needed a quality supplier of zone-heating appliances to fit their diverse market in heating hard to treat areas and zoned heating. They readily identified Ceramicx as world leading manufactures in wide-sized range of FIR ceramic elements suitable for the applications they were looking at, as well as having a range of short-wave and middle-wave heaters where FIR was not suitable.

Jonathan Howard, Commercial Director at Green Energy (eu) recalls that 'the Ceramicx Comfort IR range was perfect for many projects we were already installing. In addition,

the Comfort IR was more suitable for these applications compared to the FIR heater we had used previously. Ceramicx basically gave us additional flexibility to expand our market into areas where we saw customer demand, but no suitable panel at the time.'

The wide range of Ceramicx Comfort IR heaters therefore opened up further market opportunities that Green Energy hadn't previously been able to consider. Every door subsequently knocked upon now seems to be an open one.

'The message is going out that Green Energy (eu) is a solution provider, not just a heating supplier', says Michael Howard, Managing Director of Green Energy (eu). 'Infrared heating puts us ahead of the game, especially with regard to existing and legacy heating and ventilation technologies and how they fail to solve problems.;

The company has already performed successful Comfort installs for companies such as Mitie, Essex County Council, Brookvex, Enterprise Inns, automotive MOT bays and also Siniat – the European Leader in Plasterboard.

As a consequence Ceramicx Comfort IR products are now available right across the UK via Green Energy's relationship with City Electrical Factors who have approximately 400 branches across the UK.

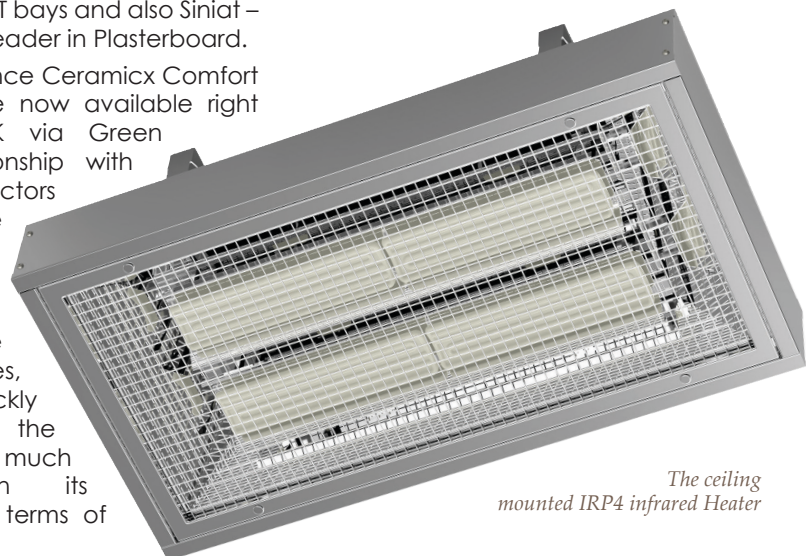
Building on these early successes, Ceramicx quickly developed the IRP4 product much improved on its predecessor in terms of

reliability, performance and price. IRP4 launched in late summer and is now selling well into the current winter market. This is already proving very popular for scenarios requiring larger industrial areas to be heated.

The two companies also identified considerable synergy in other areas of development – a key area being training where they have undertaken a joint venture (see following page)

'The joint future is bright for both our companies,' notes Frank Wilson, Ceramicx founder and managing director. 'Green Energy (eu) has fantastic market reach and contacts and is now able to integrate with us in order to design and build almost any cost-effective IR heating solution.'

Michael Howard – Managing Director of Green Energy (eu) agrees, noting that 'Ceramicx is a pleasure to work with: always available to discuss large commercial projects where their experience is invaluable, especially when we are pioneering new areas where there has been no solution before.'



The ceiling mounted IRP4 infrared Heater

Understanding IR Heating....

World-class training - available now!

Green Energy (eu) and Ceramicx have launched a much needed IR heating training portal. The move has come as many distributors continue to clamour for product training and know-how in the field of IR heat education.

“....too many players in the Comfort Market - fail to recognise the need for training...”

Richard Martin, marketing & training manager for Green Energy (eu). Say that “there were – and still are – too many players in the Comfort Market who either fail to recognise the need for training at all (“Its as easy as hanging a picture” – Not!) or who consider it only as a vehicle to enable “double-glazing sales tactics.



Richard Martin - Green Energy

Nobody to date in the Comfort IR market has established an academically accurate body of knowledge,’ adds Martin. ‘And given the amount of myth and hype out there about this technology – somebody just had to!’;

Martin says that ‘we already had a considerable amount of in-house material but we were struggling with roll-out: driving up and down parts of the country to deliver to a handful of people, who were always coming back with more people to train, or hunger for the latest updates. The “physical” delivery model was untenable. We

really had to go the online route and we set about creating the service in early 2013 - just at the time that the relationship with Ceramicx was blossoming. It made sense for both of us to collaborate on delivering this service – one that would also provide a form of accreditation training; giving structure and leadership to the market and setting our distributors and users apart from the White Van Man.’

We are now in the closing stages of establishing our online IR heat training portal. The work started in early November and is on track to deliver in Mid February 2014. On the first release, customers of both companies will receive the Infrared “Comfort” training served under each company’s distinct brands. Ceramicx are writing an “Industrial” Infrared course due for delivery at the same time.

Ceramicx customers will be able to access this training at ;

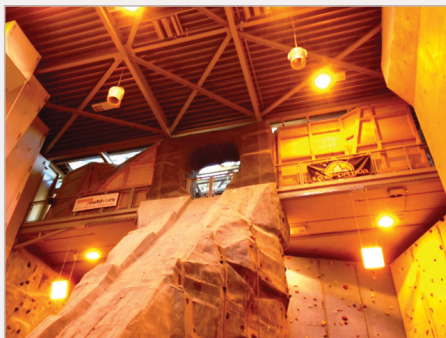
www.ceramicxinfraredtraining.com

and Green Energy (eu) will publicise its availability widely.

Martin says that ‘both companies believe that this training offering will quickly become a World-leader for the Infrared Market in a very short time.’

Richard Martin. Head of Marketing, GREEN ENERGY-EU

rjm@greenenergy-eu.com
www.greenenergy-eu.com



“ an impossible to heat situation that was solved by the use of Ceramicx products ”

IR HEAT HELPS *get a grip!*

This is a ground-up climber’s view photo of the Harlow Climbing Wall.

