Real power consumption instead of nameplate consumption

Third-party control software for compressors enables users to save a lot of money

DIETMAR POLL
PRODUCTION NO. 46, 2015

LANDSBERG. “The Airleader records what is consumed and not what is written on the nameplate,” explains Frank Daibenzeiher, head of environmental and energy management at Inovan GmbH from Birkenfeld. The company has eight compressors in use in two groups are also spatially separated. Five compressors in oil-containing network and three in oil-free network. The oil-free net is required for galvanic applications so that no contamination can occur on the surfaces.

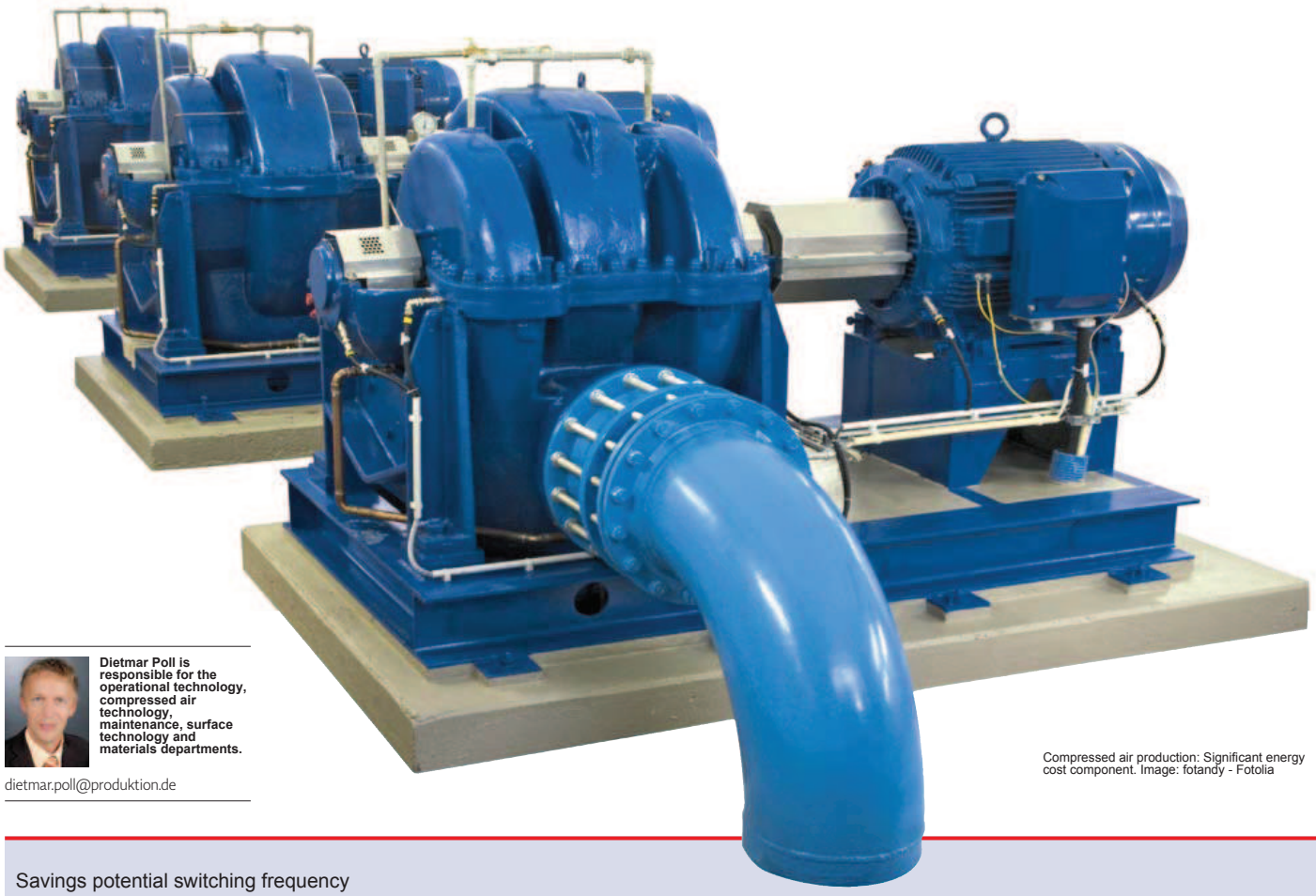
“We operate Kaeser and CompAir compressors and achieved the best results with the manufacturer-neutral Airleader solution from WF Steuerungstechnik.

