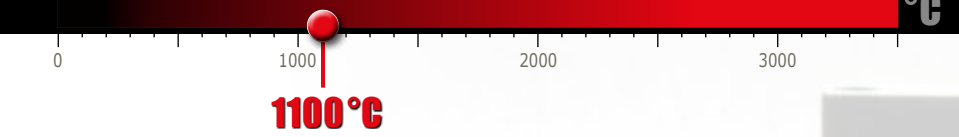




*EBO 120 for catalytic debinding with gas circulation and afterburner*

# Condensate-free debinding with vacuum furnaces

**Today techniques like pressing, rapid prototyping, powder metallurgy, siliconization and sintering are widely used production methods. Sintering, for example, is only the last step of a near-net-shape fabrication technology. Many processes, such as metal injection molding (MIM) for example, require a debinding step prior to the actual sintering.**

## FEATURES

- Catalytic debinding
- Thermal debinding
- Afterburner
- Gas guiding system
- Pre-heating of gas

For metal injection molding a small part of a polymer is mixed with a metallic powder. The so called 'feedstock' is formed which is injected into molding cavities. The molding process allows complex parts to be shaped in a single operation and in high volume. In the next process step the polymeric binder is removed either chemically with catalytic additives, solvents or water, or by heat treatment. This process is called debinding and is usually followed by sintering, which means densification of a material by heat treatment.

In the past, debinding was a rather complex and time-consuming process, carried out in furnaces with single or even multistage condensate traps. These were sometimes followed by elaborate filtering systems for the exhaust air. The use of such filtering systems entailed considerable effort for service and maintenance, often a laborious and rather unpleasant job. Filters had to be replaced, used filters disposed of and the condensate had to be removed from the condensate traps and tubings. This involved disassembly of the entire system and the use of solvents for cleaning. The condensates and the solvents have an unpleasant smell and are both considered a potential health risk. With more comfortable alternative methods available today, this kind of work is no longer economical, especially in the case of large industrial systems with high throughput.

## Examples of products which require debinding

- Small parts for handguns
- Small parts for watches
- Sintered ceramics and metals
- Parts for car engines and interiors

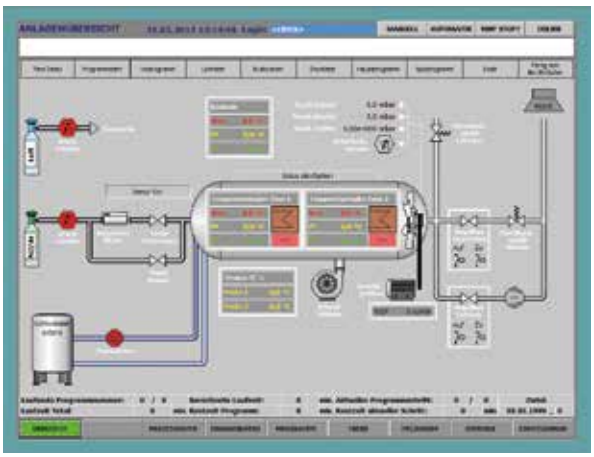
# Modern debinding technology

The drawbacks of the method described above are easily avoided by implementing a special gas flow and modifications to the furnace.

**CARBOLITE GERO offers state-of-the-art solutions for the complete process chain of debinding and sintering.** Furnaces like the **Debinding Furnace EBO** or the **Annealing Furnace GLO** are only two of a range of models designed for debinding prior to sintering.

CARBOLITE GERO's debinding furnaces are suitable for horizontal or vertical operation. With heated doors and tubings and an optimized gas outlet system, the gases produced by the heating process are guided without condensation into the afterburner where they are combusted. The specific design of the afterburner depends on the individual application. The afterburner unit used in CARBOLITE GERO furnaces can be operated with a natural gas / air mixture, propane / air mixture or catalytic ingredients.

It is also possible to attach such a debinding unit to an existing furnace, provided that it is gas-tight. In this case the afterburner unit is equipped with a system of special vacuum pumps which create underpressure. The gas is guided over the sample out of the furnace and into the afterburner.



*Visualization of GLO system*

# GLO ANNEALING FURNACES

CARBOLITE GERO GLO annealing furnaces are **gastight, retort type furnaces heated from the outside.** They are especially designed for processes in which a specific atmosphere needs to be reliably maintained within the furnace chamber. The standard sizes are available for temperatures of 600/900/1100°C and can also be used for heat treatment under vacuum up to 600°C.

- **External heating elements**
- **Dual-zone tube heating element, including special door heater (option)**
- **Incorporated door water-cooling system for protection of sealing**
- **Retort made of 1.4841 stainless steel**
- **Temperature deviation in internal chamber space of max. ΔT = 6 K (GLO ../06 and GLO ../09) or max. ΔT = 10 K (GLO../11)**