It provides a great example of an “impossible to heat” situation that was solved by use of Ceramicx products (Fast IR) and Green Energy (eu) solutions delivery. Prior to the work it was known as a “cold” wall and consequently suffered from condensation problems.

And because of the cold, and the damp, climbers were avoiding it. The leisure centre was set to lose considerable potential income each year and also, because of the damp, the metal fittings were not meeting their expected lifespan.

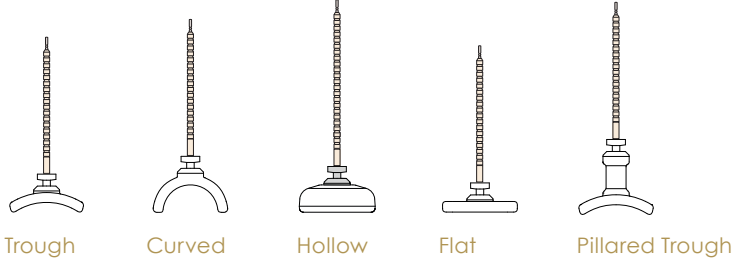
The facilities management approached Green Energy (eu) because of its known Infrared Expertise in “Impossible to Heat” situations.

Green Energy (eu) then collaborated with Ceramicx in order to determine project feasibility and the best products to use. This resulted in the specification of a bespoke FAST IR installation together with an air-extraction facility in order to remove the evaporated damp/

The installation was commissioned just before Christmas 2013 and early indications from the client are that they more than are delighted with the results.



CERAMIC ELEMENTS



Trough

Curved

Hollow

Flat

Pillared Trough

CERAMIC TROUGH ELEMENTS

www.ceramicx.com/trough-elements/



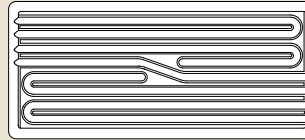
FTE / FTE-LN



HTE



QTE / QCE



LFTE

FTEL - LN

FTE Full Trough Element	245 x 60 mm	150W 250W 300W 400W 500W 650W 750W 800W 1000W
HTE Half Trough Element	122 x 60 mm	125W 150W 200W 250W 325W 400W 500W
QTE Quarter Trough Element	60 x 60 mm	125W 250W
QCE Quarter Curved Element	60 x 55 mm	150W 250W
LFTE Large Full Trough Element	245 x 110 mm	1000W 1500W
FTE-LN Full Trough Element -Long Neck	245 x 60 mm	250W 400W 500W 650W
FTEL-LN Full Trough Element Long - Long Neck	285 x 60 mm	1000W

CERAMIC HOLLOW ELEMENTS

www.ceramicx.com/hollow-elements/



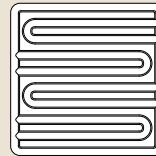
FFEH



HFEH



QFEH



SFEH

FFEH Full Flat Element Hollow	245 x 60 mm	250W 400W 500W 600W 800W
HFEH Half Flat Element Hollow	122 x 60 mm	125W 200W 250W 300W 400W
QFEH Quarter Flat Element Hollow	60 x 60 mm	125W 200W
SFEH Square Flat Element Hollow	122 x 122 mm	250W 400W 500W 600W 800W

CERAMIC FLAT ELEMENTS

www.ceramicx.com/flat-elements/



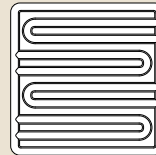
FFE



HFE



QFE



SFSE

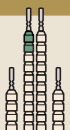


LFFE

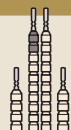
FFE Full Flat Element	245 x 60 mm	150W 250W 300W 400W 500W 650W 750W 1000W
HFE Half Flat Element	122 x 60 mm	125W 150W 200W 250W 325W 500W
QFE Quarter Flat Element	60 x 60 mm	125W 250W
SFSE Square Flat Solid Element	122 x 122 mm	150W 250W 300W 400W 500W 650W 750W
LFFE Large Full Flat Element	245 x 95 mm	150W 350W 750W 1400W

THERMOCOUPLES

www.ceramicx.com/thermocouples/



Thermocouple Type K
+ Nickel Chromium
- Nickel Aluminium



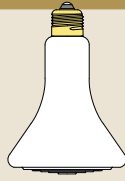
Thermocouple Type J
+ Iron
- Copper Nickel



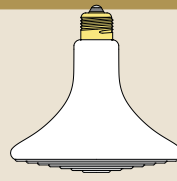
ESEB



ESES



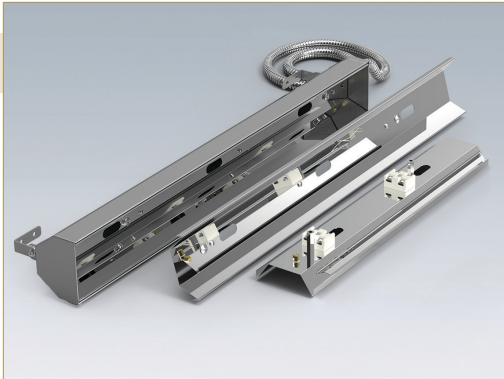
ESER



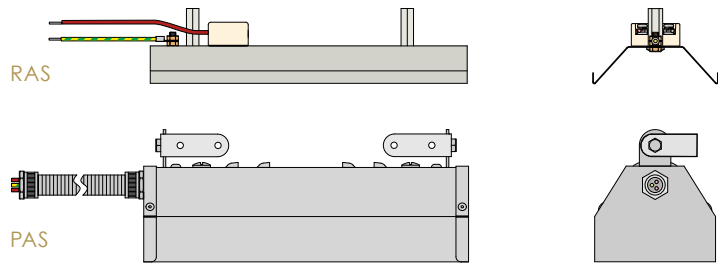
ESEXL

- ESEB** Edison Screw Element Ball
- ESES** Edison Screw Element Small
- ESER** Edison Screw Element Regular
- ESEXL** Edison Screw Element Extra Large

Ø65 x 140 mm	60W 100W
Ø80 x 110 mm	100W
Ø95 x 140 mm	150W 250W
Ø140 x 137 mm	400W

