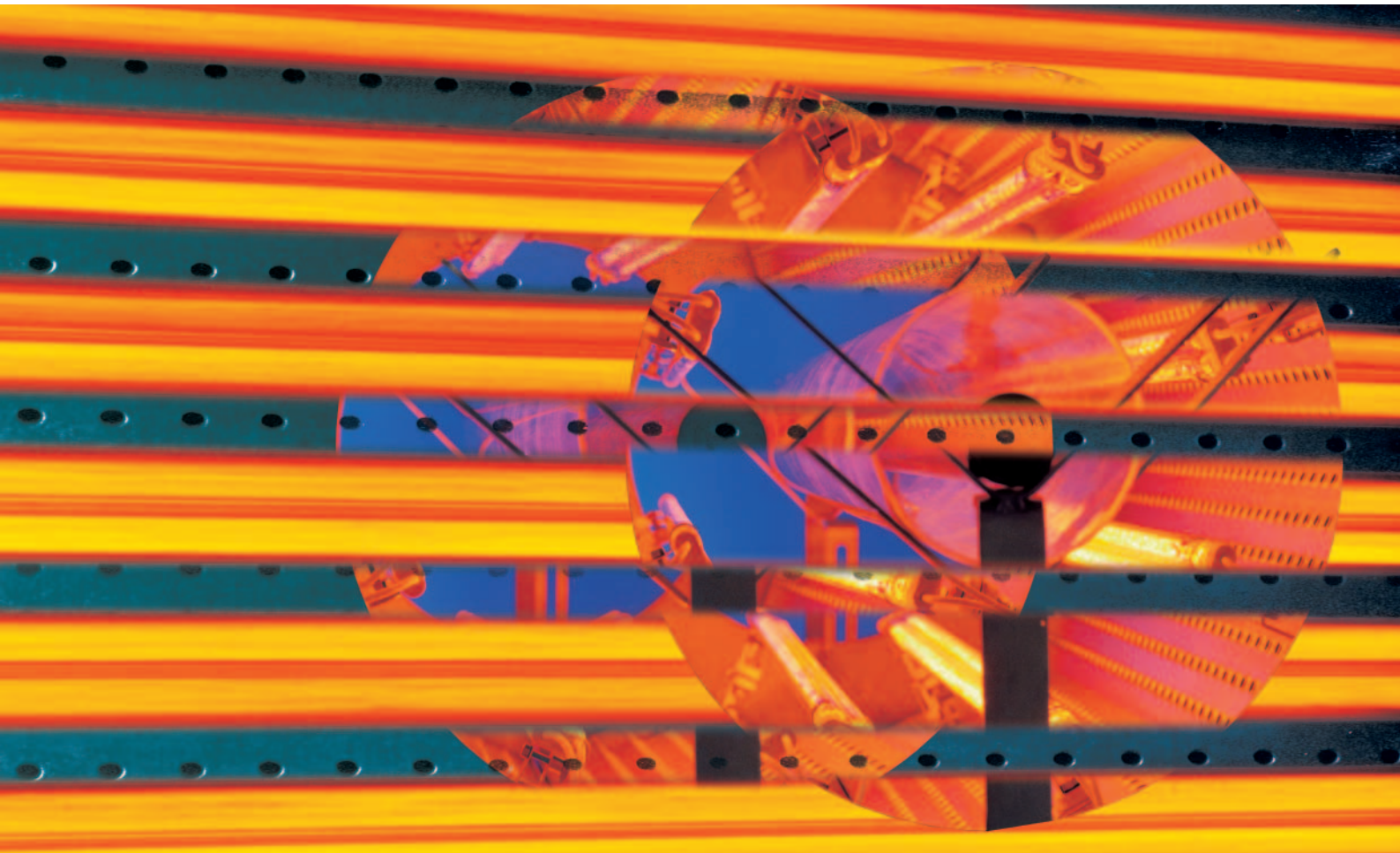


# Heraeus



## **Infrared Modules for Industrial Processes**

Heraeus Noblelight

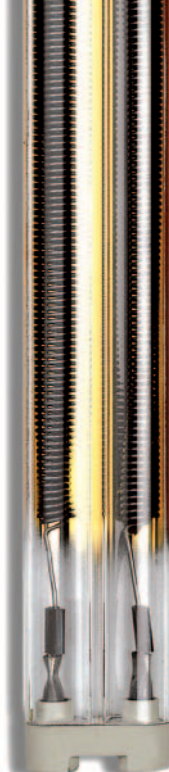
Carbon Twin Infrared Emitters CIR



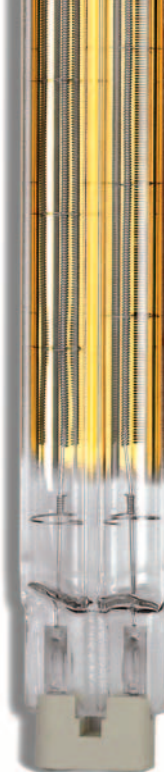
Carbon Round Tube Infrared Emitters CIR



Medium Wave Infrared Emitters



Fast Response, Medium Wave Infrared Emitters



Short Wave Infrared Emitters



## The Right Wavelength to Optimize the Result

**Infrared radiation transfers heat directly and at high efficiency. Infrared heating technology means heat only where it is needed, at the optimum wavelength for the material and in line with the process.**

### **Carbon Infrared Emitters CIR®**

CIR® emitters combine a medium wave spectrum with fast response times and high power outputs. These emitters are produced as round tube- or twin tube emitters, in lengths up to 3m, with maximum power outputs of 100 kW/m<sup>2</sup> for round tube or 150 kW/m<sup>2</sup> for twin tube emitters.

### **Medium Wave Infrared Emitters**

Standard emitters with a medium wave spectrum, solid, flexible in construction, lengths (up to 6.5m) and power output (max. 60 kW/m<sup>2</sup>), especially suitable for continuous processes.

