VPInstruments on identifying air leaks and cutting energy costs

Within various industries, addressing compressed air leaks equals efficient energy-use. As CEO of VPInstruments Pascal van Putten observes, today's detection methods include ultrasonic tools and compressor monitoring, which means they can now independently repair leaks and reduce pressure - all while ensuring savings, driving profits and advancing sustainability.

Compressed air is used in factories all over the world to control machines, processes, and pneumatic equipment. It is a safe and easily available medium which can be used in all possible places via hoses and pipes. However, against all the advantages one huge disadvantage looms when we consider compressed air as numbering among the most expensive energy carriers. It explains why many companies try to reduce costs with compressed air leakage management and monitoring. However, many out there can still save significantly more on compressed air costs. Here the simple detection and repair of leaks would be a good place to start. Immediately that results in an energy gain of 10 to 20 percent - with savings that can even reach 50 percent following expansion with compressed air monitoring and optimization.

WHY COMPRESSED AIR IS SUCH AN EXPENSIVE ENERGY CARRIER

As CEO of VPInstruments Pascal van Putten explains: "When compressing atmospheric air to a pressure of 90 to 100 psi, 75 percent of the electrical energy absorbed in the compressor is lost as heat. Pressure loss and leaks, among other things, ensure that the electrical efficiency of the entire compressed air installation is only 7.5 to 15 percent. This can be improved, and you would expect companies to do everything they can to achieve this. Yet this is not the case and every year billions of dollars in energy are wasted worldwide, simply because so many compa-

The VPFlowScope M is Industry 4.0 ready - simultaneously measuring (bi-directional) thermal mass flow, pressure, temperature and total flow

nies neglect to repair leaks and to optimise the efficiency of their compressed air installation."

HARDLY SUSTAINABLE

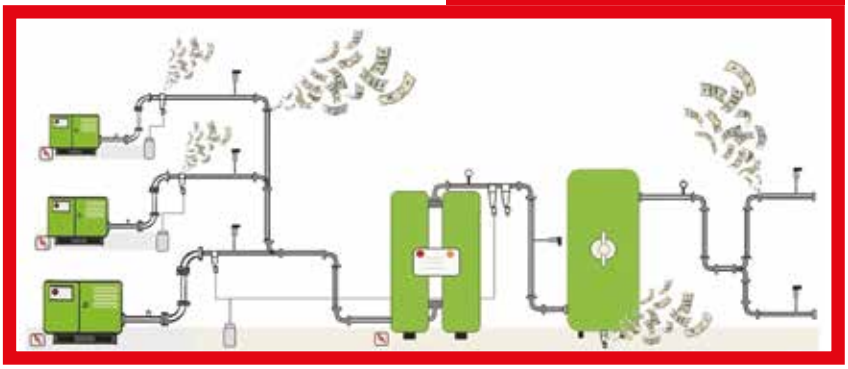
Approximately five percent of all electrical energy used worldwide is converted into compressed air - in the industry this is even ten percent. The generation of this enormous amount of energy contributes to CO2 emissions and climate change. For this reason alone, it is sensible and even necessary to reduce compressed air consumption. In addition, companies simply increase their earnings if they improve the efficiency of their compressed air installation.

LEAKAGE MANAGEMENT: LOW HANGING FRUIT

Addressing compressed air leaks is a critical, yet often overlooked aspect of optimising energy efficiency in industrial settings. Despite its simplicity and relatively low investment requirements, detecting and repairing leaks can yield significant cost savings. Here van Putten underscores the straightforward nature of leak detection and repair: "It is absolutely not complicated and does not require high investments to start detecting and repairing leaks. Let me give some examples of the costs of leaks from an installation that operates 8,760 hours/year. System pressure is 100 PSI and electricity costs come to USD 0.10 per kWh. Ten holes of just 1/16" cost the company USD 10,500 per year. With ten holes of 1/8" costs increase to USD 41,900. And in practice we often encounter hundreds of leaks of all different sizes - also larger than one eighth". So you can imagine what the total financial losses in that case will be. To detect and repair the leaks you will spend a few thousand USD on a simple measuring system and parts such as gaskets, hoses, and quick couplings. We therefore call leaks the 'low hanging fruit' in compressed air installations. Easy to detect, easy to repair - and all while producing immediate financial profit. Companies often have an external agency carry out a leak audit in which all leaks found in the factory are marked with TAGs. It is not uncommon that when the auditor returns to the factory a year later, the TAGs he applied are still there. So, nothing has been done about it while the costs continue as normal!"

PREVENTING PRODUCTION DOWNTIME

Apart from the financial benefits, there is also another and perhaps even more important reason to ensure that the compressed air system functions optimally and efficiently. In many factories a reliable compressed air supply is crucial for the continuity of many production processes. The right amount of flow and pressure determine the correct operation of production machines. However, leaks contribute to



Every second many dollars will disappear into thin air if compressed air leaks are not repaired.

