Higher-level control helps save money

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Compressed air station with idle speed below 0.03%!



Werkbilder: WF Steuerungstechnik GmbH, Wiernsheim

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“That’s impossible,” even experts will say when they find out that a company produces its compressed air with an idle share of only 0.03%. This almost unimaginable result became possible after a speed-controlled screw compressor and a higher-level AIRLEADER control system were installed in the central compressed air station. This control adapts the available capacity of the existing compressors to the fluctuating compressed air requirements with maximum flexibility.



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The higher-level AIRLEADER control from WF Steuerungstechnik in Wiernsheim replaced the existing higher-level control from a well-known compressor manufacturer. This manufacturer had promised that its control system could adapt a compressed air station to fluctuating compressed air requirements with the greatest flexibility. In practice, however, this concept has failed miserably despite all promises and attempts at retrofitting. Today, Joachim Hofmann, factory engineer and environmental protection officer, is delighted that he subsequently decided to install an AIRLEADER control system.

Oechsler AG is a high-tech plastics manufacturer with over 1,200 employees in Ansbach, Weißenburg and Großhabersdorf and a major supplier of plastic parts and assemblies primarily for the automotive, medical and electrical industries. Until 2002, Oechsler produced compressed air at the Ansbach location with four CompAir compressors: three older piston compressors (2 x 10 and 1 x 3.0 m3/min) and a small screw compressor (3.5 m3/min). These four systems were operated via pressure switches with offset switching limits. In 2002, Oechsler changed the manufacturer and bought a higher-level control system from a competitor at the same time as an additional screw compressor (8.2 m3/min). This control should flexibly control the existing compressed air generators at the Ansbach plant over the course of the week

Flexibly adapt to fluctuating needs. It should be able to automatically activate the optimal individual compressor outputs “just in time” for demand-parallel generation. The aim was to significantly reduce the cost-intensive idle time and produce compressed air with maximum efficiency.

Promises not kept

However, immediately after this control system was put into operation, daily practice showed that the system could not fulfill the promises made by the manufacturer. In the control system, the compressors to be activated had to be programmed in advance in fixed time steps according to expected consumption. Example: from 6 a.m. to 8 a.m. compressor 1, 2 and 3; from 8 a.m. to 11 a.m. compressor 1, 2 and 4 etc. Plus Joachim Hofmann. "The system could only activate the compressors according to rigid time specifications, but not flexibly, based on demand. This meant that the control system neither met our specifications nor the manufacturer's promises. This investment was for an economic production of our highly fluctuating and in advance

The AIRLEADER control has met our expectations since its inception

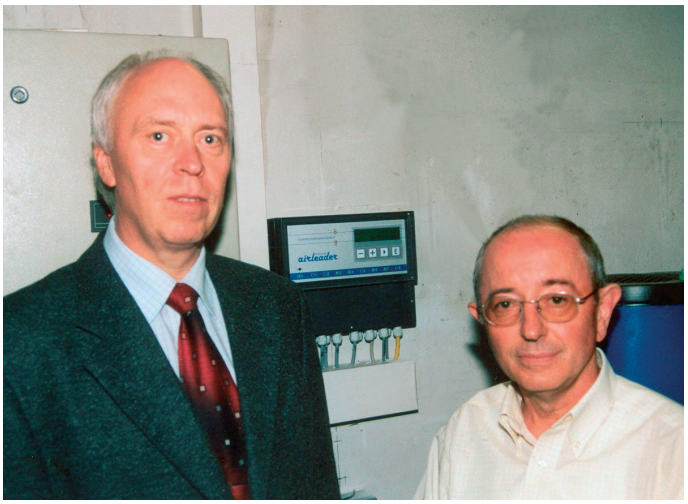
Commissioning in autumn 2003 was fully fulfilled

Completely unsuitable for compressed air requirements that cannot be defined and, despite all the manufacturer's original assurances, not able to switch the required compressor performance on and off as required - i.e. flexibly and without time constraints. Only switching on manually would have been possible. But we didn’t want such an antediluvian system.” The manufacturer then tried unsuccessfully for a long time to eliminate this crucial performance deficit by improving the programming and installing larger data storage. After unsuccessful efforts over more than nine months, it was clear to Joachim Hofmann: The system can only use known demand values from the past with rigid time steps

Oechsler AG compressed air station in Ansbach



Joachim Hofmann (right), factory engineer and environmental protection representative of the Oechsler AG in Ansbach, and Werner K. Weidner (left), managing director of the WF Steuerungstechnik in Wiernsheim



program the future. It is unsuitable for flexible, demand-dependent control of a compressed air station.