### **Fast Response, Medium Wave Infrared Emitters**

Emitters, with an improved output in the medium wave (2-4micron). Response times as fast as short wave, with a maximum power output of 150 kW/m<sup>2</sup> and lengths up to 6.4m

### **Short Wave Infrared Emitters**

Infrared emitters in the short wave region. Twin tubes with lengths of up to 6.4m and high maximum power output of 200 kW/m<sup>2</sup>.

### **Infrared Halogen Emitters NIR**

Halogen infrared emitters with a spectrum in the near-infrared region, a maximum power output of 1000 kW/m<sup>2</sup> and very fast response times.

### **Emitters for Targeted Heat**

meet all requirements in finishing processes, where only very small or curved faces, edges, borders or defined contours of the product need heating. For this Heraeus Noblelight has developed purpose built products such as contoured emitters, small surface emitters, Omega emitters and emitters for heating hot rivets.

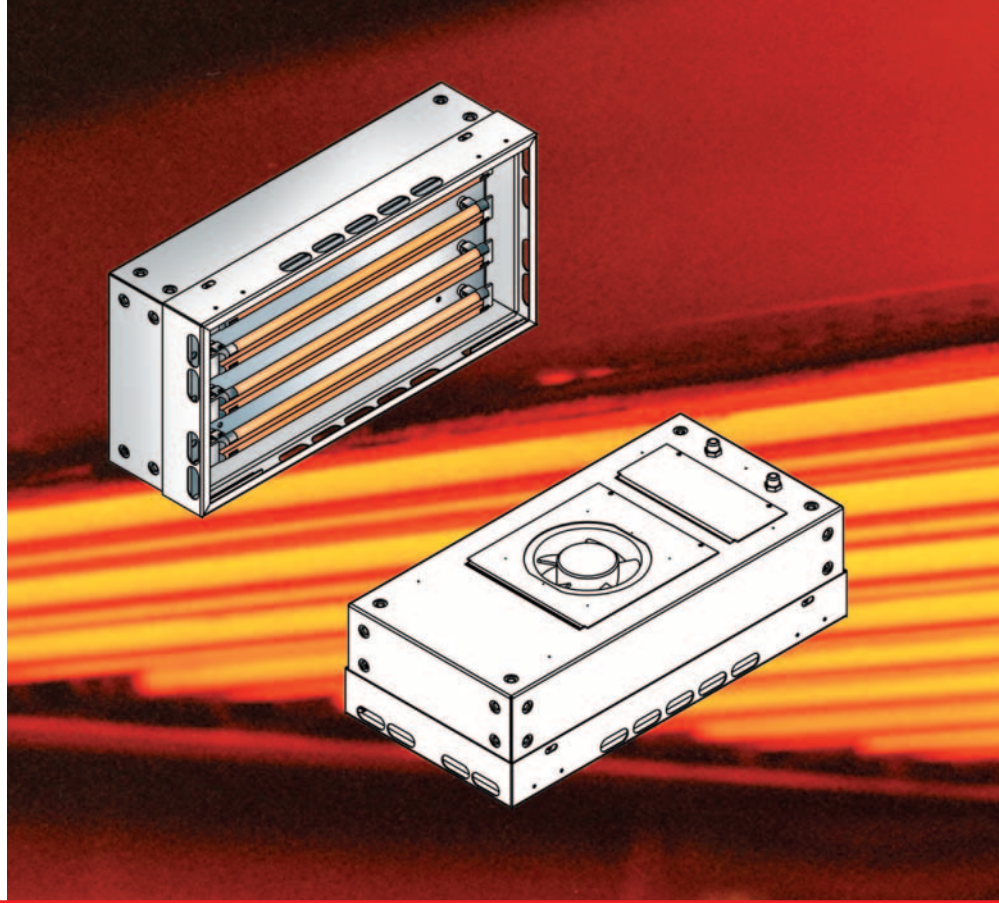
Common to all of these emitters is their focus in shape, size and spectrum to the desired process. Heat is produced in a targeted fashion exactly where it is needed. Consequently energy losses to the surrounding area are very small. Infrared emitters are produced as round tube or twin tube. Twin Tube Infrared Emitters have a high mechanical stability and can be produced in every required length up to 6.3m