Because we have an estimated electricity consumption of 268,000 kWh for 2015 - that corresponds to 1/4 of the total electricity consumption in Plant 1 - of which we save around ten percent by using the Airleader. That corresponds to around 4,300 euros per year - just in the oil-containing network at Kaeser compressors," calculates Daibenzeiher. But how exactly does it work?

Werner Weidner, managing director and provider of Airleader: "We know how big the compressors are and calculate the compressed air requirement automatically - we are the only provider. Based on the compressed air requirement, the best combination of compressors is then put together on an ongoing basis."

About the crucial difference between compressed air stations

With or without an Airleader, Weidner says: "In the compressed air stations there is often a lot of idle time and so they do not achieve the guaranteed specific performance. The Airleader can record and determine the compressed air consumption almost in real time - it is not measured, but calculated. It is a sophisticated system in which we distinguish between:

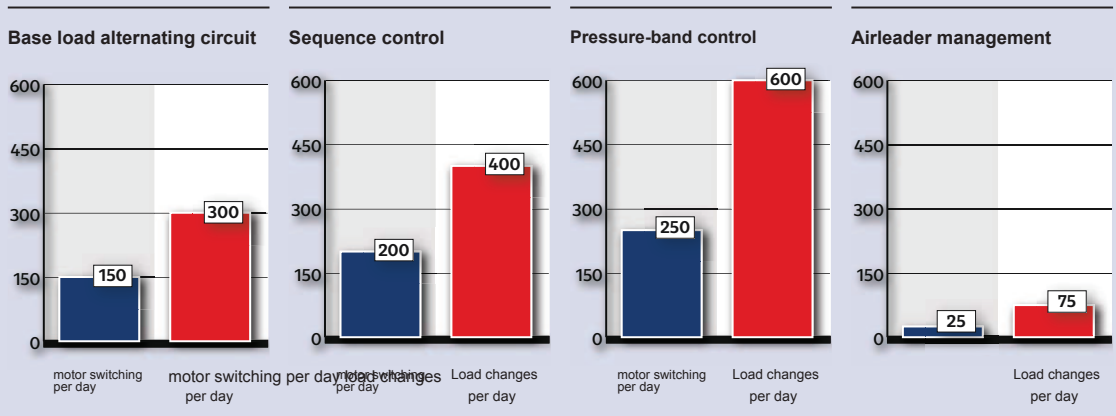


Compressed air production: Significant energy cost component. Image: fotandy - Fotolia

Dietmar Poll is responsible for the operational technology, compressed air technology, maintenance, surface technology and materials departments.

dietmar.poll@produktion.de

Savings potential switching frequency



The control of compressors has undergone a number of developments in recent years. Even though the controls became more and more intelligent, the number of motor switching and load changes continued to increase. The Airleader, on the other hand, puts an end to this and significantly reduces both values.

how heavily a compressor is loaded. We calculate the effective air-storage volume and use the rate of pressure change to calculate increases or decreases in demand. This gives the controller better information for its decisions. In effect, we model the entire operation in real time."

The Airleader is worth it for just two compressors if they have different outputs. The Airleader is used especially in larger stations when users want to be precisely informed about the current status of the respective compressors, "because it carries out a KW measurement and flow measurement, measures temperature and bearing vibrations as well as the dew point. The large compressor manufacturers do not offer this," describes Weidner.

However, there is also a limitation to the use of the Airleader, as Daibenzeiher explains: "In CompAir's oil-free network, all three compressors have an identical delivery rate of 17 m3/min - the Airleader cannot regulate that. However, it indicates that the system is not working efficiently due to the composition of the compressors." Because this 'trio' is not inherently redundant if a compressor fails. "This was not taken into account when we purchased it. That's why we will completely redesign this concept at the next opportunity. Because I actually believe that we can easily double the savings of 4,300 euros. If we replace the three CompAir compressors at 17 m3/min each, round them up to 60 m3 and then work with four different volumes within these 60 m3, the Airleader can switch on and off in different levels," predicts Daibenzeiher. Der



MASTER control for transparent compressed-air distribution: intelligent compressor control can deliver substantial electricity savings. Photo: WF Steuerungstechnik

The focus is on redundancy and energy saving.

The energy savings through the Airleader are also easy to understand, as Weidner explains: "For example, the 132 kW motor of a compressor can only be started four times per hour. Otherwise there will be too frequent start-up peaks. If it gets these ten times, it is certain that it will break down after a few hours. That's why the manufacturers let the compressors run at idle after the load run and that's when it needs idle power." It is precisely these frequent start-up peaks that the Airleader prevents, as can be clearly seen in the bar diagram at the bottom left.

