Quantima compressors at Badische Stahlwerke

With high efficiency: oil-free compressed air for reinforcing steel production

Ordinary steel can also be produced in Germany at competitive prices, as evidenced by Badische Stahlwerke (BSW) in Kehl am Rhein. The investment in state-of-the-art plant technology for the new wire rod mill is leading the way in conserving resources and ensuring energy efficiency in the production of reinforcing steel. One example of this is the supply of compressed air: five compressors using an innovative compression principle ensure that up to 250 m³/min of oil-free compressed air is generated.

Customer
Badische Stahlwerke GmbH, Kehl
www.bsw-kehl.de/bsw-en/

Product range
Badische Stahlwerke GmbH ranks among the worldwide leading electric steel plants and supplies high-quality steel bars and wire rod to the whole of Europe

Aim of Project
An energy saving supply of oil free compressed air across the entire power range, particularly in off-load

Special feature of the application
CompAir not only supplied the compressors, but also took responsibility for the entire detailed planning of the compressed air station, including processing, storage, water cooling with pumps and heat exchangers, and all of the pipework

Compressed air station
5 oil free and speed regulated Quantima Q-52 centrifugal compressors provide 250 m³/min at 6,5 bar;
1 adsorption and 3 refrigerant dryers;
1 compressed air generation unit and
1 pipework for 2 quality stages

Badische Stahlwerke (BSW) in Kehl am Rhein is a specialist steel producer. The company, located on a peninsula on the Rhine in Kehl, opposite Strasbourg, employs around 850 staff and produces over 2.2 million tonnes of round steel products per year. These are primarily used as reinforcement in concrete construction.

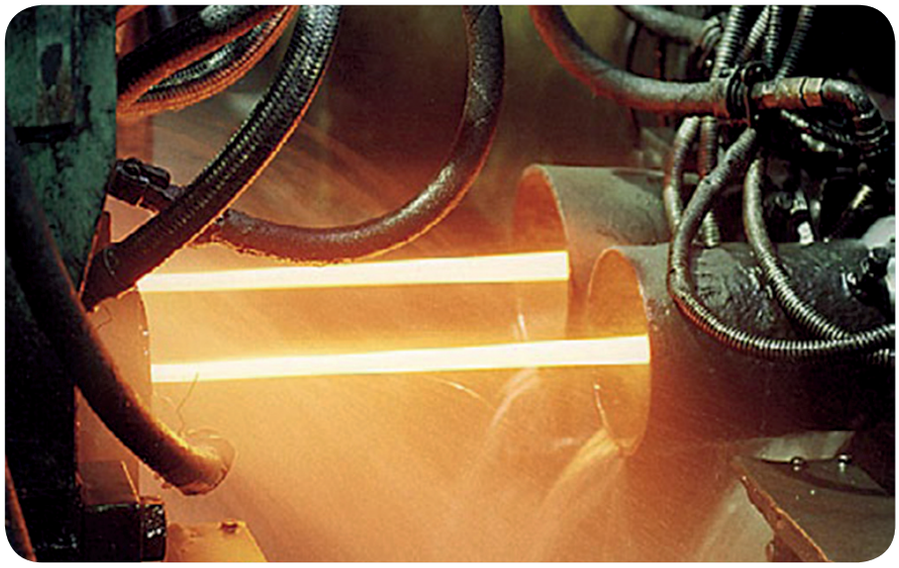
New rolling mill – new compressed air station

The vast majority of materials used are steel scrap, meaning the raw materials cycle is handled almost entirely in BSW's production plant, making their processes highly efficient and very successful.
The company is the market leader for reinforcing steel in Germany and has made substantial investments in recent months to protect the future of its site. To this end, a new state-of-the-art rolling mill has been commissioned with the added aim of meeting increased quality requirements for reinforcing steel products.

The new rolling mill also needed a new compressed air supply. BSW took charge of the planning and invitation to tender on its own initiative in accordance with the plant manufacturer's requirements. Reiner Hagemann: "The new rolling mill needs a maximum of 250 m³/min at a pressure level of 6.5 bar. Some of this is needed

Joachim Lehmann, Dipl.-Ing. (FH), BSW operations manager for maintenance: "It was the 'total cost of ownership' that was critical to our investment decision."

Reiner Hagemann, Dipl.-Ing., BSW operations manager for plant maintenance and new construction planning: "The new rolling mill needs compressed air as control air and for cooling the rolled materials, among other purposes: ...



... After rolling, the wire must be cooled quickly. To achieve this, cooling water is sprayed on the wire at a defined pressure and then blown off. As the compressed air comes into contact with the end product, the surface of which must be oil-free, we therefore need oil-free compressed air."

as control air, although most of it is needed as process air, particularly in the cooling section."

