

CASE STUDY AUTOMOTIVE

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Quantima technology helps maintain high quality standards at Daimler Benz

As part of the process of modernising one of its two compressed air stations, the Mercedes Benz truck plant in Wörth replaced two ageing piston compressors with an energy-saving Quantima Q52 compressor from CompAir.

Following an independent engineering audit, the machine is now delivering up to 5% more energy savings than originally anticipated.

Energy efficiency – a top priority

Daimler decided to replace the compressed air station, as the existing piston machines were becoming expensive to maintain and could not offer the same efficiency as newer models.

Energy efficiency was a major factor in the choice of compressor as Matthias Kreiner (Dipl.-Ing. (FH)), planning engineer with responsibility for compressed air and industrial gases for Daimler explains; “We have always been mindful of the energy usage and costs involved in our processes. For example, there are energy meters fitted at both compressed

air stations, so we know the cost of running the compressed air system as a whole as well as the cost per cubic metre.”

Maximum savings

Following a visit to a pilot user in Finland, Daimler’s planning department opted to replace the two existing piston compressors in the 6-bar network with one Quantima compressor. A Quantima user that replaces a conventional compressor can achieve energy savings of up to 25% and, over a ten-year period, the 300 kW Quantima can produce 1920 tonnes less CO₂ than a conventional screw compressor.

Overview

- ▶ **Client**
Daimler AG, Mercedes Benz truck plant
- ▶ **Location**
Wörth, Germany
- ▶ **Application**
Automotive production
- ▶ **Products**
Quantima Q-52 compressor
- ▶ **Customer Benefit**
High quality air/low processing costs

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Benefits at a glance

- ▶ **Energy savings - up to 5% higher than originally specified**
- ▶ **Low air moisture content - desiccant dryers use waste heat to dry the air, for significant efficiency improvements**
- ▶ **Economic oil-free air - ensures contaminant free air at a low cost**
- ▶ **Compact footprint - easier installation into existing plant**
- ▶ **Variable speed machine - matches air output to plant requirements automatically**

Desiccant Dryers Assist Energy Savings

Each of the three machines in the compressor station is linked to a desiccant dryer. In a conventional desiccant dryer, the desiccant material is often regenerated by blowing externally-heated hot air through it. The Quantima installation differs by using the hot air generated from the second stage of compression to regenerate the desiccant, which would otherwise be lost as waste heat.

This is enabling Daimler to make significant energy savings and the overall efficiency of the compressor station is improved again.

Exceeding specifications

Following installation, an independent engineering consultancy tested the performance of the compressor station. The results were even better than CompAir's original forecasts. Energy efficiency was up to 5% higher and the air quality also exceeded specifications, with low residual moisture content after drying: at average ambient temperatures a pressure dewpoint of around 40°C is achieved.

Reliability and efficiency assured

The Quantima compressor is monitored by the intelligent Q-Master control system, which continually records and checks all system parameters. The system is connected online to a central CompAir control room enabling the company to offer Daimler its comprehensive Q-Life preventive maintenance

package. Combined with ongoing remote maintenance, this provides high compressor reliability with a ten-year warranty.

Technical data

Quantima's speed-regulated, high-speed electric motor drives a rotor shaft that is linked to an impeller at each end. This is managed with no contact using adaptive magnetic bearings – without any gears, rolling contact bearings, friction, oil or wear to achieve speeds of up to 60,000 rpm. Quantima compressors are available with an output range from 26.7 m³/min to 52.1 m³/min at 7 bar – a range previously limited to large screw and centrifugal compressors.

The air flows firstly through a highly effective filter. It is then compressed in the first impeller and forwarded to the second impeller via an intermediate cooler which produces the operating pressure. It then passes through a second cooler, after which it is made available in the system at the appropriate operating pressure or processed in a refrigerant dryer. The Q Master feedback control system uses speed control to provide exactly the volume of compressed air needed by the process. For example, in no-load operation at 2.5%, a Quantima machine requires just a fraction of the energy needed by other compressors when idling.

While other 300 kW compressors generate noise levels of typically 74 dB(A) or more, the Quantima machine, with its acoustic canopy is quieter, at just 69 dB(A).

