

Improving the sustainability of your compressed air system

Atlas Copco



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Most would agree that maintaining equipment with high-quality servicing is important and beneficial. However, all too often short-sighted financial decisions are made that may overlook regular maintenance of equipment, and this can be more damaging than one first imagines. When it comes to compressed air systems, foregoing a long-term view and only servicing the equipment on an ad hoc basis can end up costing the bottom line as well as the environment, in terms of the wasteful use of energy from unnecessarily inefficient equipment.

To bring sustainability to a business operation that uses compressed air, one should not only focus on the regularity of the service intervals but also the actual quality of the service performed on the equipment. In order for a compressed air system to perform at optimal output level, there are many application-related parameters that need to be considered, including: the quality of the air produced, the pressure that is produced, the volume of compressed air and quality of the overall compressed air system together with related piping and end-user tools.

Both the regularity of the service and the quality of the service are critical. Although these points appear at first quite obvious, often one or both of these fundamental parameters are overlooked for the benefit of short-sighted financial decisions. The old saying goes: “Look after the dollars and the cents will look after themselves”; however, ad hoc service is looking after the cents today but will not deliver the dollars in the long run.

If compressed air equipment is not serviced or the incorrect type of service is performed, energy costs can increase by more than 25%. When one considers that a compressed air system in many cases accounts for 30% of the total energy consumption of a typical industrial site, a seemingly modest increase in equipment inefficiency can translate to large sums over time.

What is quality service?

Quality service means using a qualified person or organisation, with a comprehensive understanding of the equipment, application and your specific needs, to

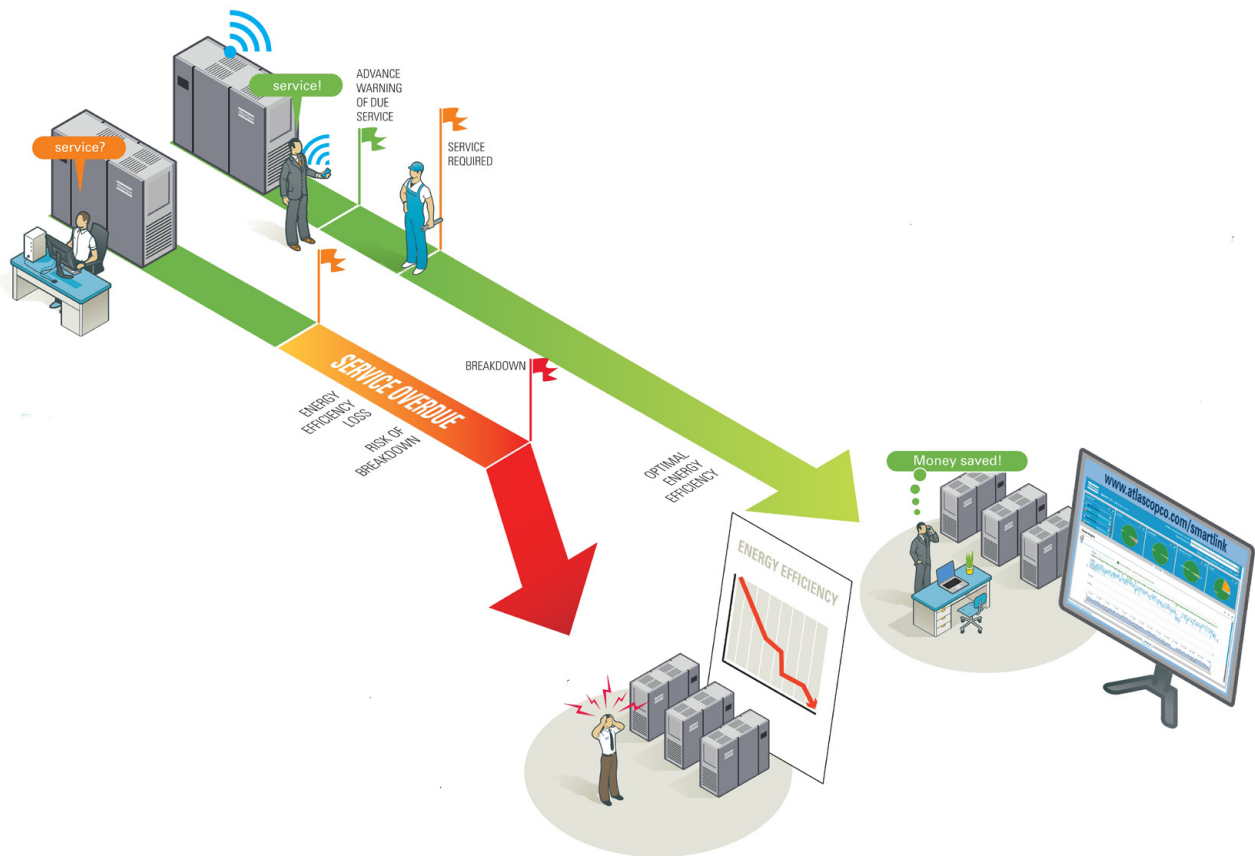
work on your equipment. This means having services performed which are tailored to your set-up, your equipment and your objectives for sustainability. It also means having the services performed by a person or an organisation that understands what you want to achieve and what it means not to waste resources, energy and money.

