

Airs & graces

With costs under perpetual scrutiny, Steed Webzell assesses compressed air systems and how best to please both plant engineers and managers in today's tough times



**Above: Domnick
Hunter compressed
air filter elements
Right: CompAir's
SmartAir Master
system**

Every plant has dissected its energy costs in recent years, with electricity, gas and water consumption top of the target list – but what of compressed air? Many plants overlook this utility, assuming that little can be done to impact energy consumption. But, according to rotary vane compressor manufacturer Mattei, a compressed air system can account for as much as 30% of total electricity costs in some plants – so maybe a review could pay dividends, after all?

“When looking to save energy and cut costs, plant managers should assess their compressed air systems, as the electricity consumed during operation over a five-year period accounts for more than 75% of the total cost, including servicing and the initial capital outlay for the compressor,” explains Mattei general manager Andy Jones.

“Many will be surprised to learn that a 132kW compressor could consume over 1,000,000kWh annually,” he adds. “Companies that run several large compressors could easily have associated electrical costs of £500,000 per annum. So, by reducing the system’s energy consumption by just 10%, they could save £50,000.”

There is a plethora of ways to cut the cost of running compressors and they don’t always involve buying new machines. According to Mattei,

undertaking a data logging exercise, checking the system for leaks and assessing the overall layout and design will all highlight where improvements can be made. “Many companies are wasting in excess of 30% of air generated, simply to serve leaks. So it’s a false economy to install a new energy-efficient compressor without first fixing leaks,” says Jones.

According to the Carbon Trust, the leak rate on an unmanaged compressed air system can be as much as 40% of output. Just one 3mm leaking hole costs roughly 3kW, equating to around £2,000 a year. The good news is that there is an easy way to identify air leaks and assess system efficiency.

Compressor specialist Boge advises plant engineers, at the end of a working day, to record

pressure on the air receiver before shutting down the compressor. By timing how quickly the pressure drops, you can determine the leak rate. If the system is efficient, the pressure will remain the same once the compressor has been switched off and, ideally, be the same in the morning. However, if the pressure has dropped, it is a sure sign of leaks. In this

event, using equipment, such as an ultrasonic leak detector, is advisable.

Meanwhile, air specialist Thorite offers a leak reduction programme using ultrasonic leak detectors as part of its compressed air audits service. Every potential source of air leak is checked, with a report locating each leak, classifying it by the amount of air wasted and listing repair costs for each.

All that said, there is little doubt that replacing a compressed air system will offer worthwhile savings in light of recent technology advances. David Burton, general manager at Boge, says that, in most cases, a new system will pay for itself through sustainable reductions in energy costs. “Producing more air than is required means unnecessary cost,” he states. “So, where appropriate, invest in a frequency-controlled compressor that can adapt to demand fluctuations, produce the required volume at a constant pressure and reduce energy costs. A correctly sized unit will virtually eliminate off-load running costs and stop-start current peaks,” he adds.



Riding high

A distributor of compressed air solutions is illustrating why the specialist route can offer the biggest benefits for end users. Activ-Air distributes Norgren products, but has also supplied engineered pneumatic systems to applications extending from theme park roller coasters to underground mass transit systems.

Russell Davison, group managing director at Activ-Air, explains: “Norgren makes it easy for users to get its products, but, as a principal distributor, our [approach] is based around adding value – so ‘specialist’ to us means project-based.”

Davison gives a recent example of Activ-Air meeting a major scheduled refurbishment requirement. Originally presented as a request to tender for 206 new replacement cylinders, Activ-Air carried out an in-depth assessment and proposed a programme of refurbishment for every cylinder. The result was savings 70% above the plant’s expectations.



CompAir makes the point that introducing a modern control system that monitors and optimises the compressed air system can also reduce energy costs. The compressor manufacturer's Smartair Master is a control system that provides detailed management reports to plant engineers. The system controls up to 12 compressors, fixed or variable speed, and claims to reduce energy consumption 35% by operating all of the compressors to the narrowest pressure band.