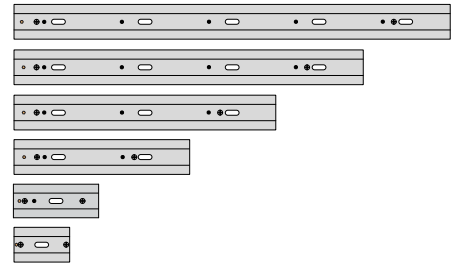


REFLECTORS / PROJECTORS



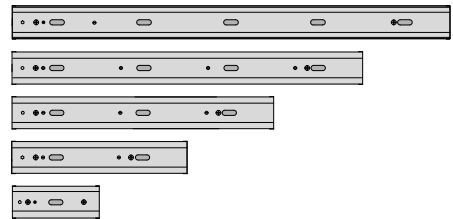
REFLECTORS

- RAS 5** Reflector Aluminised Steel 5 1,254 x 100 mm
- RAS 4** Reflector Aluminised Steel 4 1,004 x 100 mm
- RAS 3** Reflector Aluminised Steel 3 754 x 100 mm
- RAS 2** Reflector Aluminised Steel 2 505 x 100 mm
- RAS 1** Reflector Aluminised Steel 1 254 x 100 mm
- RAS 0.5** Reflector Aluminised Steel 0.5 160 x 100 mm

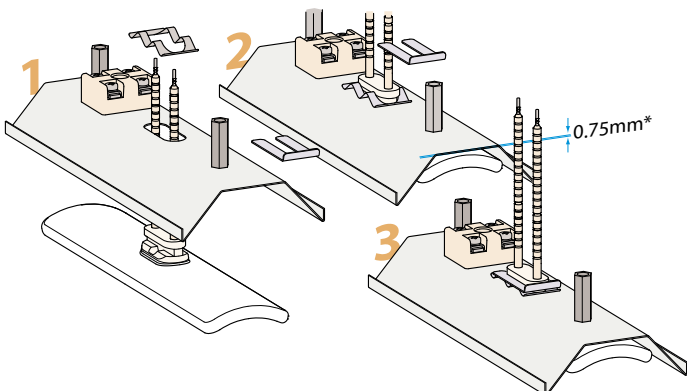


PROJECTORS

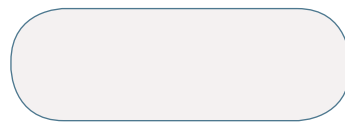
- PAS 5** Projector Aluminised Steel 5 1,258 x 94 mm
- PAS 4** Projector Aluminised Steel 4 1,008 x 94 mm
- PAS 3** Projector Aluminised Steel 3 758 x 94 mm
- PAS 2** Projector Aluminised Steel 2 508 x 94 mm
- PAS 1** Projector Aluminised Steel 1 258 x 94 mm



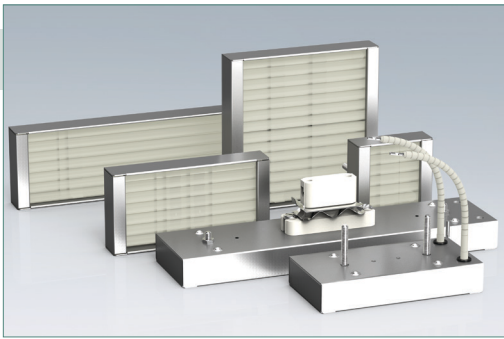
INSTALLATION OF PILLARED ELEMENTS



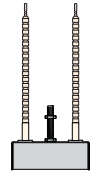
Recommended reflector thickness 0.75 - 0.9mm
(minimum/maximum thickness 0.5 - 1.5 mm)



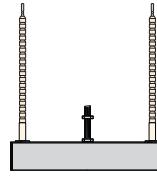
Slot hole size 42 x 15 mm



QUARTZ ELEMENTS



Standard



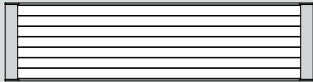
Square



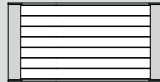
Pillar

STANDARD QUARTZ ELEMENTS

www.ceramicx.com/standard-quartz-element/



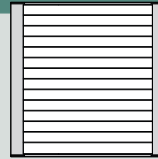
FQE



HQE



QQE

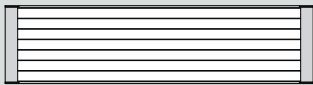


SQE

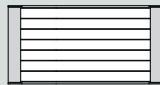
FQE Full Quartz Elements	247 x 62.5 mm	150W 250W 400W 500W 650W 750W 1,000W
HQE Half Quartz Element	124 x 62.5 mm	150W 250W 400W 500W
QQE Quarter Quartz Elements	62.5 x 62.5 mm	150W 250W
SQE Square Quartz Element	124 x 124 mm	150W 650W 1,000W

PILLARED QUARTZ ELEMENTS

www.ceramicx.com/pillared-quartz-elements/



PFQE

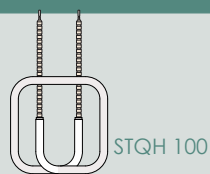


PHQE

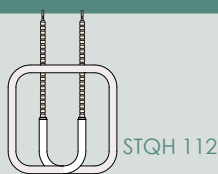
PFQE Pillared Full Quartz Elements	247 x 62.5 mm	150W 250W 400W 500W 650W 750W 1,000W
PHQE Pillared Half Quartz Element	124 x 62.5 mm	150W 250W 400W 500W

SQUARE QUARTZ TUBE ELEMENTS

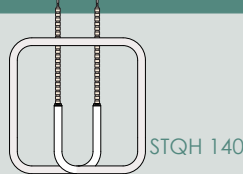
www.ceramicx.com/quartz-square-tube-elements/



