Heraeus

Gas Catalytic Infrared Systems

Efficient industrial processing

Gas Catalytic Infrared Heat - Good to Know

Gas catalytic infrared emitters convert natural gas or propane into medium to long wave infrared by using a special platinum catalyst. The by-products are water and carbon dioxide.
This flameless catalytic reaction produces controllable surface temperatures of the emitters between 175 ° C and 480 ° C. The radiation intensity can be varied infinitely between 20% - 100% of the available output.

Infrared heat transfers energy and generates heat where it is needed. PLC controlled infrared ovens are precisely designed to match the thermal process application. This saves energy, improves process stability and increases capacity and quality. The process time can be reduced by up to 66% and the required space by up to 50% when compared to conventional systems.
The emitted radiation is in the range 3.5 to 5.5 microns and thus exactly matches the absorption spectrum of powder coatings and water.

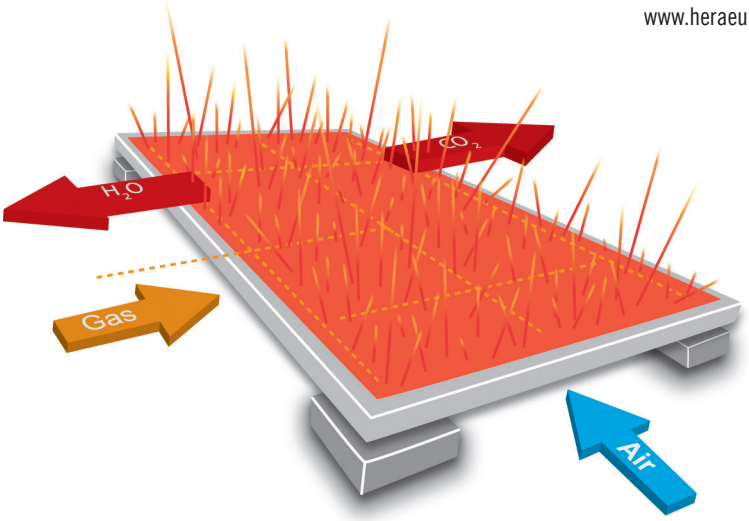
Technical Data

- Surface temperature of 175 – 480° C
- Maximum surface power density about 20 kW/m^2
- Flameless reaction
- Homogenous heat distribution
- Intelligent PLC control
- Emission of CO_2 + H_2O

Gas catalytic IR heat is ideal for several processes:
Coating of heat-sensitive substrates such as MDF, powder coating metallic and non-metallic substrates, drying processes for example lacquer, food, leather etc. and thermoforming of plastics.
The heaters are available in four standard sizes that can be combined to create large or small oven systems depending on the application. Each system can be split into any number of individual PLC controlled zones for precise process control.

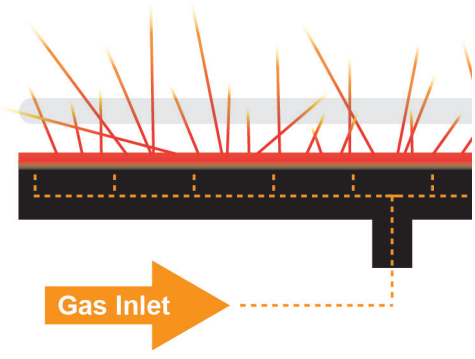
For more information also have a look at our video:

www.heraeus-noblelight.com/infrared



Gas + Oxygen + Platinum Catalyst = CO2 + H2O + Infrared Heat

The gas catalytic reaction requires an electrical pre-heat at start-up only.



Gas Catalytic infrared heat is flameless!

