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Special expertise in customised ovens and furnaces

Elite Thermal Systems, based in Market Harborough, produce a standard range of ovens and furnaces for surface and heat treatment applications in operating temperatures of up to 2000°C. The company also offers special expertise in custom design and manufacture to meet specific thermal process characteristics – a number of examples are featured here.

Annealing indium wafers

Elite has recently designed and manufactured a special system for annealing indium wafers under cleanroom conditions for use in optoelectronics. The system is centred around an Elite oven with a maximum operating temperature of 500° C. The oven incorporates a 110mm reaction tube with a 600mm heated length.

A special carrier assembly is employed to insert the wafers into the heated zone of the system. The carrier is passed into the heated zone of the reaction vessel by a gas tight manual push-pull rod mechanism. The wafers are then processed under a high purity hydrogen/nitrogen gas mixture controlled by flow meters and micro filters.

Loading and unloading of the wafers onto the carrier assembly is facilitated by a precision slide assembly, which allows the whole carrier slide and push rod assembly to be withdrawn clear of the reaction tube.

Managing director of Elite, Alf Roberts, said: "This was a challenging project due to the need to keep a clean and pure environment for the wafers. The system is typical of the innovative designs we can develop that offer a very high degree of precision and sophistication to meet the needs of the optoelectronics market."

Special oven for corrosive materials

Another recent non-standard application was for a leading international photographic manufacturer, who required a special 450°C oven for the production of barium bromide.

The challenge presented to Elite was to produce a system that was capable of withstanding the corrosive properties of the product and by-products of the process while maintaining safe working conditions for personnel.

An oven, designed with innovative features to provide a solution to the problem, is now installed and working at production capacity. It can process up to 30kg of barium bromide per day. The highly corrosive properties of the product and evolved vapours demanded special design characteristics and the use of a work chamber manufactured from a special corrosion and heat-resisting material. The access door was also fitted with specially designed gas tight thermal seals.

Multiple gas inlets were provided together with exhaust and drain points for the safe collection of evolved condensates, with the heating elements being isolated from the process atmosphere.

Full temperature programming with digital communications for integration into a production supervisory system was also incorporated.

Increasing the value of gemstones

Elite also won a contract recently to develop a furnace for another highly specialised application – the clarification of gemstones. The furnace, destined for the Far East, will produce gemstones that are significantly clearer, thereby increasing their purity and value.

The furnace will be of chamber design incorporating a vertical elevator and will operate at 1800°C. A requirement of the design is close temperature control with an inert internal atmosphere. The gemstones will be elevated into the furnace where they will be held at a constant temperature, in a non-oxidising atmosphere, for a long cycle time.

Other, more typical, applications for Elite oven and furnaces include curing plastic coatings, lacquers and varnishes, simulating ageing for quality testing, and high temperature surface treatment systems for use in aeroengine turbine blade manufacture. *Tel: 01858 469834. www.elitefurnaces.com*

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This 1200°C, three-zone horizontal tube furnace from Elite Thermal Systems is said to be providing big benefits at the Corus Technology Center - Swinden Laboratory, where it is being used to simulate manufacturing conditions on newly developed grades of steel wire. Previously this research was carried out in two tube furnaces, but a lack of temperature uniformity over the heated length meant that the results obtained could become unreliable.

Each of the furnace's three heating zones is controlled independently by its own thermocouple and PID controller, to ensure a very stable and precise system. This degree of control, together with a number of other innovative features, makes the furnace ideal for simulating the manufacturing conditions. Graded low thermal mass insulation provides rapid response times and optimum thermal efficiency and an outer mesh case cover promotes natural air-cooling for maximum operator safety.

When looking for a suitable system for this application, senior research assistant at Corus, Peter Brownlow, approached several specialist manufacturers of research furnaces for advice. "Elite responded very quickly and with the most positive approach," said Peter. "It was obvious from the outset that they had the experience to understand our precise requirements and could supply a furnace that would meet our needs."