It is important to have services performed by someone who has been trained to perform the task, can perform the task consistently and has access to both genuine parts and technical resources at all times. Servicing equipment with non-genuine parts will increase your risk of breakdown significantly and may compromise the quality of your compressed air system. If you apply high-quality compressed air standards, such as in food production or in a medical application, this will be detrimental.

How can technology help?

The question of when to service the equipment is sometimes the hardest one to tackle. Many users with fluctuating needs for compressed air find it difficult to know the time intervals for service and as a result may turn to ad hoc service. By doing this, the quality of the equipment may be compromised.

Technology may now provide a solution to this problem, as air compressor and vacuum systems are now ‘connected’. This means the compressor system is remotely connected and can communicate performance data to both the end user and the service provider. Connected equipment can be designed to regularly send updates on the performance and output levels via SMS,



email or both. As a result, potential malfunctions can be identified and rectified before they turn into costly production stops and breakdowns.

The data collected through this technology will not only help keep the compressor system serviced and at its operational peak performance, it will also provide useful data on the equipment output that can be used to overview the business operations.

Having a 'safety gap' built into a system's pressure settings can easily result in more than 5% additional energy cost. For mid-sized industrial operations, this means thousands of wasted dollars, year after year. To ensure stable and economical operation of the compressed air system at all times, a central controlling system is essential and it can be integrated in the compressed air system configuration.

When applying the latest remote monitoring and central controlling technologies together with preventive maintenance service agreements, operational costs can be predefined and budgeted precisely to suit the site's specific needs. This also enables the service provider to assign the best resources for each intervention to make sure correct spare parts and appropriate technical competence are always applied. By ensuring this, respective equipment can be kept running with highest uptime and lowest possible operational costs at all times.

Technology can help determine when service is needed; it can also help users understand their operations in order to make them more sustainable. This can be achieved through reduction in energy consumption, minimising operational spending and making sure they get the longest

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possible lifespan out of the compressor. Technology alone cannot provide such benefits, but in combination with a quality and timely service, the technology can help to unlock optimum operational performance.

VSD technology's contribution to operational sustainability

When considering the heavy reliance on compressed air as a vital source of energy or part of the process in many industrial businesses these days, then sustainable behaviour in terms of a reliant and efficient supply of compressed air is of utmost importance.

Compressed air often accounts for up to 30% of the total energy used in manufacturing facilities. Therefore, a compressed air system cannot be excluded from the equation of sustainability and this was the main driver for Atlas Copco to innovate, invest and develop variable speed drive technology for compressor applications.

What is variable speed drive for an air compressor?

