



Reference customer:
Sennestahl GmbH, Germany

Sennestahl is a commercial heat treatment company which has been operating for more than 35 years in Bielefeld, Germany. Its customers come from the automotive and manufacturing industries. See also the company website: www.sennestahl-warmbehandlung.de.

Equipment

The customised solution consisted of one CARBOJET® high-speed gas injection lance per pit furnace with piping and a CARBOFLEX® atmosphere control unit. The CARBOJET® high-speed nozzles are constructed from heat-resistant material to ensure a 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 also 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 August 2006, and the system was able to resume production within a few days. Using the CARBOJET® system, two pit furnaces have been in operation since January 2007.

Background

Sennestahl is a complete solution provider with individual solutions for all possible heat treatment requirements. It handles a wide range of different products and materials in the course of its operations. The various heat treatment processes are carried out using gases and application expertise supplied by Linde.

Customer objectives

Sennestahl was concerned about the time and money it was spending on maintenance and on the replacement of ventilator fans, which were being damaged due to vibration. The company was also concerned about a sooting problem that was affecting the parts carburised in the upper part of the furnace.

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® technology, Sennestahl was able to begin operating its pit furnaces without fans. This resulted in a significant saving on maintenance costs, and because the lances are practically maintenance-free, the pit furnaces can now be operated longer without shutdowns.

The CARBOJET® solution also ensured improved carburising and temperature uniformity, as demonstrated both by CFD calculations and in practice. This resulted in a more homogeneous product quality and reduced soot formation.

Customer benefits Sennestahl's production manager Dietmar Holzenbecher is very pleased with the performance of the CARBOJET® technology in the pit furnaces: "The half-year trial we carried out in the first furnace provided us with solid proof of the suitability of the CARBOJET® system for daily use," he reports. "We've now installed the CARBOJET® system in our second furnace. I'm convinced that this technology is a success in our rough, non-stop operation."

"Broken ventilators are now history. And without the vibrating ventilators we also expect that the heating elements, retorts and brick lining will suffer less frequent damage. We've already seen a noticeable reduction in maintenance costs. All these cost savings would not have been possible without the introduction of the CARBOJET® lances."

"We are very pleased with the service we've received from Linde. It has been a pleasure to work with Linde's dedicated engineers during both the installation and the testing period."



Dietmar Holzenbecher, production manager at Sennestahl GmbH



Now history: broken fans, costly repairs and production downtime

Reference Linde Gas and BOC have installed CARBOJET® lances in several furnaces at several UK and European heat treatment companies.

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