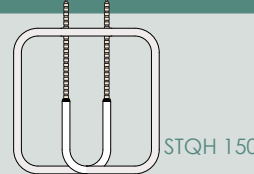
STQH 100



STQH 112

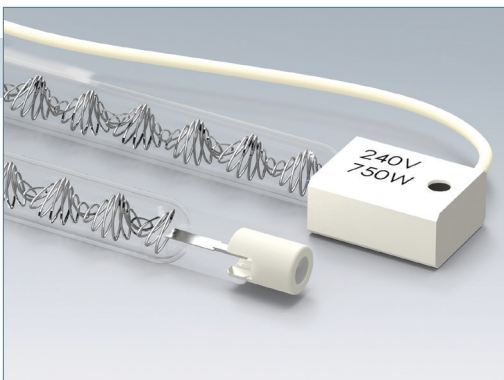


STQH 140

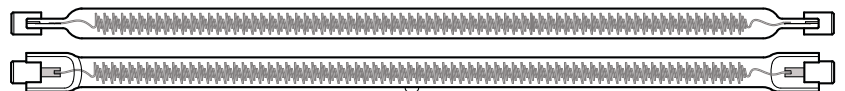


STQH 150

STQH100 Square Tube Quartz Heater	100 x 100 mm	150W - 400W
STQH112 Square Tube Quartz Heater	112 x 112 mm	150W - 400W
STQH140 Square Tube Quartz Heater	140 x 140 mm	150W - 650W
STQH150 Square Tube Quartz Heater	150 x 150 mm	150W - 650W



QUARTZ TUNGSTEN / HALOGEN



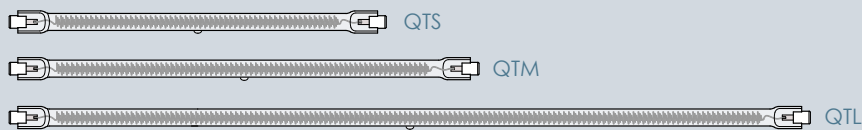
Quartz Tungsten



Quartz Halogen

QUARTZ TUNGSTEN TUBES

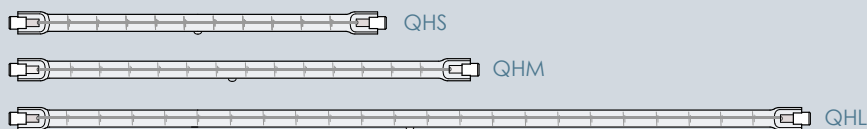
www.ceramicx.com/fast-medium-wave-emitters/



QTS Quartz Tungsten Short	Ø10 x 244 mm	750W
QTM Quartz Tungsten Medium	Ø10 x 277 mm	1000W
QTL Quartz Tungsten Long	Ø10 x 473 mm	1500W 1750W 2000W

QUARTZ HALOGEN TUBES

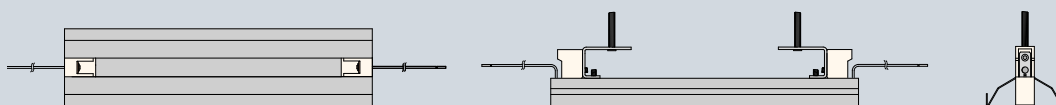
www.ceramicx.com/short-wave-emitters/



QHS Quartz Halogen Short	Ø10 x 244 mm	750W
QHM Quartz Halogen Medium	Ø10 x 277 mm	1000W
QHL Quartz Halogen Long	Ø10 x 473 mm	1500W 1750W 2000W

QUARTZ TUNGSTEN/HALOGEN REFLECTORS

www.ceramicx.com/reflectors/

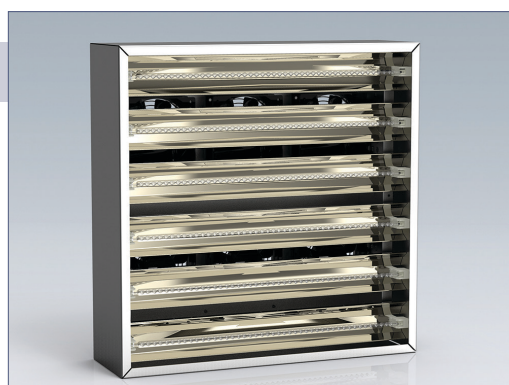


QTSR Quartz Tungsten/Halogen Short Reflector	250 x 62 mm	(Suitable for QTS/QHS, Tubes supplied separately)
QTMR Quartz Tungsten/Halogen Medium Reflector	300 x 62 mm	(Suitable for QTM/QHM, Tubes supplied separately)
QTLR Quartz Tungsten/Halogen Long Reflector	497 x 62 mm	(Suitable for QTL/QHL, Tubes supplied separately)

SPECIAL TUBE ORDERS

www.ceramicx.com/special-tube-orders/

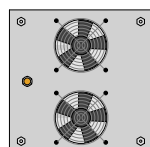
Ceramicx can supply other types of Halogen/ Tungsten elements, of varying design, dimensions, length, coatings, terminations and electrical rating.



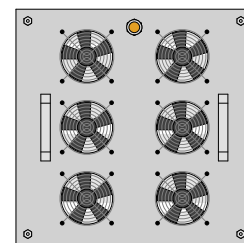
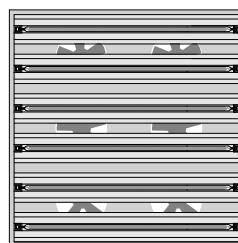
FAST IR



FastIR 305



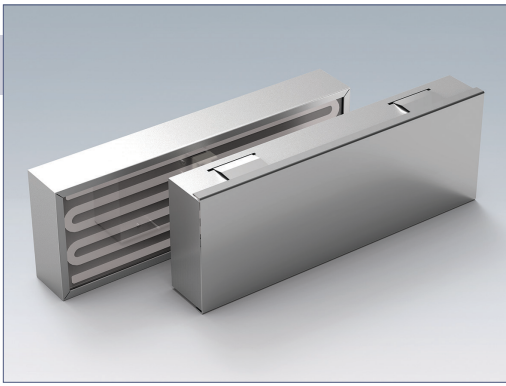
FastIR 500



FAST IR

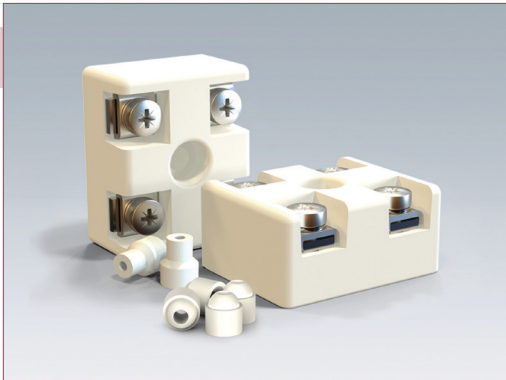
www.ceramicx.com/fastir-systems/

FastIR 305 Suitable for 1000W Quartz Tungsten/Halogen Heaters QTM/QTH (tubes sold separately)	305 x 305 x 150 mm	4 Tube 4kW	5 Tube 5kW
FastIR 500 Suitable for 2000W Quartz Tungsten/Halogen Heaters QTL/QTH (tubes sold separately)	500 x 500 x 150 mm	6 Tube 12kW	7 Tube 14kW



CUSTOM PANEL HEATERS

Custom Panel Heaters.
Available with anodised aluminium or ceramic glass face.
Range of Wattages and Voltages.
Multi-zone options with removable miniature thermocouple plug.