Variable speed drive, or VSD, essentially adjusts the motor speed of a compressor to match the actual need for compressed air. As the demand for compressed air goes up, the VSD drive will ramp up its speed to accommodate the increased demand. However, it is when the demand for compressed air falls that the VSD drive will truly become beneficial. When the demand falls, the motor will slow down and eventually stop completely in order to match the lower demand. This provides significant energy usage savings compared to a traditional compressor that runs at a constant speed loaded and unloaded, using very much the same energy regardless of fluctuating needs for compressed air.

It's commonly understood that nine out of 10 businesses would benefit from a variable speed drive in their compressed air application. In other words, only one out of 10 has a need for consistent compressed airflow. With the majority of businesses having fluctuating needs for compressed air, a VSD can contribute to operational sustainability as it has the ability to reduce energy consumption by about 35%. VSD technology can play a positive part in terms of the overall commitment to sustainability and the reduction in energy waste.

The drive to further the development of VSD

technology has not been standing still since the technology was first introduced in 1994. Atlas Copco has been leading the way, guided by its mission to make businesses more sustainable and less wasteful.

Atlas Copco's latest developments in VSD technology have resulted in VSD+ being introduced. This new drive takes the technology to the next level with an energy saving of up to 50% now possible. When considering the purchase price for a compressor system only accounts for a fraction of the total life cycle cost and the majority of the cost over the lifetime will come from energy consumption, then variable speed technologies and sustainability truly do go hand-in-hand.

After 21 years in the market, VSD technologies are still bringing benefits and these are only going to get greater as the technology becomes more advanced.

External factors are driving businesses to become more sustainable; therefore, business leaders will need to embrace technology to realise financial savings and to ensure the longevity of the business.

With such a high demand for compressed air in so many applications and industries, VSD technology is going to become increasingly important for business owners to gain a competitive edge.

Case study: Queensland manufacturer upgrades to GA VSD+

Australian manufacturer of flexible connectors Aquaknect Flexible replaced its ageing compressors with Atlas Copco's latest VSD compact oil-injected rotary screw air compressor — the GA VSD+.

Aquaknect Flexible has manufacturing operations in Meadowbrook, Queensland, allowing it to tailor-make hoses for its customers' specific requirements with very short turnaround times. The company uses the



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Vaughan explained that Aquaknect Flexible decided to lease the new air compressor rather than an outright purchase, and when comparing the lease costs it is clear why Davies decided on an Atlas Copco GA VSD+ 15kW machine.

"We estimated that an equivalent fixed speed air compressor would cost 50% more over the life of the lease."

He said the GA VSD+ compressor offers a major leap forward in FAD (free air delivery) with improvements of up to 12% and a breakthrough in energy efficiency requiring on average 50% less energy than a comparable idling compressor.

"Plus, it's much quieter than the old Hydrovanes, and other air compressors on the market; down to an unbelievable 62 dB(A).

"In fact, it is so quiet that when the compressor was first installed, the workers at the plant often forgot to turn the compressor off at the end of their shift, even though the compressor is in the work area, up on a mezzanine level.

"To overcome the problem, we simply programmed the machine to turn itself off at the end of every day," Vaughan said.

Suitable for a range of industries, the new rotary screw compressor is driven by a high-efficiency IPM (interior permanent magnet) motor, which exceeds IE 3 rating at 94.5%; corresponding to IE 4 (Super Premium Efficiency motor class).

The compact motor, which was designed by Atlas Copco, features optimal oil cooling and an oil-lubricated motor bearing all in a sealed unit, meaning no greasing of bearings or airflow required for cooling of the motor.

And unlike traditional compressors, the motor and drive train share one drive shaft and are vertically aligned to allow a smaller footprint of 55% compared to the previous range. There are also no gears, belts or shaft seal to maintain.

The whole drive train is completely closed, offering IP66 protection, with one oil circuit that cools the motor and lubricates the element and bearings.

"Our old machines offered an average of 35% power savings, but these machines offer a massive 50% in power savings," said Vaughan.