A **Gold Reflector** on the IR emitters reflects the IR radiation; the effective radiation onto the object is therefore roughly doubled.

Infrared Halogen Emitters NIR



Infrared Halogen Emitters NIR



## The Right Wavelength to Optimize the Result

Different wavelengths are more suitable or less suitable for a particular process according to the absorption properties of the material and the practical requirements of the production process. Heraeus Noblelight is a specialist in custom-built infrared emitters and assists in the selection of the optimum emitter. Heraeus Noblelight creates the basis for solutions, which are matched precisely to the requirements of the user. The development of emitters are directed at the needs of customers and the latest state of the art technology.

**Heraeus Noblelight infrared modules comprise one or more infra red emitters mounted in a suitable housing and usually wired into a terminal box mounted on the back of the unit. System solutions comprise modules and a control panel designed to meet the requirements of the individual process.**

### **Modules – designed for the process**

The great strength of Heraeus Noblelight lies in the tailor-made solutions it offers customers. Experienced personnel in Germany, Belgium, Great Britain and the USA construct modules to meet customer requirements. The latest technology, such as three-dimensional CAD techniques, is available.

Modules can be built from all infrared emitters to dimensions that suit customer's plant with outputs necessary for the specific process. The selection of the optimum emitter for the material to be heated is made with reference to the process data.

Heraeus Noblelight modules are tailored solutions offered with or without ventilation and designed to meet all issues such as emitter type, thermal and mechanical stability, air movement and operating environment.

They are designed to be fitted into an existing plant or for installation into new lines.

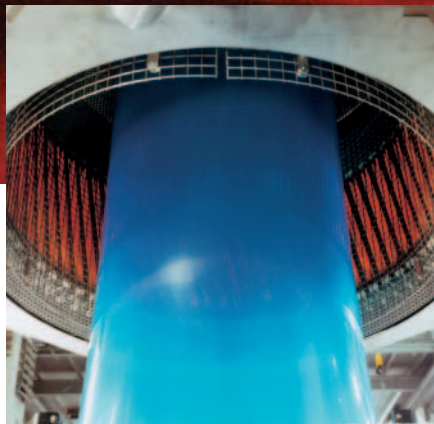
### **Systems – for the complete heating process**

On Request infrared modules can be provided as part of a complete solution. This can provide simple on off control of emitters through to full closed loop control where substrate temperature is measured and emitters regulated to maintain the required heating profile.

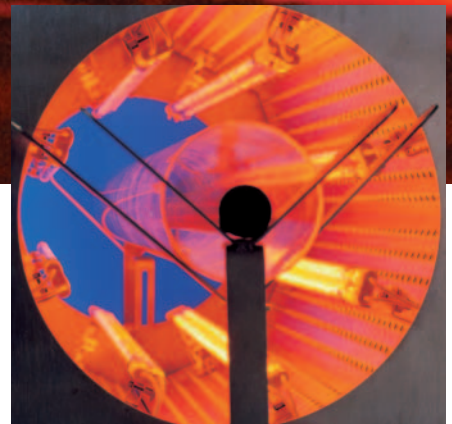
The control panel provided will be a wall mounted or floor standing enclosure equipped with all the necessary electronic and electrical equipment.