STEATITE

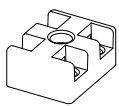
Steatite ceramic dust has proven itself to be the material-of-choice for the manufacture of electrical insulators. It has good mechanical strength with good dielectric properties and a high temperature resistivity of up to 1000°C.

Steatite is most commonly used in applications where a high temperature electrical insulator is required. It operates very well in cold switching applications and is also an excellent high voltage insulator.

STANDARD STEATITE COMPONENTS

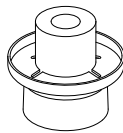
www.ceramicx.com/steatite-press-components/

2P Ceramic Terminal Block



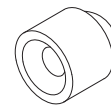
10 Pack
no Fittings
40 x 32 x 20 mm

Ceramic Grommet and Starlock



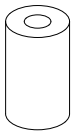
Fastener Set 100 sets
per pack - used as an
Insulator in sheet metal
with 6mm hole
21 x 18 x 15 mm

Ceramic Beads



per kg
Loose or Strung
Ø5 x 6 mm
4.5 mm to shoulder

Ceramic Tubes



Ø5 x 11 mm

SPECIALISED STEATITE COMPONENTS

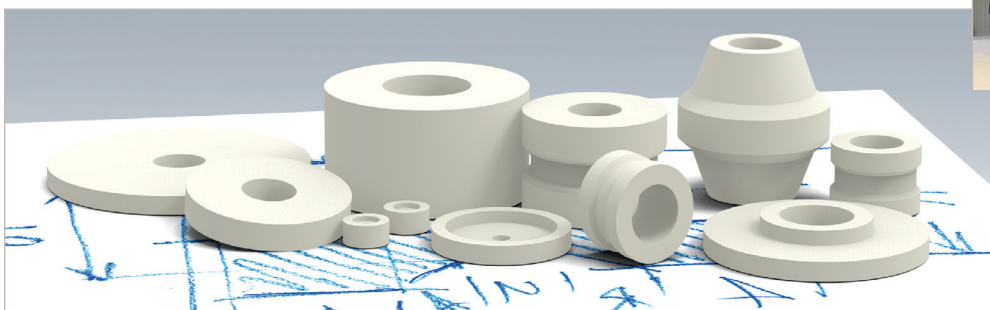
www.ceramicx.com/specialised-dust-press-components/

Ceramicx now offers the manufacture of specialist Steatite ceramic dust press components to companies that need quality insulators as part of their product manufacturing. For over twenty years Ceramicx has been shipping components and products to manufacturers in over 65 countries worldwide. Service, confidentiality and world class quality is offered, together with a unique know-how in developing and designing product solutions in Steatite Ceramic where needed.



Ceramicx manufactures dust press components on Dorst 20 and 15 tonne presses (shown above) and a Dorst 6 tonne press

A selection of parts that can be purchased



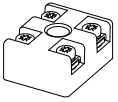
ACCESSORIES

HIGH TEMPERATURE CONNECTORS

www.ceramicx.com/high-temperature-connectors/

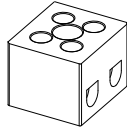
2P Ceramic Terminal Block

10 Pack
Stainless Steel
Fittings
40 x 32 x 20 mm



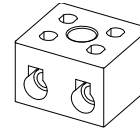
2P Mini Ceramic Terminal Block

10 Pack
Nickel Galvanised Brass
Inserts, Zinc-plated Steel
Screws
21 x 18 x 15 mm



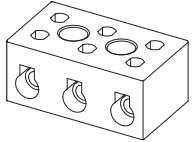
TB2 Ceramic Terminal Block

(closed) 10 Pack
Plated Brass Inserts,
Nickel Galvanised
Screws
34 x 30 x 22 mm



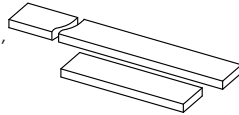
TB3 Ceramic Terminal Block

(closed) 10 Pack
Plated Brass Inserts,
Nickel Galvanised
Screws
51 x 30 x 22mm.



Stainless Steel Buzz Bar

used with the ceramic
terminal block to
produce a flexible power
distribution system
8 x 2 x 1000 mm

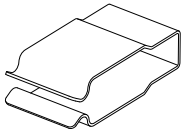


MOUNTING COMPONENTS

www.ceramicx.com/mounting-components/

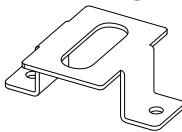
Flat Ceramic Base Holder

For Halogen/Tungsten
heaters fitted with flat
ceramic base



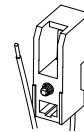
Mounting Bracket

For ceramic elements
72 x 57 x 28 mm.
slot 42 x 15 mm



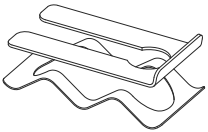
R7s Ceramic Holder

For Standard Quartz
Tungsten/Halogen Tubes



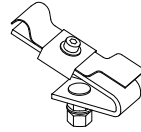
Steel Wave and Spring set

Used in the mounting
and installation of all
Ceramic elements
and the Pillared
Quartz elements



STQH Holder

For all types of square
tube Quartz Heaters
(STQH)

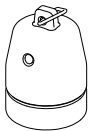


E27 ACCESSORIES

www.ceramicx.com/bulb-reflector-and-e27-holder/

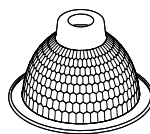
E27 Edison Bulb Holder

High temperature
porcelain holder used
with ceramic IR bulbs
Ø53 x 74 mm



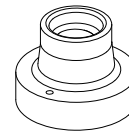
Ceramic Bulb Reflector

Highly polished
reflector for use
with ceramic IR bulbs
Ø220 x 110 mm



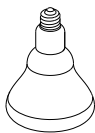
E27 Bulb Holder with Base

High temperature
porcelain holder used
with ceramic IR bulbs
Ø78 x 60 mm



Glass Infrared Bulb

225W
Ruby Double
mirror
123 x 170 mm

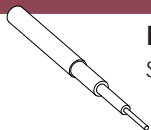


HIGH TEMPERATURE NPC CABLE

www.ceramicx.com/high-temperature-npc-cable/

High Temperature NPC Cable

Single Conductor Cable, Flexible Nickel Plated Copper Core, Glass Fibre Insulation, Silicone Coated Fibreglass Braid
0.75 mm, 1.5mm, 2.5mm, 4.0mm