Powder Coating System Reduces Costs and Improves Quality

Flogas Britain Ltd, established in 1984, are one of the leading providers of Liquid Petroleum Gas (LPG Gas), supplying Propane and Butane to domestic and industrial users across the UK. The company have a large number of depots nationwide enabling them to offer high quality products at a competitive price. At their main site, they refurbish thousands of gas cylinders each week, ranging widely in size, colour and weight. Committed to undertaking regular reviews of their operations to identify improvements, Flogas Britain Ltd. decided to replace its existing wet paint facility which had reached the end of its useful working life. The major decision was made to move from wet paint to powder coating as significant advantages could be realised. Working with systems integrator Junair Spraybooths Ltd., Heraeus Vulcan designed a gas catalytic infrared oven, similar to designs we have used in the past for LPG gas cylinder painting. This was integrated into a system consisting of a Zinc de-gassing oven and Gema automated spray booth. The 6 zone Gas Catalytic IR oven was designed by Heraeus Vulcan engineers in the USA, with a complete package consisting of DXF files for the sheet metal structure of the oven, infrared heater panels and all the gas controls for the oven being delivered to systems integrator Junair Spraybooths Ltd.. The oven was assembled in their facility and within a matter of weeks, it was ready to be shipped to site for installation. Once running, the PLC control system of the Gas Catalytic IR oven was setup with a number of heat profiles or recipes, to suit the different sizes of cylinder being processed, and stored in the memory for instant recall when needed. Gas Catalytic IR ovens from Heraeus Vulcan are considered to be the most cost effective solution to LPG cylinder refurbishment available today.

Simon Eldridge, Cylinder Supply Chain Manager at Flogas Britain Ltd. stated: "We now have a state of the art system which has delivered all the required improvements. Initial indications are that the system will pay for itself well within the required payback period. I have been very impressed with Heraeus Vulcan."

Key Improvements

- More effective use of available space
- Reduced operating costs
- Much improved quality
- Added capacity
- Improved reliability
- Reduced Carbon footprint

Powder Coating System Improves Response Time

Doughty Engineering is the world leader in the design and manufacture of rigging, suspension and lifting equipment for the film, TV and theatre industry. Prior to installing a new powder coating system, the company outsourced all their powder coating to two subcontractors. Whilst they were generally happy with service that was offered; typical turnaround time was anything from 2 days to a week. However, it became clear to Doughty Engineering that over the last 5 years, customers were becoming more demanding. They were holding less stock and so expected suppliers to hold a large inventory and offer short lead times. Maintaining large stocks was not the answer, especially when there are 100□s of products. However, the converse was not an option either. If a customer called for a part and it was not in stock, they would simply phone up another supplier. This created the risk of losing hard won business to competitors. So the ability to become much more flexible and responsive became important. The answer was to bring 95% of their powder coating “in-house”. Working with systems house, Junair (Spraybooths), Gema UK and Caldan conveyors, the optimum system was designed and implemented. For the oven, Heraeus Vulcan Gas Catalytic IR technology was chosen due to its superior energy efficiency, small footprint, and improved finish quality over conventional convection technology.
As a result of this new investment in process capability and capacity, Doughty Engineering Ltd. report that the system has now been running faultlessly since February 2014.

Stephen Wright a Director of Doughty Engineering Ltd. said:
“Apart from the reduction in operating costs and the improvement in quality; the intangible benefits such as improved customer service and the ability to be more responsive will help us maintain existing and gain new customers. The new powder coating system has surpassed our expectations and made an immediate difference to our business."

Key Improvements

- Improved quality
- Increased throughput, three hours not unusual
- Considerably reduced lead times
- Rush jobs in custom colours carried out "while you wait"
- 10% operating cost saving
- Increased capacitiy