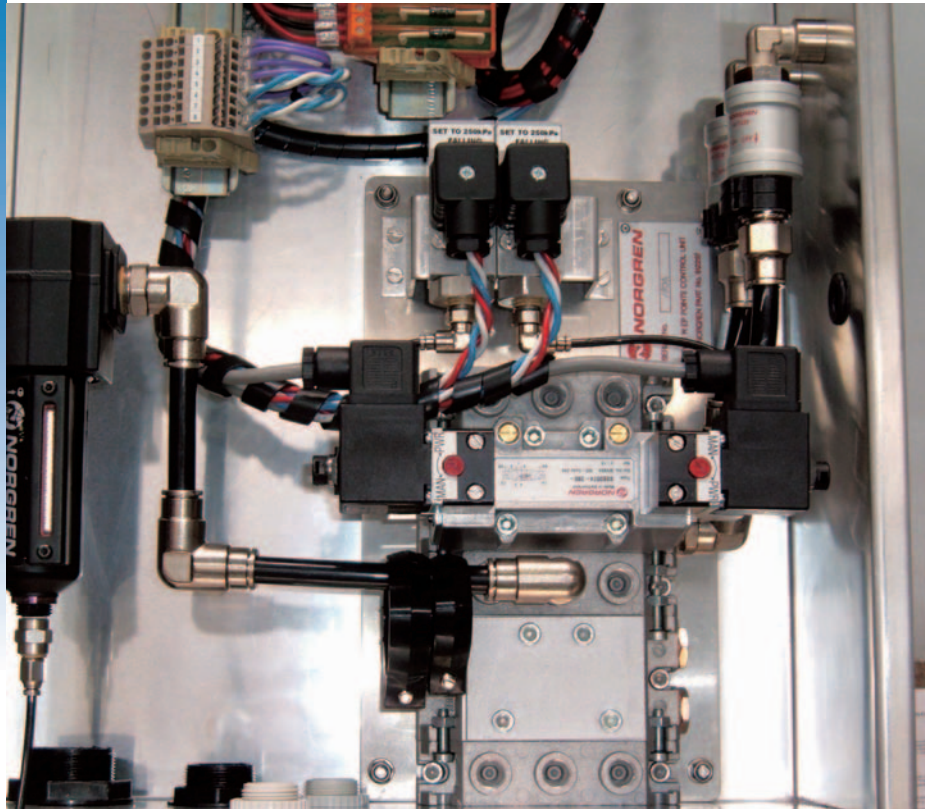
Incidentally, almost the entire energy consumption from the supply of a standard compressor is converted into heat. This heat can be redirected into spaces, such as workshops, or used for pre-heating domestic water – reducing other plant energy costs.

One company to achieve savings from new compressor technology is Thirsk-based adhesive and sealant specialist Bostik, which cut compressed air energy costs by 32%, thanks to the installation of a Boge SLF 125 frequency-controlled screw compressor. "The new compressor has contributed to overall site energy savings of 8% per annum," comments Bostik's engineering manager, Mike Brier.

Environmental efficiency

However, arguably the biggest development in recent years was the oil-free compressor, which has become popular in applications where entrained oil carry-over is not acceptable – such as medical research and semiconductor manufacturing. For example, a water-cooled, oil-free compressor from Atlas Copco helped optical storage media manufacturer Sony DADC achieve its energy efficiency and environmental protection objectives. The firm installed a rotary-screw ZR160 VSD FF unit at its West Sussex plant and is now taking steps towards recovering energy from the compressor to supplement the site's hot water system, as well as the warehouse and office heating circuit.

The variable speed drive feature of the compressor matches output to user demand and is capable of achieving energy savings of up to 35%,




according to Atlas Copco. Additional energy economies are a result of the integral regenerative MD no-loss, heat-of-compression technology dryer, which replaces the original heatless desiccant dryers and their associated purge air losses.

But there is a caveat in all this: cutting costs through planned investments in new technology is one thing; doing so by cutting corners is quite another. For example, replacing filter elements on an annual basis is recommended by most equipment suppliers, but how many actually do that?

This does matter, as failure to do so can adversely affect air quality, a vital element in the efficiency and longevity of any compressed air system. Parker Domnick Hunter explains that it is first important to consider the function of filters, which, throughout their operating lives, are bombarded by oily, acidic condensates and high velocity dirt particles. This, he observes, weakens filter media and, over time, reduces filtration performance which (importantly) cannot be detected by differential pressure monitoring.

Engineers should analyse the cost of replacement elements versus the cost of not replacing them, he advises, taking into account the risk of damaged equipment, downtime, emergency repair costs and contaminated or faulty product batches.

Meanwhile, for plant engineers concerned about quality and the wider compressed air system, Beko has introduced Beko Check, which offers an on-the-spot test. This firm notes that any plant operating a compressed air system has to ensure that unacceptable levels of oil-contaminated condensate are not discharged to sewers or rivers. Beko Check gives a clear indication of whether plants are operating within their consents – and what needs to be done, if they are not. 

Above left: there is no substitute for regular maintenance
Above right:

Norgren's A type EP compressor controls
Below: Atlas Copco's energy efficient, water cooled ZR160 VSD FF compressor