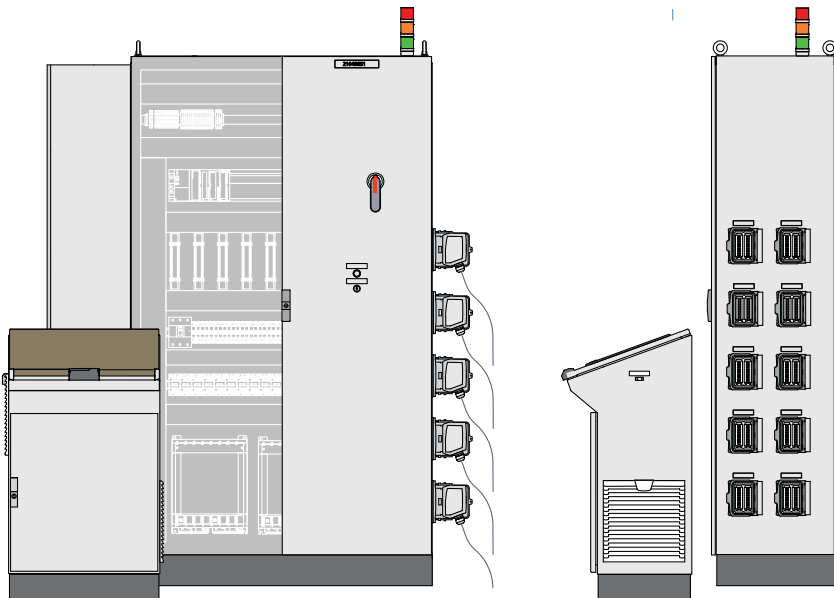
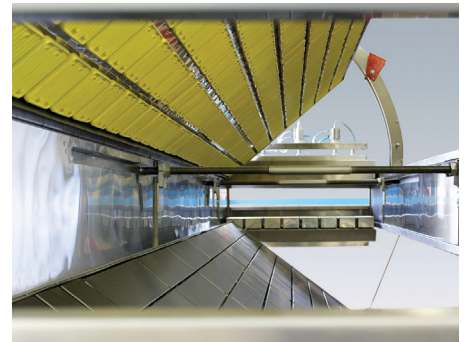
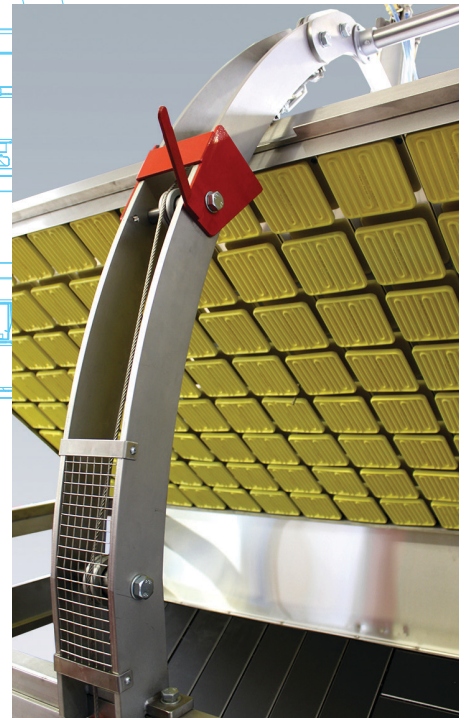
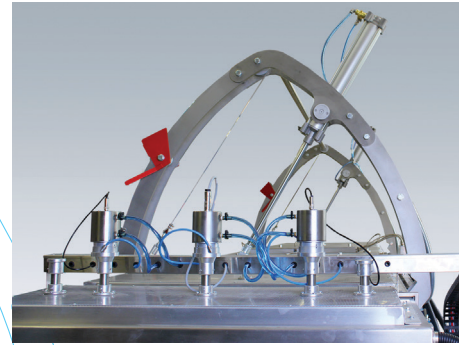
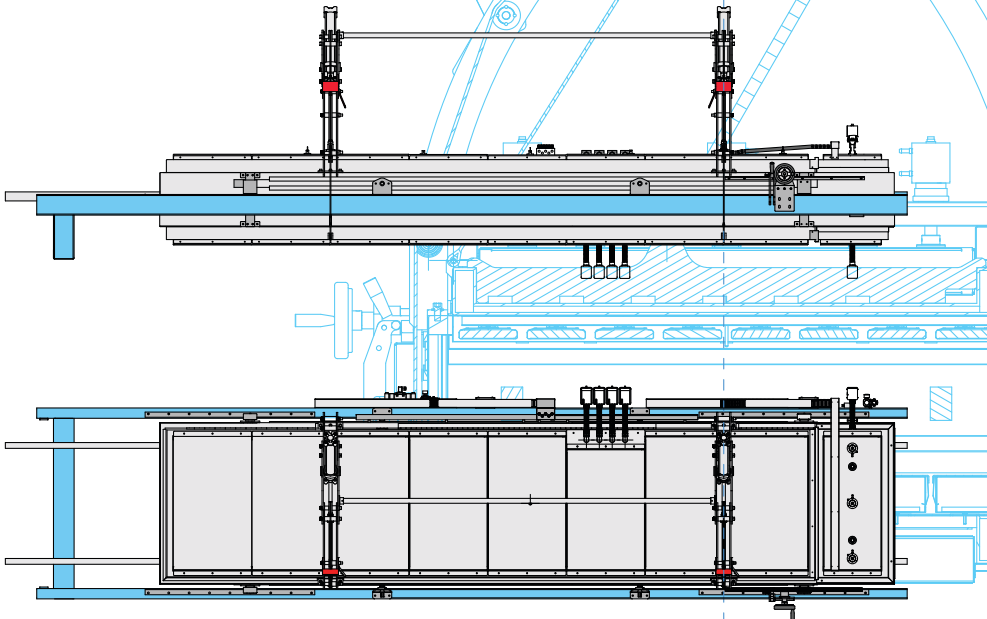


'clamshell' style oven and control system 160kW

Application:
Irwin 44 inline Thermoformer upgrade.

comprised of:

ceramic hollow constructed upper heaters, anodised aluminium lower heaters, 132 control zones, pneumatically operated opening/closing mechanism, zone temperature feedback via type K thermocouples and infrared thermometers, HETRONIK HC 500 power control with Siemens S7-300 master and 17" touchscreen panel PC.



