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Heraeus Tests Show New MAX Oven Is Five Times Faster for Glass Tempering

Recent extensive tests in the Heraeus Noblelight Applications Centre have demonstrated that the tempering of glass, heat-formed packaging products used in the medical and pharmaceutical sectors is five times faster and significantly more energy efficient with the new MAX oven than tempering carried out using conventional electric heating techniques. In addition, the compact oven requires much less floor space than a conventional oven and individually-controlled oven elements can be arranged one behind the other in a modular fashion to allow very fast product change-over.

Medication, tablets and pills in the pharmaceutical and medical sectors are often packaged in small glass bottles or ampoules. These need to be safe and clean but the special shape of this glass packaging makes its manufacture something of a challenge. The glass is formed under heat, which means there are residual thermal stresses. Before they are put into use, these thermal stresses must be removed, otherwise there is a danger that the glass will crack. Stress relief is achieved by tempering. This involves a controlled heating to around 600 °C, depending on the type of glass, followed by a slow cool-down. Various technologies can be used for this heating process, including induction ovens and conventional fireclay-clad ovens for batch operation and convection- or standard infra-red ovens for high volume continuous operations. A new development is the MAX infra-red oven, which offers significant user benefits.

Unlike conventional ovens, which use fireclay as the insulating material, the inside of a MAX infra-red oven is comprised exclusively of quartz glass, including QRC® nanoreflectors. This QRC® (Quartz Reflective Coating), developed by Heraeus, is essentially an opaque, white, quartz glass. Its nanostructure imparts a diffuse reflective capability to the material, resulting in a very high homogeneity of the temperature field in the oven. The quartz glass also renders the oven resistant to thermal shock and allows ovens to be more compact and suitable for continuous process applications. In addition, quartz glass is very clean, which is very important in the pharmaceutical manufacturing sector, as it minimises the possibility of the glass containing unwanted particle impurities.

Tests in the Heraeus Applications Centre in Kleinostheim, Germany, have established that when glass is heated in a 150kW MAX oven at a rate of 50 degrees C temperature rise per second then the complete tempering process, including cool-down and dependent on sample geometry, can be completed in around five minutes. By using a polarity meter, it can be shown that the stresses in the glass are successfully removed.

Juergen Weber, development manager at Heraeus, points out another benefit, “Our calculations also showed that with this oven it is potentially possible to temper around 1000 glass products, at just 15 kW, within one hour! This means that tempering is five times faster and cuts energy consumption by over 90% compared with conventional methods.”

Heraeus specialises in the production and application of high quality energy sources covering the electro-magnetic spectrum from ultraviolet to infra-red. It has over 40 years experience in infra-red technology and offers the expertise, products and systems to provide efficient and effective solutions to drying, heating and curing problems throughout industry.

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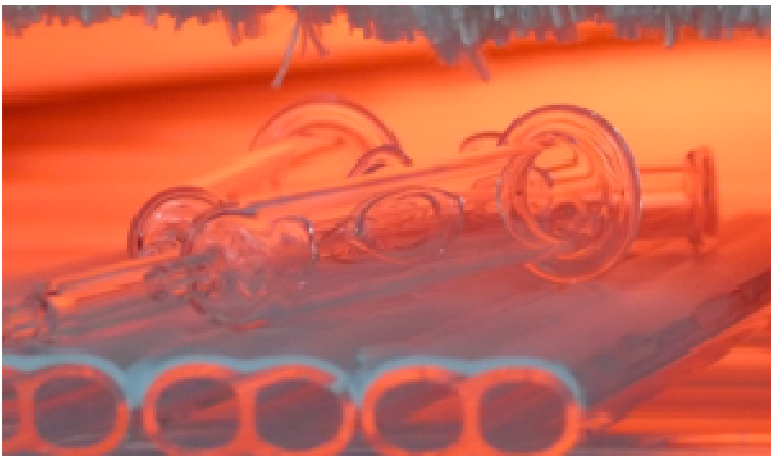


Fig 1: Tempering of glass in the MAX oven

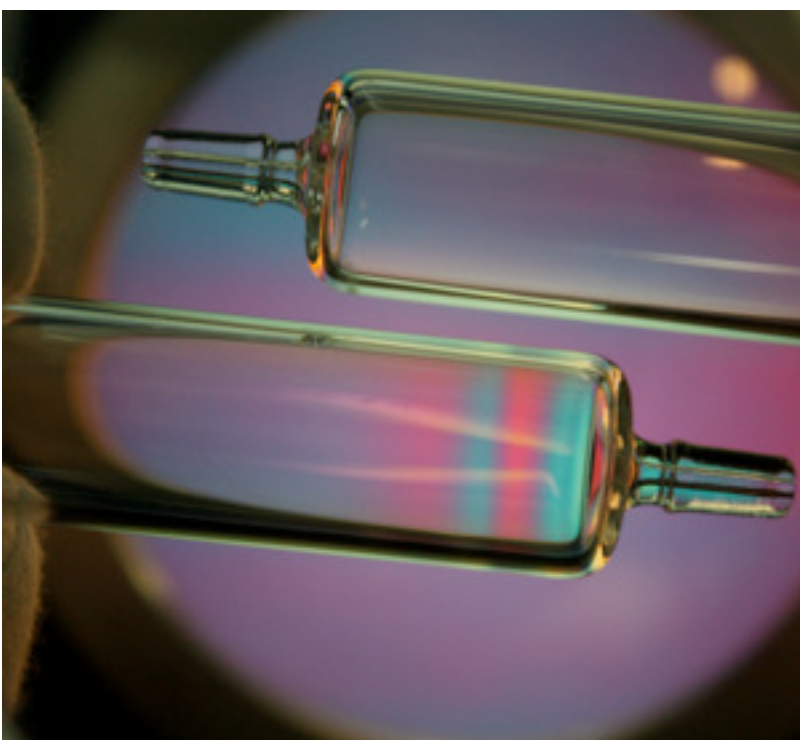


Fig. 2: A Polarity meter illustrates the difference between a stressed and a stress-relieved ampoule