Contact with WF Steuerungstechnik

In the meantime, the demand for compressed air had continued to increase, meaning that the compressed air station also had to be upgraded. But now Oechsler took a two-pronged approach:

-For expanding the compressed air capacity
ity, we contacted CompAir again.

-For a higher-level control system,
The existing contacts with WF Steuerungstechnik in Wiernsheim, the control specialist and manufacturer of Airleader, were developed further.

“Owner Werner K. Weidner has ours

Problem analyzed correctly immediately. I had known about the AIRLEADER control offered by WF Steuerungstechnik for a long time. But at the time it seemed to me to be too simple and ultimately too cheap. "Today I regret that I didn't immediately decide on the AIRLEADER control system, but rather on the compressor manufacturer's control concept," admits Joachim Hofmann today. In the parallel negotiations about an additional compressor, Oechsler decided again on the CompAir brand. Area sales manager Rainer Höß recommended an additional speed-controlled system with a range of 1.8 to 13.0 m3/min. After Werner K. Weidner had expressly confirmed that the AIRLEADER control also drives compressed air stations with speed-controlled compressors.

Compressor capacity [m³/min]		Load time [hh:mm:ss]	Idle time [hh:mm:ss]	Load run [kW]	Idle [kW]
1 - Piston compressor 10.0	00:06:53	00:01:23	6.65	0.28	
2 - screw compressor 3.5	29:14:35	00:52:51	643.34	7.94	
3 - Screw compressor 8.2	211:35:51	00:27:18	9,521.90	6.83	
4 - Piston compressor 3.0	13:32:39	00:00:00	279.89	0.00	
5 - Piston compressor 10.0	00:00:00	00:00:00	0.00	0.00	
6 - controlled screw compressor 1.8...13.0	318:27:46	00:00:31	13,728.50	0.00	
7 - Screw compressor 18.0	319:52:59	00:01:59	35,187.12	0.94	

Table 1: Running times of the individual compressors

Joachim Hofmann bought the CompAir compressor and the AIRLEADER control as a package solution via CompAir “from a single source”.

Idle share below 0.03%

"The AIRLEADER control has fully met our expectations since it was put into operation in autumn 2003. The idle times of our compressed air station are now only 0.03%. The AIRLEADER control therefore makes a decisive contribution to the cost-effectiveness of the compressed air station. Now we finally have the solution that we originally wanted," comments Joachim Hofmann. Table 1 shows the values for the period from September 1st to 14th, 2004. With the exception of compressor 3, all other systems are CompAir compressors.

During these two weeks, the regulated screw compressor 6 and the unregulated screw compressor 7 did the main work. They were actively supported by compressor 3 and, to a lesser extent, by compressors 1, 2 and 4. Compressor 5 was not active. In these two weeks (336 hours) 600,774 m3 of compressed air with 59,674.39 kWh were produced. As a result, 0.0993 kWh was required for 1 m3 of compressed air. Particular attention should be paid to the fact that the total electrical requirement of 59,674.39 kWh includes an idle share of only 15.99 kWh. This tiny proportion of just 0.027% convincingly documents the high performance of the AIRLEADER control.

“Universal artist”

The high universality of the AIRLEADER system is proven by the fact that this control

-with any compressor make
ricat,
-with piston and screw compressor
ren
-as well as regulated and unregulated

Systems can work together without any problems, regardless of the age and performance of the systems. In the new professional version, the compressed air consumption is calculated over several different sized and overlapping time windows, independent of the compressor circuits. The container and net volume is automatically calculated by AIRLEADER and included in the result. The self-learning control anticipates the consumption that will occur in the near future and automatically selects from the station's existing "compressor pool" the system or system combinations that produce the currently required compressed air most economically. The only requirement is that the



The AIRLEADER control makes a decisive contribution to the cost-effectiveness of the compressed air station



Compressed air consumption diagram

Compressor gradations idle portion	
100%, 100%, 50%, 50% 15 to 25%	
100%, 100%, 50%, 25% 10 to 15%	
100%, 100%, 66%, 33% 6 to 12%	
100%, 100%, 50%, 30%, 30% 1 to 3%	
100%, 100%, 50%, 20...75% speed controlled 0.5% and less	

Table 2: Examples of compressor gradations and corresponding idling proportions through AIRLEADER control

Performances of all available compressors can be entered once via the control display. Subsequent purchases or decommissioning of compressors can be easily updated at any time. The AIRLE-ADER control can be connected, programmed and put into operation by any electrician.