Other energy-efficient components of the GA VSD+ compressor include a more efficient fan, robust air intake system and an innovative air inlet valve, which is maintenance-free. The mechanical polymer inlet valve uses air to open and close (no spring) and with no 'blow-off' in operation, resulting in no unloaded power consumption.

compressed air to drive its crimping and cutting machines as well as vital testing equipment.

Like most manufacturers in Australia, the ever-increasing cost of electricity was a huge factor when deciding on a new compressor for the manufacturing plant.

"Reduction of running costs, reliability and cleaner air delivery were the key features why we chose the Atlas Copco GA VSD+ air compressor for our Queensland manufacturing facility," said Tom Davies, general manager of Aquaknect Flexible.

Davies explained that the company had been using old technology — three old and inefficient Hydrovane compressors.

"Now we just have the one latest-generation Atlas Copco compressor, instead of three," he added.

Duncan Vaughan, sales engineer with Atlas Copco's Queensland Industrial Air Division, said: "These are brilliant machines. The power savings alone are significant enough to justify investing in a new machine.

"The new compressor delivers far more air, better air quality, and far more efficiently than what the company had in the past."

Operational benefits of on-site nitrogen generation

There's a certain amount of pride that comes from a job well done. It doesn't matter if you're painting your house or landscaping your garden — you can achieve satisfaction and save money at the same time. The same theory can apply to on-site nitrogen generation, which allows manufacturers or industry to generate nitrogen on-site and, as a result, achieve significant savings from economies of scale. And all of this can be achieved without sacrificing purity or quality.

Nitrogen is a dry, inert gas with no odour, taste or colour. It is also available in abundance, as it constitutes 78% of the Earth's atmosphere. The gas is vital to a variety of industries — from food processing to lab work, electronics, marine and mining — and is considered a fifth utility requirement in most of these industries after water, power, gas and air.

The growing awareness of sustainability has prompted many industries to generate their own nitrogen on-site. On-site nitrogen generation not only reduces traffic or movement at a facility from vehicle deliveries but also the associated fossil fuels and emissions from those deliveries, as well as the administrative time and costs associated with processing regular orders.

On-site nitrogen generation can therefore reduce energy use and lower a facility's carbon footprint. Other benefits include:

Supply reliability and quality. 24/7 availability of pure nitrogen gas means no production downtime, continuous production to meet the application's requirements and peace of mind for the user.

Price stability. Freedom from fluctuating nitrogen and delivery costs allows users to establish more accurate operational costs.


Financial savings. On-site nitrogen generation offers potential savings of 40-80%, depending on current nitrogen supply costs. Return on investment could be less than two years, depending on the flow demand, after which point it can provide more than 80% ongoing savings in maintenance and energy costs compared to nitrogen bulk or cylinder use.

Increased operational efficiency. Users can eliminate rental charges, transportation expenses, paperwork costs and evaporation losses of bulk systems.

Safety. There can be a reduced risk of employee injuries from storage tanks or exposure to delivered liquid nitrogen. Truck deliveries and movement on-site can also be eliminated.

On-site nitrogen generation can provide good manufacturing control for customers and an effective way to improve product handling and production. All processes are focused on minimising environmental impact and achieving high energy efficiency.

Atlas Copco energy-efficient compressed air systems, together with nitrogen generators, allow users to produce their own nitrogen gas on-site at the pressure, purity and flow required — all for a fraction of the cost of conventional bottled or bulk nitrogen supplies. Furthermore, Atlas Copco variable speed drive compressors allow automatic adjustment of flow and pressure to match the demands of the nitrogen generator unit. This will increase the user's productivity and lower the energy consumption.



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On-site nitrogen generation can provide a more sustainable and cost-efficient solution than gas delivered in cylinders or bulk supply. Shifting to on-site nitrogen generation is just one way to achieve significant cost savings, with the added benefit of a lower carbon footprint

to help meet the company's environmental stewardship objectives.

Learn more about on-site nitrogen generation and its application by visiting <http://www.atlascopco.com/nitrogenus/applicationstories/>.

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