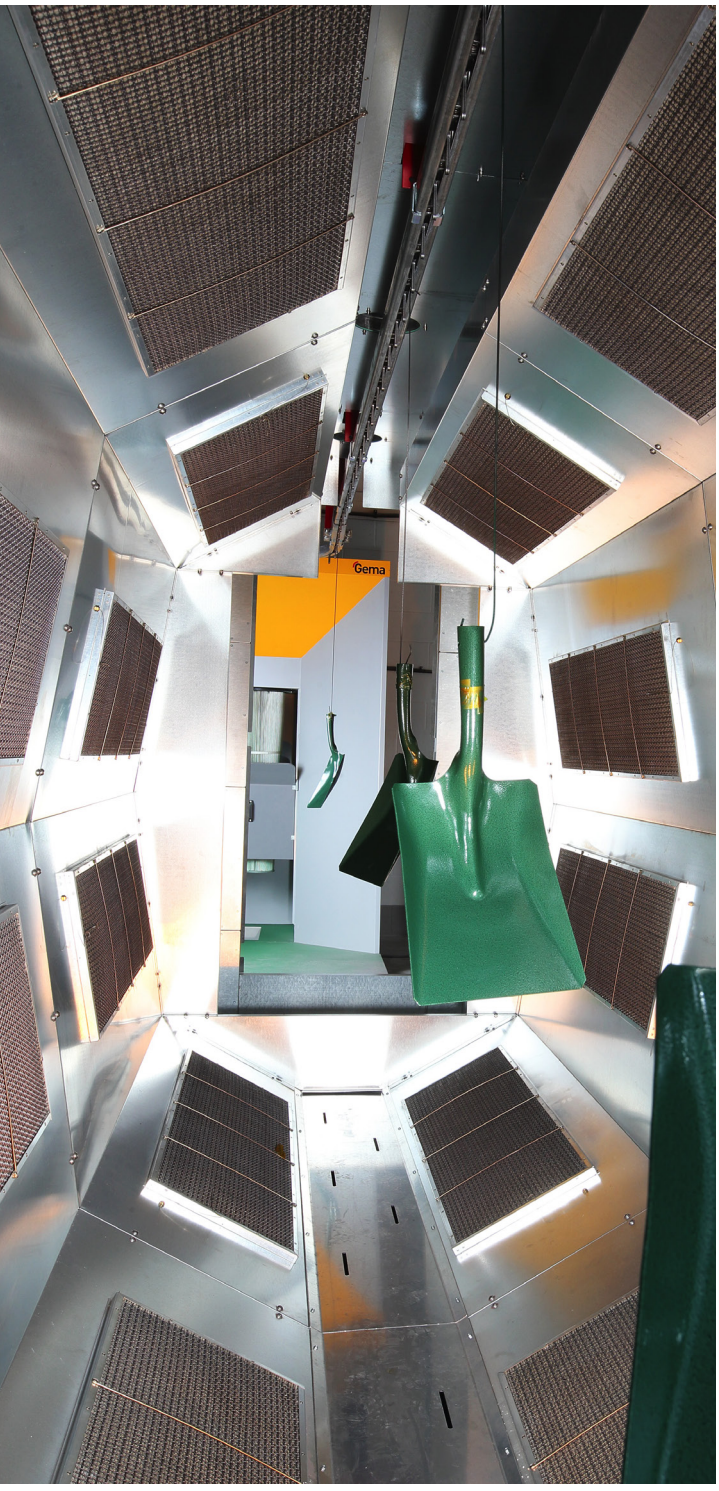
Infrared Systems cure powder coating on MDF boards flexibly and at high quality

An infrared oven from Heraeus Noblelight is ensuring brilliant surface quality of kitchen door fronts at Kempa in Belgium. There is a wide range of requirements for kitchen fronts in terms of design and surface properties. As well as the variety of colours and shapes, other properties such as scratch-resistance, chemical resistance and water resistance also play an important part. This is where the benefits of powder coating come into effect, as, as well as a seamless coating, powder coating also provides excellent mechanical and chemical properties. The precisely accurate process and the curing of the powder on the various kitchen fronts is ensured by the flexibility of the Heraeus gas catalytic oven.
Kempa Products nv is based in Herentals, Belgium and manufactures fronts for kitchens, tables and chairs. Since 1992, it has used both solid wood and MDF for its products. Kitchen fronts in MDF are enhanced with a coating and for this both liquid and powder coating systems can be used. Kempa supplies kitchen fronts exactly to customer specifications in batches from one upwards. Consequently, in order to meet the powder coating requirements, the drying and curing oven must be flexible enough to meet all situations.
Heraeus has supplied Kempa gas catalytic infrared heating systems for the pre-heating and for the curing itself. Powder coating on MDF boards is significantly more homogenous if the boards are pre-heated. This increases electrical conductivity, which then helps the powder to be distributed more homogenously. The second gas catalytic infrared oven serves to gel and cure the powder coating. Generally, powder absorbs infrared radiation very well, heats up very quickly and is gelled in significantly shorter time than in a conventional convection oven. As there is no circulation of air, dust inclusion is eliminated and the powder is not swirled around. A fast melt improves the coating quality and increases the production line speed. Infrared heat is transferred faster and at higher power than hot air, so that in most cases the oven is shorter than a convection oven or the production line speed is faster.
The oven at Kempa has an implemented zone control that allows adjustment of every temperature profile according to the requirements of MDF board dimensions or powder type used. Heraeus application specialists established with Kempa the required oven settings. Finally, various programmes to meet the different requirements were incorporated in the control system and these can be called up on demand.

Key Improvements

- Quicker job completion
- Quality Improvement
- Flexible system, adjusted to customer requirements
- More homogenous coating if the boards are pre-heated
- Dust inclusion is eliminated
- Increase in production line speed

Questions and Answers



Q: How flexible are the technologies in working with mixed batches?