This in turn is confirmed by another user of the Airleader, Stefan Schneider, Project Management at Ronal AG from Härkingen in Switzerland: "Without the Airleader, the switching cycles of the compressors mean that the idling rate is around 20 percent. Depending on the plant's equipment, we can reduce idle times to less than 0.1 percent." Ronal has currently connected all Atlas Copco and Kaeser compressors to an Airleader control system in eight plants worldwide.

sen. Weidner explains: "The Airleader also registers when, for example, a department is no longer working and half of the compressed air network is simply disconnected, so to speak. Because it is an iterative calculation process that is carried out. This process is always running in the background, because the network volume is constantly being freshly calculated. This means that after just a few switching points, the Airleader recognizes that a ratio is no longer correct." Errors can therefore be detected in advance, as described in the two 'Error detection' info boxes on the right.

Further advantages of using the Airleader enable online observation, fault detection either through the direct display or through observation of the pressure curve and maintenance messages. "Now a 'benchmark energy consumption' is also possible because a comparison can be easily carried out using the Airleader calculation. It is also possible to export the data to a higher-level EMS system for the Ronal Group," says Weidner.

The Airleader also immediately notices when there is a big difference.

demand changes abruptly, it uses the average rate of pressure change to calculate the increase or decrease in production demand. "When pressure falls, Airleader can immediately replace small compressors with larger ones, start additional large compressors and then select the correct combination again. Airleader can do this because it calculates the effective air-storage volume and average rate of pressure change," Weidner explains.

But what about the manufacturer's own controls? "The Airleader is a manufacturer-open system - in contrast to the manufacturer's own controls, which make it difficult for companies to add other compressors to their compressor fleet. For example one

speed-controlled compressor to a control from another compressor manufacturer," emphasizes Weidner. This works in theory - but in practice it becomes so expensive and complicated that the customer prefers to buy the compressor from the existing brand. "This means that the customer is protected from competitors, so to speak. All manufacturers have plug-and-play systems, but only for their own compressors," summarizes Weidner.

In addition, any type of positive displacement compressor (piston, screw or rotary) can be connected to the Airleader - "regardless of whether it is 30 years old or equipped with the latest electronic control. We communicate very easily via potential-free contacts and four to 20 milliamperes signals," concludes Weidner.

Error detection I

Defective refrigeration dryer The Airleader detected a defective refrigeration dryer at Inovan GmbH using the standard dew point monitoring, which would not have been noticed without the Airleader. Otherwise the water accumulation in the system would have become too high, which would then result in damage would have occurred. In this way, the Airleader has both prevented damage and achieved an increase in quality, because checking for water content results in a higher quality standard for the compressed air, which was previously not possible.

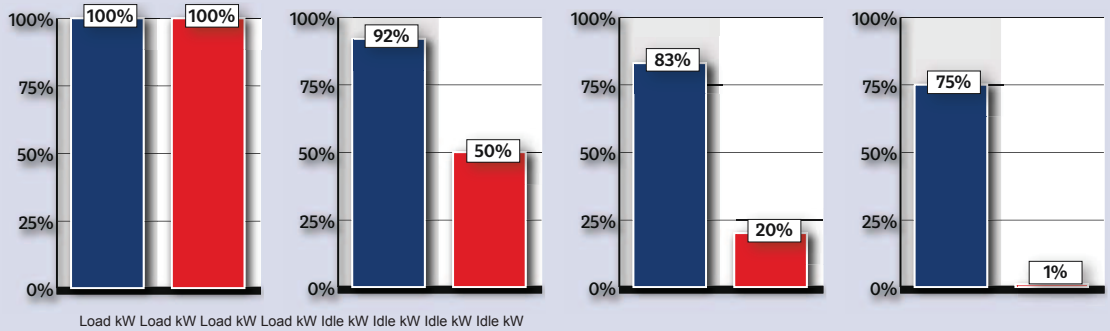
Error detection II

Defective compressor The Airleader measures both the power consumption and the air released by the compressor. When the airleader at Inovan used this compressor and there was no difference in the air produced, it was clear that this compressor used electricity but did not produce compressed air. Thus comes

The transparency of the Airleader control enables a clear assignment of which compressor has which performance. Without the Airleader, production would not have been able to run at full capacity with less compressed air than required and only then would the error have been noticed. This also results in an increase in quality by increasing production stability.

Potential for saving energy costs

Basic load switching switching Sequence control Pressure band control Airleader management



Further developments in controls have had a noticeable impact on energy costs. But here too, the Airleader can top the values again, especially with the significantly reduced idle values.