## All Kinds of Modules



*Plastic drawing with IR heat*



*IR Module in oven form*

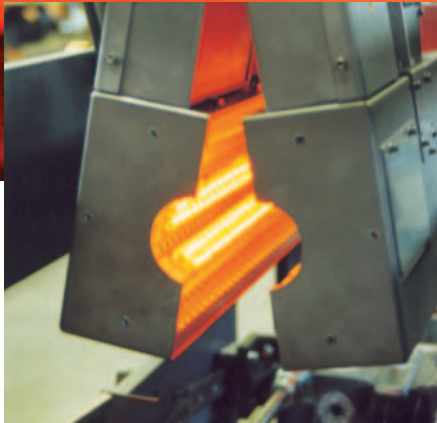
Modules can come in various forms – to suit the process. Depending on the process parameters, the product web widths or special temperature profiles, flat large heating fields, individually shaped modules, tunnels or ovens can be designed and built.

### **Plastic drawing with infrared modules**

Infrared modules arranged in flat heating fields are best suited for heating processes on product webs. However, many processes require further consideration. Tubular profiles need to be evenly heated all round, as consistent heating is important to obtain constant foil thickness. Consequently, the plastic tubes are heated to a given temperature and then stretched. The advantage of IR radiation over warm air is that the heat is concentrated in a very small space. As a result the heating zone is reduced. IR modules can be controlled very accurately and reliably heat plastic materials to the required temperatures.

### **Module Ovens**

Modules in oven form facilitate the heating of continuous plastic tubes or fibres. They also allow the vulcanisation of rubber as the heat is evenly concentrated onto the product from all sides. A quartz glass safety tube allows air cooling of the emitter surface without cooling the product.



*Bending of plastic components*

### **Bending of plastic components**

Thermoplastic components are heated by infrared before forming. Compact, controllable modules ensure that only the product, and not the surrounding environment, is heated. Modules can be hinged to facilitate loading of components. The product temperature is measured with a pyrometer and, at a given temperature, the plastic components, such as tubes, are removed and formed as desired.



*Vacuum plant with infrared emitters*

### **Operations in vacuum**

In the production of thin film solar cells, float glass sheets are heated so that they can be coated. This takes place in vacuum plant. Infrared emitters, which generate heat directly in the vacuum chamber, heat the float glass sheets very effectively. Heraeus modifies its emitters for operating in vacuum with special sockets and leads and also manufactures emitters with special voltages. Infrared modules are also modified for operation in vacuum, so that all current conducting parts are built for vacuum conditions.



# Modules for all sectors

Industrial manufacturing processes need heat for many different production stages. Infrared modules reliably and efficiently heat product webs, dry lacquers and activate adhesive, assist in the forming of plastics and are used in the production of foodstuffs. Infrared modules facilitate the application of infrared heat in virtually all sectors.



*Carbon module for car internal fittings*



*Heating chocolate*



*Carpet web relaxed before the coating*

## **Carbon module with zone regulation**

A module with Carbon infrared emitters is helping to improve the quality of internal carpeting of motor vehicles.

This has been made possible through 15 individually controllable zones, which allow the maintenance and control of a given temperature profile.

Car internal carpets are formed in a very complicated manner and are different for every type of car.

A complete module system, where each individual zone has its own thyristor, which controls the power individually, and where the temperature of the carpet is controlled with the aid of a pyrometer, leads to a significant improvement in quality. Not least, such a system can be adjusted to cater for the different types and shape of carpet.

The flexible control and the fast response times of the carbon emitters also allow significant energy savings.

## **Chocolates need IR heat**

In the manufacture of caramel-filled chocolates, the edges of a chocolate filled mould are heated and then fused with a chocolate lid.

Carbon infrared emitter's heat the chocolate reliably and, because of their very fast response, can be switched off quickly in the event of a production line stoppage to prevent any over-heating of the chocolate. The emitters are very stable and are also fitted with an alarm system to detect any damage. The infrared modules require only 25 % of the space required by ceramic modules.

