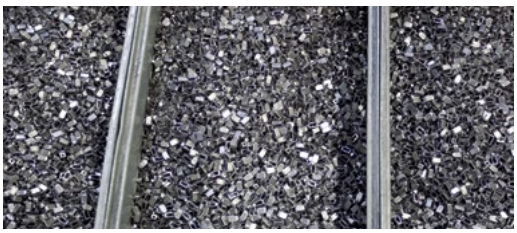
BOC
A Linde company

CARBOJET®. High-speed Gas Injection in a Rotary Retort Furnace.



Reference customer: Weidmüller GmbH, Germany

Weidmüller is the leading manufacturer of parts for electrical components used in energy, signals and data transmission technologies. The Weidmüller Group operates production facilities, sales companies and agencies in over 70 countries. The company is known for its high quality standards and fl exible production. See also the company website: www.weidmueller.de.

Equipment

The existing CARBOTHAN® methanol injection lances were replaced with CARBOJET high-speed nozzles. The atmosphere conditions are monitored as before, using oxygen probes, and the process gas feed is controlled by the CARBOFLEX® atmosphere control system. During the changeover the existing gas systems were put into operation with minor changes. The CARBOJET high-speed nozzles are constructed from heat-resistant material to ensure long life.

Atmosphere supply

High-pressure nitrogen from an on-site liquid nitrogen tank allows for a high gas velocity in the CARBOJET nozzle. Together with methanol, the nitrogen generates the carrier gas inside the furnace. Additionally, propane and often also air is used to control the carbon potential of the atmosphere. If the customer wants to carry out a carbonitriding process, the customer may need to add ammonia. Propane is supplied in tanks or gas cylinders. Ammonia is supplied in gas cylinders or cylinder bundles.

Installation date

The first furnace was equipped with CARBOJET high-speed nozzles in June 2006, and the systemwas able to resume production within a few days. Using the CARBOJET system, all three rotary retort furnaces have been in operation since January 2007.

Background

The high-quality connectors, clamps and screws manufactured by the company need to be carbonitrided in order to ensure the high strength and durability required under demanding operating conditions. Using gases supplied by Linde, this heat treatment process is carried out in a rotary retort furnace at the Weidmüller production facilities located in Detmold, Germany.

Customer objectives

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CARBOJET technology

By injecting a small amount of nitrogen using the CARBOJET nozzles, the resulting high-speed gas flow (250–300 m/s) mixes the atmosphere and ensures the homogeneous distribution of gas and temperature inside the furnace.

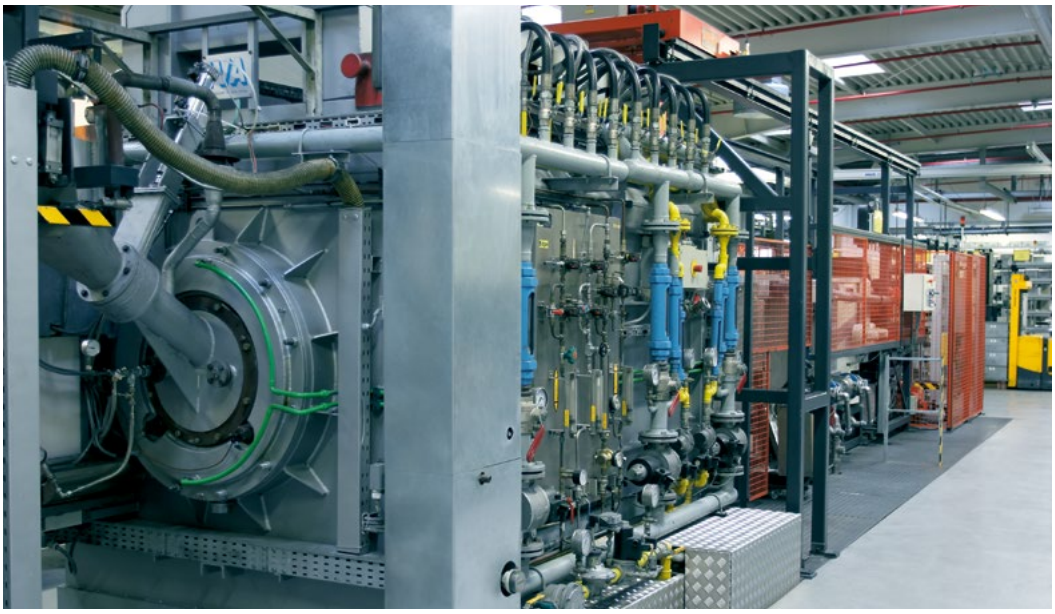
Results

Thanks to the use of CARBOJET high-speed gas injection lances, Weidmüller was able to improve the productivity of its rotary retort furnaces. This was mainly due to better gas convection and heat transfer inside the furnace. The use of the CARBOJET technology also helps to ensure a higher carbon potential and transfer rate, resulting in a homogeneous product quality and reduced soot formation.

Customer benefits

The Weidmüller Group is very happy with the new installations: “After installing the CARBOJET high-speed nozzles, we have not only been able to increase the productivity by as much as 18%, but also managed to reduce the scattering in hardening results. Since we are heat-treating a large number of different parts, it was essential to keep the old optimised process gas and atmosphere parameters. The installation of the CARBOJET concept was a success, since it brought out the best from our furnace with minimum investment and maximum effectiveness.”

“So far we have not seen another system that can achieve similar results. The changes in the gas feed were virtually negligible, and did not result in any signifi cant production shutdown. The application engineers did a splendid job supporting us during the testing period. So it’s no surprise that just six months from the start of the first test we had installed CARBOJET equipment on all our furnaces.”



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