Control Systems

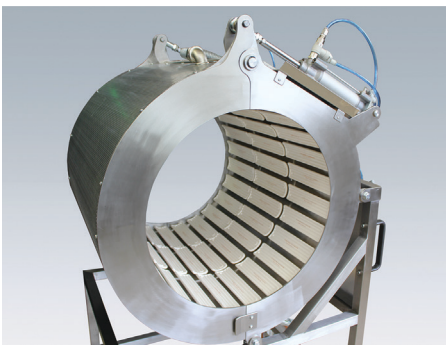
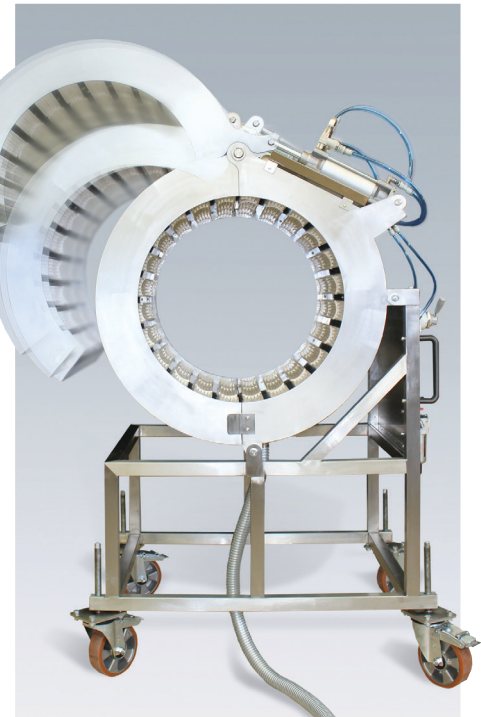
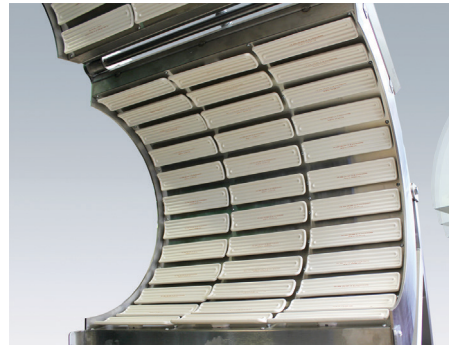
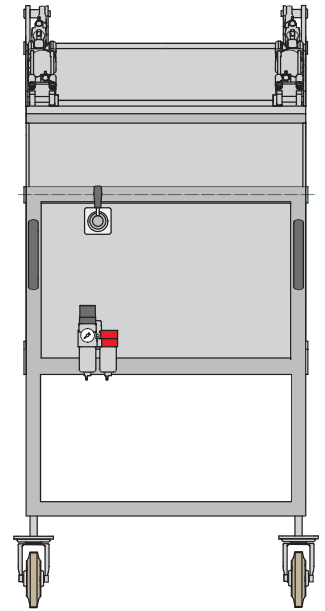
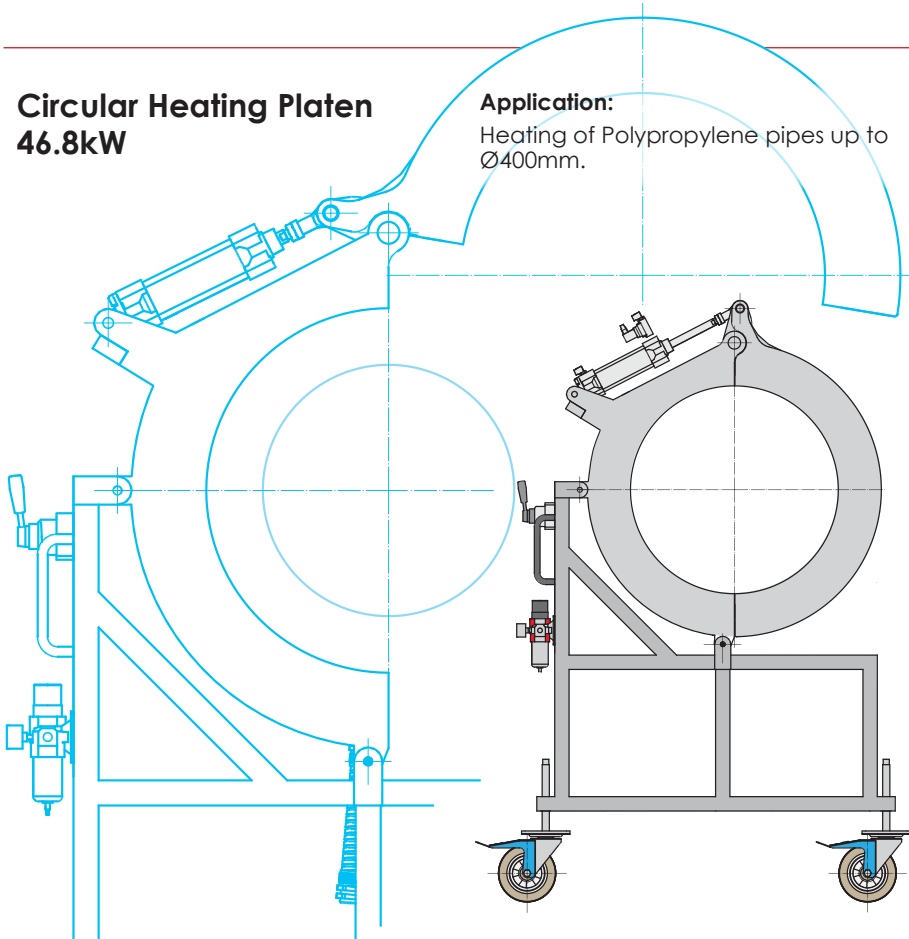
It is rarely possible to match the installed heater load exactly to the process heat requirement. For this reason, a control system is normally a prerequisite in most industrial radiant heat applications. The ability to control heat output allows us to optimize the heating process. With all radiant heat transfer applications there is a limit to the amount of energy which can be absorbed by the target over a specific

period of time. Modern manufacturing requires short process times with minimal energy usage. Applying excess heat introduces the risk of surface scorch which is why it is critical that the heater output can be tuned to provide both process speed and high quality parts. Ceramicx can build custom control heat systems to provide this, from simple open loop percentage time based systems to closed loop PID. All our control systems utilise solid state power control (thyristor/triac), using zero-cross, SSR's or phase angle power

Circular Heating Platen
46.8kW

Application:
Heating of Polypropylene pipes up to
Ø400mm.