Stepped compressor capacities

However, optimal savings results require staggered compressor performance. They are available at Oechsler in Ansbach with 3.0, 3.5, 8.2, 2 x 10.0 and 18.8 m3/min as well as the speed-controlled system (1.8 to 13.0 m3/min) in an ideal combination. The speed-controlled system is always known as “system no. 1" active - alone when demand is low, or in conjunction with one or more systems with a fixed speed when demand is higher. This is why the AIR-LEADER control can control the performance range

The speed-controlled system should always be optimally “supported” with systems with a fixed speed that are currently selected depending on demand. An alternative station e.g.. with three 18.8 m3/min systems and one speed-controlled system (1.8 to 13.0 m3/min) could therefore not deliver such an excellent idle result.

However, a speed-controlled system is not an essential prerequisite for economical compressed air production with the AIRLEADER control. According to Werner K. Weidner's experience, when using an AIRLEADER control system, the idling proportions shown in Table 2 can be achieved depending on the corresponding power rating of the compressors.

Even with only fixed speeds in the correct gradation, idling proportions of less than 5% can be achieved because these proportions only occur for the smallest active system, while the larger systems to convert the energy to the maximum during load running. With an additional speed-controlled system, idle speeds of 0.5%, in the case of Oechsler even 0.03%, can be achieved. The latest version of the AIRLEADER control can even operate stations with two speed-controlled systems, which further increases the control range thanks to the additional services.

Total transparency

In addition to the AIRLEADER controller without internal data logging, WF Steuerungstechnik optionally offers inexpensive additional software, which is purchased by operators in more than 90% of cases because of its extensive additional benefits. This software enables all current status data of the AIRLEADER control to be passed on to an external PC via appropriate interfaces, the ability to continuously view its operation on a screen and print out all data. It shows both the current performance and the performance for each individual

In the total electrical requirement is 59674.39 kWh

an idle share of only 15.99 kWh included

a working day in the past transparent. In addition, compilations over longer periods of time and evaluations of individual results are then possible.

The PC software can optionally be extended with a communication module. The data-recording PC can then automatically send fault messages or compressor-service reminders by modem, email, SMS or fax to predefined recipients. Remote software allows data to be queried at any time, an advantage for contracted compressed-air stations. The standard AIRLEADER controller has three analogue inputs. One input is reserved for system pressure. The other two can connect a variable-speed compressor and, as at Oechsler in Ansbach, a dew-point transmitter. If no variable-speed compressor is connected, that input can instead monitor room temperature, a second pressure sensor, a flow sensor or a similar signal. The master-slave version has six analogue inputs, allowing consumption measurements for particular production areas and additional pressure sensors. Both versions allow maximum

Minimal windows. Setpoint deviations are reported. All data can be saved in the external PC. If the AIRLEADER control fails, e.g.. in the event of a power failure, the controls integrated in the connected compressors are immediately activated.

Energy savings of up to 20% and more

"According to our many years of experience, energy savings potential of up to 40% can be achieved with the AIRLEADER control, depending on the configuration of the compressor performance. The average savings is 15%. Even if we can reduce the energy requirement of large stations by just 5 or 8%, this can mean savings of several hundred thousand euros. That's why the investment in an AIRLEADER control system usually pays for itself after three to seven months," emphasizes Werner K. Weidner. The control system was developed over 15 years ago from practice for practice. Because of its significant energy saving potential, it should be part of the basic equipment of every compressed air station. The system is available for stations with 2, 4 and 8 compressors. In the master-slave version, several decentralized stations can even be networked via fiber optic cables, so that 16 or more compressors can be connected via a central AIR system. LEADER control can be driven. Conclusion: no matter what the situation looks like in practice - only with an AIRLEADER control can compressed air be generated with maximum efficiency. "The current AIRLEADER program was designed for the highest possible future security. The software works independently of hardware. Therefore, the program could be transferred to another controller today after the hardware addresses have been linked. We will continually develop the AIRLEADER software. In the future it will offer further interesting additional services via the connected compressors," predicts Werner K. Weidner.