A: Although components heat up at different rates, they never exceed temperature of convection oven. Infrared heats up components at different rates and will reach different temperatures depending on mass. Care should be taken to "group" like parts size and mass.

Q: What about the design of the ovens?

A: For convection ovens, product testing generally is not necessary. Although simple, it results in larger sizes and longer oven times. Infrared ovens normally require advanced product tests to determine oven design (power, wavelength, density, length, zoning, etc.).

Q: What can be used for "Class 1 Applications (high solvent)?"

A: Convection ovens are more easily designed for use in Class 1 areas. Again the trade-off is simplicity vs. size and efficiency. Infrared systems are more complex to use in Class 1 areas, and like convection will require large amounts of air flow to remove solvents, and interlinks between IR source and conveyor to shut down the system in case of line stoppage. The advantage of IR here is size (reduced footprint) and throughput. A combination of IR and convection may be the best solution.

Q: Which oven type is more common?

A: Convection is widely known and easily accepted. It is easy to use and requires little training. Infrared is a more complex system that offers many more advantages: smaller footprint, less power consumption, zoned heating, closed loop control, quick start up and shut down. Although not as widely used as convection, infrared systems are quickly gaining acceptance as a highly effective alternative to the standard convection technology.

Q: How is power calculated?

A: For convection a simple mass x specific heat x temperature rise calculation provides information for oven design. For IR, tests are often required to determine design.

A: In a 200°C convection oven, the complete component will eventually achieve 200°C. Infrared ovens require more planning than convection for 3 dimensional objects. Because conduction cannot be relied upon to heat hidden areas, care is taken to design oven to equally heat all surfaces. Design and control are key to a good job.

Q: How does colour-reflectivity-transmission of material influence oven design?

A: A convection oven will have always the same design and characteristics. Infrared systems are custom designed to suit the substrate being processed.

Gas Catalytical Infrared Test Center

Infrared heat transfers energy and generates heat where it is needed. PLC controlled gas catalytical infrared ovens are precisely designed to match the thermal process application. This saves energy, improves process stability and increases capacity and quality. With our Application Center we offer all our customers the opportunity to answer important questions, from a practical viewpoint. Competent, technically experienced employees carry out and monitor the tests.

- Customers can bring along their own parts and coatings for trials
- Facility for powder or wet spray
- Ability to handle parts up to 800mm wide x 1500mm high
- Oven equipped with 16 off gas catalytic panels
- 20-100% regulation of gas over 8 independently controllable zones
- Full temperature monitoring of substrate temperature via data logger
- Engineering consultation
- Combination trial possible with electric IR

Benefits of the Gas Cat IR Systems for the Finishing Industry

- Pre heat or curing times are typically 1/3rd of those required by a convection oven
- Energy savings of up to 50%
- Reduced footprint to free up valuable factory space
- Minimal air movement within system eliminates contamination between different colour batches
- Flameless reaction resulting in production of water CO_2 and heat
- Wavelength of gas cat ideally suited to absorption characteristics of powder
- Low maintenance system

Contact the experts at Heraeus, if you are looking for efficient solutions for industrial heating processes.

Find our test centers for gas catalytic infrared systems in Buford, USA and in Neston, UK.
Just contact us!

The Infrared Process Technology division of Heraeus Noblelight (business segment specialty lighting sources) develops and manufactures infrared emitters and systems for industrial heating processes. For over 50 years we have focused on their specific application requirements. With a wealth of experience encompassing more than 3000 different heating processes, we can match our emitters precisely to meet your needs in terms of spectrum, power, length and shape.

Make use of the intelligence of infrared technology.
In contrast to conventional thermal processes, infrared transmits large amounts of energy in a short time. This heat is used exactly where it is required and only for as long as it is required for a particular process. This offers energy savings of up to 50%.

Profit from the acknowledged Heraeus quality – the proven twin tube design with a unique length of up to 6.5 meters – contoured emitters, which are shaped to match the geometry of your work piece – the new QRC® emitter, with its nano reflector for stable heating processes under aggressive ambient conditions. Convince yourself personally of the efficiency of infra-red emitters for your process in our Application Centers.

Make use of our expertise and experience to optimize your production process and realize real competitive advantage.

10/2016 Printed in Germany

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