Comprised of :
72 long wave ceramic elements
grouped into 4 control zones,
pneumatically operated opening/
closing mechanism, zone temperature
feedback via embedded type K
thermocouples.



controllers depending on heater load type. Applications vary enormously, from small single zone systems to large multi-zone systems required in Thermoforming applications. Depending on the zone requirements of the application, we can use one or more 1/16 DIN temperature controllers or for larger systems a PLC with HMI is generally used. Control equipment / PLC's from different manufacturers (eg. Allen Bradley, Siemens and Cannon Automata equipment.) These can be combined with a Hetronik multichannel control

system to increase functionality and controllability and also provide valuable feedback on load status. Regardless of the size and complexity of the system required, Ceramicx has a solution to suit

ceramicx



Schull Community College Sponsorship

Ceramicx are happy to have sponsored the Gaeltacht award to Schull Community College again this year. Aishling Connolly (centre) was presented the Award by Ted Owens, (left) C.E.O., Cork Education & Training Board and Brendan Drinan, (right) Principal, Schull Community College.

Exhibitions

Chinaplas® 2014
国际橡塑展

23 - 26 April 2014. Shanghai New International Expo Centre, Shanghai, PR China.
Hall W1 Stand W1E63

PLASTINDIA 2015

05 - 10 February 2015.
Pragati Maidan, New Delhi, India

Cáthál appointed to board of directors of Skibbereen and District Chamber of Commerce

Cáthál has in the last week been invited to join Skibbereen Chamber of Commerce as a member of its board of directors. Cáthál will join the team of experienced local business persons to try and help secure more funding for the Chamber and enhance the conditions to attract more Industry to the area.



New Quality Controller for Ceramicx

We are happy to welcome Inaki Lopez to the Ceramicx team as Quality Manager. Inaki has 15 years' experience in Quality Control in the Automotive industry in Spain. He takes over from Mike Sheehan who relieves this duty to continue his good work in purchasing and maintenance.

Pádraig re-joins the Ceramicx team
in the position of Productivity Improvement Engineer



Padraig Courtney has recently re-joined the Ceramicx team from his 2 year sojourn with the University of Limerick where he was completing his masters in costing and control to add to his Manufacturing Engineering degree. Padraig takes up the position of Productivity Improvement Engineer with some promising possibilities for this year coming.

On Tuesday 21st January, Cáthál Wilson was joined by his family in the University of Limerick for his graduation with his PhD in Manufacturing Engineering.



Cáthál pictured with his 3 month old son Ellis and wife Eimear.



Society of Plastics Engineers
All-Ireland New Technology Forum and SPE Polymers Conference 2014 "From Translation, to Convergence, to the Bottom Line" - Building Plastics into the Future

Tuesday 4th March 2014 - Athlone Institute of Technology
Thursday 6th March 2014 - Waterford Institute of Technology

In March of this year, Waterford Institute of Technology in conjunction with Athlone Institute of Technology will host the Society of Plastics Engineers Annual conference - the first of its kind to be held in Ireland. The conference will bring together political leaders, state agencies, business people and industry experts to discuss the challenges facing Medical Device, Pharmaceutical, Green Technology, Composites and Plastics Processing companies, in both their core and emerging businesses. Topics will include the benefits of innovation clustering, the changing demands of regulation for companies launching products in a global marketplace and proactive long-term planning within the global materials ecosystem to foster future innovation and growth.

The conference will provide key opportunities for companies to forge links with SPE members, other SME's, MNC's and knowledge providers both from within Ireland and abroad.

Further information available at www.4spe.org

Ceramicx would like to congratulate

Ryszard & Matgorzata Wanatowski on the recent arrival of their twin daughters Julia and Natalia who join their young daughter Victoria. We feel that we may have to consider putting a hammock in his work area.

We would also like to congratulate Cáthál & Eimear on the arrival of baby Ellis Sean Wilson on October 14th.



Talk to us today about your infrared heating needs.



- Frank Wilson *Managing Director* frank.wilson@ceramicx.com
- Tadhg Whooley *Technical Sales Manager* tadhg.whooley@ceramicx.com
- Amanda Murphy *Sales and Logistics* amanda.murphy@ceramicx.com

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- Bobby Bell *Managing Director* bobby@absoheating.co.za
- Marc Johnson *Operations Manager*

www.ceramicx.com

CHECKOUT ▶

ceramicx
onlineshop



Infrared heating elements direct from the manufacturer

▶ Ceramic Elements

▶ Trough elements

▶ Hollow Elements

▶ Flat Elements

▶ Ceramic Bulbs

▶ Thermocouples

▶ Quartz Elements

▶ Quartz Heaters

▶ Single Tube Quartz Heaters

▶ Pillared Quartz Heaters

▶ Quartz Tungsten / Halogen Elements

▶ Quartz Tungsten Tubes

▶ Quartz Halogen Tubes

▶ Special Tube Orders

▶ Steatite Press Components

▶ Specialised Statite Components

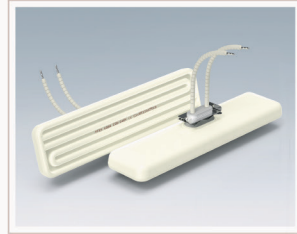
▶ Accessories

▶ High temperature connectors

▶ Mounting Components

▶ High Temperature Cable

▶ Bulb Reflector / Holders



FULL FLAT ELEMENT HOL...

Available from 250 to 800 Watts
Dimensions: 245 x 60 ...

VIEW PRODUCT ▶



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Full Flat Element Hollow
Available from 150 to 800 Watts D

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WATTAGE

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