CELEBRATING 25 YEARS PIONEERING ENERGY SAVINGS AND ENHANCING EFFICIENCY

A global pioneer in energy monitoring and measurement solutions, VPInstruments recently marked its 25th anniversary following a quarter-century of contributions to sustainable energy practices.
Since its establishment in 1999 the company has been a leader in providing insights in energy efficiency and management - thanks to easy-to-use solutions that are trusted by professionals worldwide.
VP Instruments' 4-in-1 flow metres, power metres, dewpoint sensors and monitoring systems have all empowered diverse industries - including food & beverage, automotive, glass and consumer goods. Today, insights from the company's instruments help customers to slash up to 30 percent of their compressed air and technical gas usage. To honour this significant milestone, VPInstruments is set to host a series of internal and external activities throughout the year. Notably, the 'Energy360 Conference 2024', scheduled to take place from 18-20 September. Open to professionals and enthusiasts alike, the event will be providing a platform to discuss industry trends and advancements in energy management. Grateful to its customers and partners for their continuous support, VPInstruments reflects today on its journey - all while remaining committed as ever to delivering sustainable solutions for energy savings.

pressure loss. Insufficient pressure can not only lead to machine downtime but also affect the quality of products. Errors in packaging or inconsistent texture/taste of foods can inevitably lead to costly recalls - not to mention damage to a company's image. In addition, if pressure drop is incorrectly diagnosed as an equipment defect, there is a chance that investment in new equipment will be required. This entails (unnecessary) additional investments that could have been better utilised elsewhere. Optimising compressed air systems not only increases energy efficiency. It also establishes the foundation for a reliable and well-performing production process.

Ultrasonic detection makes it possible to identify the location of leaks very accurately. The leaks are then marked pending repair.

LEAK DETECTION METHODS

When a hydraulic line leaks somewhere in the factory and the puddle of hydraulic fluid on the floor continues to spread, it is evident the problem is solved as quickly as possible. Not so with compressed air leaks. After all, being 'just air' there's no emergency situation - they will take care of it someday. Postponement leads to cancellation and the financial and (possible) operational consequences of such a nonchalant attitude will now be clear.

There are various techniques and leak detection methods to quickly and easily detect leaks in compressed air systems, ensuring minimal disruption to operations and maximum cost savings. A few follow here:

- Ultrasonic leak detection. This is a commonly-used method for locating compressed air leaks.
- Ultrasonic detectors can capture high-frequency sounds produced by air leaks and make them 'audible' to humans, allowing maintenance teams to accurately locate, mark and repair the source.
- Compressor monitoring. A widely-applied additional method for detecting (the risk of) leaks is to carefully check/monitor the compressor. This method compares the current performance of the compressor with the achievable/expected performance according to specification. Structural deviations in a negative sense can directly indicate leaks.
- Venting test. This method measures the time it takes for a compressed air system to reach a specified pressure drop. If this is carried out periodically,

a trend-based insight can be obtained into the overall system efficiency.

- Trend analysis. The use of flow metres and monitoring systems provides valuable data about possible leaks. By analysing the measured and trended data, it becomes possible to identify areas within the plant where significant changes have occurred over time or acutely. This may be caused by (sudden) leaks. This 'suspicious zone' can then be specifically examined using ultrasonic measurements.
- Downtime consumption. There are still plenty of factories that do not produce during the weekend. That said, they nevertheless see their compressors kick in during the weekend.
- Measuring compressor power consumption during downtime is a very good indicator of the amount of leaks in a factory.

Leaks in compressed air systems can occur anywhere. They often occur at couplings and in (older) hoses. But also with (incorrectly mounted or corroded) pipes, fittings, filters, regulators and lubricators (FRLs). Leaks can also occur in production lines at control and shut-off valves, flanges, cylinder rod gaskets and thread seals.

BUDGET RESPONSIBILITY

"It is crucial that the maintenance team can independently carry out leakage repairs without the need for approval 'from above' every time," Van Putten emphasises. "After all, this has a very slowing and demotivating effect. It would be useful to introduce a guideline stating that repairing something that costs less than three to six months of energy waste can be carried out immediately and without formal approval. In addition, the savings accrued after repairs in the subsequent period can be added to the energy savings budget. This creates a self-sufficient, cyclical fund within the organisation, with the result that solving leaks and further optimising the compressed air network will make an essential contribution to increasing profits."

PRESSURE REDUCTION

After leaks have been resolved, it is important to analyse and optimise the compressed air installation in a targeted manner. With the help of permanent monitoring, for example, the current compressed air consumption is measured and monitored, and changes are signalled in a timely manner. VPInstruments has developed the real-time VPVision monitoring system that, in combination with VPFlowScope flow, pressure and temperature metres, provides the information that allows a maximum cost-effective compressed air system to be achieved. For safety reasons, an overly-high working pressure is often set, for example seven bars. But is that necessary? Sometimes machines that require high pressure have long been replaced. By reducing the pressure in small steps and monitoring the system and machine performance full-time for correct operation, it is often possible to reduce the pressure by 14.5 to 21 PSI. Here it is useful to remember that every 14.5 PSI pressure reduction means a seven percent reduction in energy costs - while there are no costs to try this out. ■

ABOUT VPInstruments

Offering industrial customers easy insight into energy flows, VP Instruments believe that industrial energy monitoring should be easy and effortless to enable insight, savings and optimization. The company's products are recommended by leading energy professionals worldwide and offer a complete measurement solution for compressed air flow, gas flow and electric energy consumption. Its monitoring software VPVision can be used for all utilities - enabling customers to see where, when and how much they can save. Today VP Instruments products can be found all over the world. The company serves all industrial markets, including automotive, glass manufacturing, metal processing, food & beverages and consumer goods.

With VPVision (here with 6 flow metres) the entire compressed air network can be monitored and optimised, covering power, flow, pressure, temperature, dew point and more.

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