Efficient compressors with an innovative drive concept

It might surprise some compressed air experts that CompAir won the tender with its oil-free Quantima machines. These compressors, which differ from the familiar screw or turbo compressors due to their two-stage compressor unit and innovative magnet-mounted drive, have until now been used mainly in food processing and other sensitive processes that require ultra pure compressed air.

However, the performance data spoke for itself even in this application in heavy industry, explains Joachim Lehmann, Dipl.-Ing. (FH), operations manager for maintenance at BSW: "We used the 'total cost of ownership' as our guide and the Quantima machines definitely came out on top." A major reason for this is the innovative drive and compression principle: a speed-regulated high-speed electric motor drives a rotor shaft which is linked to an impeller at each end and thus compresses the incoming air in two stages. The only moving part, the directly driven rotor shaft, is managed with no contact using adaptive magnetic bearings.

Very low off-load consumption

This simple gear-free design ensures a high level of efficiency across the entire power range, particularly in off-load. With 2.5 % in no-load operation, the Quantima compressors require just a fraction of the energy needed by a screw compressor or standard turbo compressor when idling. This feature plays an important part in making the compressed air supply so efficient. Joachim Lehmann: "The consumption profile fluctuates dramatically, which means that there is no typical load situation typical load situation and the compressors are switched on and off more frequently. The low off-load consumption is therefore a major plus for us."

The fact that two Quantima compressors have already been in use at BSW for several years, and that the company is satisfied with these, also played a part in the choice of compressors. The decisive factor at that time was the fact that the Quantima required very little space: while the previous models that were replaced had to be dismantled in a complex process, the compact Quantima compressors were easy to transport to the installation site using a pallet truck.

One compressed air generation unit – two quality stages

CompAir's concept, which was implemented in the second half of 2013, involved the installation of five speed-regulated Quantima Q52 machines. Each machine is fitted with an electronically regulated 300 kW motor and supplies up to 50 m^3/min of oil-free compressed air.

The control air is processed by two adsorption dryers.

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>
> **Joachim Lehmann, Dipl.-Ing. (FH), operations manager for maintenance at BSW**

CompAir not only supplied the compressors, but also took responsibility for the entire detailed planning of the compressed air station, including processing, storage, water cooling with pumps and heat exchangers, and all of the pipework. The higher-level controller also fell within the scope of supply. Reiner Hagemann: “The new rolling mill placed heavy demands on our engineering capacity, so we made use of CompAir’s ‘manpower’ and engineering services in compressed air technology.”

It was also CompAir’s idea to use a single compressed air station to generate two compressed air qualities. CompAir sales engineer Siegfried Wurth: “About 10 % of the compressed air is needed as control air for pneumatic drives for doors and valves. It is processed via an adsorption dryer with a pressure dew point of –40C. Most of it is cooled using three refrigerant dryers. This allows BSW to dispense with a separate compressed air system for control air.”

Oil-free compressed air – even in the steel works

The reason why the “normal” air at the plant will also needed to be oil-free is easy to explain. Reiner Hagemann: “After rolling, the wire must be cooled quickly. To achieve this, cooling water is sprayed on the wire at a defined pressure and then blown off. As the compressed air comes into contact with the end product, the surface of which must be oil-free, we therefore need oil-free compressed air.”

The new rolling mill has been in operation for a few months, and the plant manufacturer is still making the final adjustments together with BSW to optimise the plant’s operation. As the mode of operation also affects the amount of compressed air needed, CompAir is involved in this work. Exact figures are therefore not yet available for the efficiency of the compressors. However, it is already becoming clear that the facilities are highly efficient. Joachim Lehmann: “The level of efficiency of the compressors is very good.”

Complete confidence in the new technology

BSW has already seen from the existing older machines that the Quantima compressors are also economical in terms of servicing and spare parts requirements. Those responsible arranged a “Q-Pack” complete package for long-term servicing of these compressors when they were installed. Joachim Lehmann: “We have now saved ourselves from having to take this precautionary measure in the truest sense of the word, as we have confidence in the technology. The existing facilities are completely reliable.” Thanks to this, the station was designed to allow a further two Quantima compressors to be installed if required ie if production increases in the future, without any major modifications. Harald Härter, Managing Director of Sales Division Central Europe: “For us, the use of Quantima compressors at BSW is pointing the way ahead, because it shows that this technology also offers major financial benefits to compressed air users in primary industry.”

CompAir was responsible for storage, water cooling with pumps and heat exchangers, and all of the pipework.

Video:
https://www.youtube.com/watch?v=Dn4ZBNXCPiY&feature=youtu.be

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