Heraeus has developed special modules with a safety foil for food applications.

## **Relaxing textiles**

In the manufacture of carpet tiles, hot bitumen is applied to the tile backing structure. To guarantee the adhesion of the bitumen layer to the backing structure the carpet must be "relaxed" as much as possible. To do this, the carpet web is heated with infrared and stretched over rollers. The complete operation is pyrometer controlled, which in combination with very fast response IR emitters ensures that changing line speeds or unexpected production line stoppages are not a problem. The infrared modules concentrate a lot of energy in a very small area, to save both energy and space.



*Drying of latex on the backing of carpets*



*Coating of wood parts*



*Drying PVC anti chip compound*

### **Making carpets with IR**

Latex, is applied to woven carpet to, provide stability and to bind the woven tufts into the weft backing. This medium wave system with width switching capabilities is used to pre dry the latex coating before the carpet passes over a steam heated drum. With this arrangement, high quality carpets can be produced time after time, production speeds are increased and productivity improved.

### **Drying of varnish on wood**

In the manufacture of furniture, wooden boards or panels are coated many times to achieve the desired shade or colour. Before the cover varnish is applied, a water-based stain coat must first be completely dried. This takes place reliably and rapidly with infrared radiation. Medium wave emitter's dry water based coatings very efficiently and save energy. Coatings on temperature-sensitive products can also be dried quickly, without overheating the product. IR Modules require significantly less space and operating time than conventional heating methods. They are simple to handle, are easily incorporated into the manufacturing process or retrofitted into existing plant.

### **Drying PVC in the automotive industry**

A PLC controlled system with body identification ensures that only vehicles with a PVC anti-chip compound applied are heated.

Infrared is used to pre cure the PVC coating applied to the sill area of the vehicle.

Two banks of carbon emitters are designed to direct energy to the area of the sill where the coating is applied. To ensure maximum energy efficiency the emitters are cascaded to track the vehicle as it moves down the line.



# Tested, Checked and Proven

## Know-how with tradition

Heraeus Noblelight has many years' experience in infrared heating technology and provides individual advice and service. Heraeus Noblelight offers its customers the capability for proving trials in its in-house Applications Center or on-site with experienced technical assistance. Heraeus has Application Centers all over the world.

Here you can examine the effects of infrared and the different infrared spectral radiation on your product as well as measure the temperature distribution during the heating process. From these results Heraeus engineers can calculate the required power output and other parameters needed for your new thermal process.

In addition we offer a range of portable test equipment which can be used for an online appraisal of the benefits of infrared.

## Areas of Application

- Heating
- Drying
- Coating
- Laminating
- Annealing

Find nearly all about infrared on our CD.  
Order free of charge!

Source information

Foil drawing (page 4): Windmüller & Hölscher,

D-49525 Lengerich, Vacuum plant (page 5): Roth & Rau

Oberflächentechnik GmbH, D-09358 Wüstenbrand



Tests in the Application Center



Tests with customer materials

## Heraeus is your partner for industrial heating processes in

- Glass
- Plastics
- Textiles
- Automotive
- Semi-conductor Manufacture
- Food Processing
- Print and Paper
- Electronics
- Metals

Heraeus Noblelight sales engineers use 30 years of company experience from all major industries to give you expert guidance during the initial stages of your thermal process design.



Drying trials on-site with portable test equipment



**Heraeus Noblelight GmbH**  
Reinhard-Heraeus-Ring 7  
D-63801 Kleinostheim  
Germany  
Phone +49 (6181) 35-8545  
Telefax +49 (6181) 35-168410  
E-Mail:  
hng-infrared@heraeus.com  
www.heraeus-noblelight.com

**Heraeus Noblelight Ltd.**  
Unit 1 Millennium Court  
Clayhill Industrial Estate  
Buildwas Road  
GB-Neston, Cheshire CH64 3UZ  
Phone +44 (151) 353 2710  
Telefax +44 (151) 353 2719  
hnl-neston@heraeus.com  
www.heraeus-noblelight.com

**Heraeus Noblelight, Inc.**  
2150 Northmont Parkway, Suite L  
Duluth, GA 30096/USA  
Phone +1 (770) 418-0707  
Telefax +1 (770) 418-0688

E-Mail:  
info@noblelight.net  
www.noblelight.net



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