

Mannesmann Precision Tubes pushes the boundaries of precision manufacturing With a CARBOFLEX[®] atmosphere control system from Linde

Highlights

- Precise atmosphere control enabling local production of standards-compliant annealed parts
- Predictable, high-quality annealing results for reduced post-treatment effort (e.g. cleaning and pickling)
- Ease of operation thanks to fully automated control unit with recipes
- Cost savings through optimized gas consumption

Customer

The name Mannesmann has been a byword for the highest quality steel tubes for over a century – ever since the Mannesmann brothers revolutionized the piping, engineering and vehicle construction industries by inventing a rolling process for manufacturing seamless tubes. The Mannesmann business unit is now a member of the world-renowned Salzgitter Group.

As part of the Mannesmann business unit, Mannesmann Precision Tubes (MPT) is a leading European manufacturer of cold-drawn seamless and welded precision steel tubes. The company offers a wide range of premium-quality products and services to create intelligent solutions for its customers' tube-related challenges. Its integrated quality management system is certified to ISO 9001, IATF 16949 and ISO 14001, ensuring consistently high quality standards along the entire process chain – from the pre-material to the ready-to-dispatch precision tube. With locations in Germany, France, the Netherlands and Mexico, the company has around 2,300 employees worldwide.

Building on the research and innovative synergies of the wider Salzgitter Group and

driven by a strong customer focus, MPT is committed to continually evolving its core competencies and performance so it can continue to meet its customers' requirements moving forward.

Challenge

Reflecting this commitment to constantly evolving its capabilities in line with local needs, MPT wanted to expand production capacity at its Guadalajara site in Mexico. The move was prompted by rising local demand for high-quality automotive parts such as camshafts, stabilizers and drive shafts.

These parts are typically fabricated from quenched and tempered steel grades. The high precision and quality levels required for these fail-safe components mandates a heat treatment step for annealing. This annealing step, in turn, calls for a high-performance atmosphere control system within the furnace so the final product is carbon-neutral and oxide-free.

To meet local demand for these parts, MPT decided to add a new 20,000 tons/year roller-hearth furnace made by Bättenhausen to the two existing production lines (with an



The CARBOFLEX control cabinet: the gas flow adjusts automatically to maintain atmosphere composition within set limits.



As an essential part of the installation, CARBOCAT® in-situ catalysts are used to produce high-quality endothermic gas.

annual joint capacity of 17,000 tons). The challenge lay in finding an atmosphere control system capable of giving MPT granular control over the carbon potential in this third furnace so it could meet its quality commitments to its customers.

Solution

MPT turned to its long-standing and trusted partner Linde for assistance. Linde has been supporting MPT with atmosphere control systems at different locations for over thirty years, so it was well acquainted with MPT's application requirements. Having evaluated competitor alternatives and drawing on the insights gained from various live production lines deploying competitor technologies, MPT opted for the proven performance of Linde's CARBOFLEX® atmosphere control solution.

CARBOFLEX provides advanced atmosphere control during carburizing, neutral hardening and annealing in continuous furnaces. It combines gas analytics with a gas flow and mixture control system to maintain the atmosphere composition within set limits – selected to give a much greater degree of precision over the finished parts.

CARBOFLEX is based on a two-in-one design with a nitrogen-based atmosphere system plus an external or in-situ endogas generator (CARBOCAT®). This allows operators to precisely tailor the atmosphere composition to the alloy being treated and the specific zone within the furnace. MPT opted for the in-situ model. In the words of Thomas Mende, Director Corporate Purchasing and Logistics at MPT: "We knew from experience that Linde's CARBOFLEX solution was the most sophisticated technology available and best equipped to give us the granular control over the gases that we needed to meet our customers' demanding quality requirements."

The custom-built CARBOFLEX system was thus shipped to Mexico in 2017, installed in 2018 and went live in February 2019. Linde provided a complete package extending from process consultancy through

installation (including piping, wiring and programming) to actual commissioning, complemented by CARBOFLEX service and maintenance plus technical and safety training.

"The entire project ran smoothly thanks to the excellent team spirit. We knew we could rely on Linde to liaise with our furnace provider and resolve any issues that arose to ensure everything ran according to plan," continues Mende.

Benefits

First and foremost, the CARBOFLEX system gives MPT the absolute precision over its furnace atmosphere that it needs. This enables it to meet ever-increasing demands for surface properties and comply with the rigorous standards specified by its customers. The ability to standardize annealing processes across all Mannesmann sites and thus fabricate key parts locally also translates into logistics and transport savings – as MPT previously exported these components from Germany to Mexico. The capacity to optimize gas consumption paves the way for additional cost savings. CARBOFLEX allows operators to automatically adjust the gas flow in accordance with actual needs and avoid any wastage.

In summary, the system has met all of MPT's expectations and confirmed its trust in Linde. "Ultimately, we knew from experience that we could rely on Linde to deliver on its contractual commitments. This collaborative mindset, coupled with Linde's excellent application know-how and willingness to put this expertise to work for us, was one of the biggest success factors for this project," concludes Mende

Looking Ahead

Building on the success of this and other CARBOFLEX installations across the group, MPT has already placed another order for a CARBOFLEX system for its Hamm site in Germany. The plan is to install the new system when the existing contract with another supplier runs out.

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