Gardner Denver

How **efficient** is your compressor?

A guide to optimising energy efficiency to improve a compressor's performance and total cost of ownership

Overview summary

Compressed air – the fourth utility
An introduction to compressed air and the impact that improving energy efficiency can have on your system's performance.

Improving total cost of ownership
How sizing and specifying a compressor correctly can dramatically cut lifetime costs.

Making savings with energy audits
Discover where energy – and money – is being wasted.

Auditing performance
Other opportunities for improving productivity, safeguarding product quality and reducing site downtime.

The 'Internet of Things'
How the fourth industrial revolution is transforming compressor efficiency.

iConn
An introduction to Gardner Denver's revolutionary cloud-based air management platform.

The **fourth** utility

Compressed air is often referred to as the fourth utility. It is essential to many sectors as a safe, reliable and versatile source of power. However, it takes a considerable amount of energy, generally in the form of electricity, to produce the clean, dry, pressurised air that is needed for so many processes and applications.

This is shown by the sheer amount of energy required to meet the UK's compressed air needs. The nation's industry uses over 20TWh of electricity to compress air – the equivalent to the output of four power stations. Generating this huge quantity of compressed air accounts for 10 per cent of the industrial sector's total energy costs.

These figures show that ensuring maximum energy efficiency and minimal wastage should be a key consideration for businesses, regardless of their size. Indeed, they should keep Lord Kelvin's famous saying in mind:

"To measure is to know – if you cannot measure it, you cannot improve it."

As such, identifying inefficiencies and optimising performance is increasingly vital for operators looking to improve their bottom line. The consequences of not dealing with these issues can be problematic for equipment performance and finances.

For further information about these issues and how to improve energy efficiency, read on...

Improving total cost of ownership

A key driver for improving innovation and technological advancement is total cost of ownership. Many factors need to be considered when prioritising a compressor's total cost of ownership, including:

Correct specification

Energy costs have the biggest impact on total cost of ownership, so it is important to check the installed compressor is sized correctly, and suitable for the demands placed upon it.

Over-specifying is unnecessary, as it can lead to a higher initial outlay and more expensive on-going maintenance. To avoid this, engineers need to know the maximum and minimum air pressures and the compressed air flow demanded by the system. On existing systems, this information can be measured by installing a data-logging device, which audits and saves the required data.

This data can be used to select the correct compressor size, reducing the risk of specifying under or over the exact requirement. As a result, an appropriate amount of energy is expended running the compressor, resulting in greater efficiency.

Whole life costs

Though purchasing a compressor with a lower up-front cost may seem shrewd, a cheaper, less proven unit may suffer from maintenance issues in the future. Often, these issues lead to increased service costs, meaning any original savings may be lost later on, as the total cost of ownership rises.

Consequently, it is advisable to view the unit's initial purchase price as part of the larger whole life costs, and not an individual expense. By considering purchase price alongside long-term costs like servicing and maintenance, more informed decisions can be made when specifying a compressor.

Case study

Muraspec

Gardner Denver distributor PSI Air Compressors & Blowers (PSI) helped leading wallpaper manufacturer Muraspec achieve energy savings of £12,000 per year, through specifying an appropriate compressor for their demands.

Muraspec wished to replace their 15-year-old unit with an updated model to deliver improved operational efficiencies and cost savings. Through a data logging exercise to monitor the old compressor's efficiency and cost, PSI proved Muraspec's previous unit, a fixed speed machine, was inefficient.

PSI specified the L75RS compressor from Gardner Denver brand CompAIr, whose oil-lubricated rotary screw 75kW system is ideally sized to meet the needs of Muraspec's manufacturing facility. The compressor features a high efficiency airend that allows operation at low rotational speeds, reducing overall energy costs and total cost of ownership.

"We used PSI's data to specify a system that is fit for purpose, suitable to our daily demands, and incurs lower service and maintenance costs than the previous compressor."

Keith Firmston
Engineering Manager
Muraspec

Making savings with energy audits

Industry averages suggest energy costs account for more than 80 per cent of a compressor's total cost of ownership. With this in mind, it is clear that undertaking a thorough and detailed energy audit could reduce total cost of ownership, while delivering improved levels of efficiency.

An energy audit can be absolutely invaluable to any company looking to improve operational efficiency. They can showcase where energy is being wasted and where it can be recovered, leading to significant cost savings for the operator.

The importance of pre-assessment surveys

Before undertaking an energy audit with a business, a reputable supplier should first carry out a pre-assessment survey, looking at a range of variables that will affect compressed air usage.

These variables can have a huge effect – for example, if inlet temperature rises by 4°C, compressor energy consumption increases by one per cent. Similarly, increasing pressure by one bar can lead to a seven per cent increase in energy consumption.

A pre-assessment survey includes:

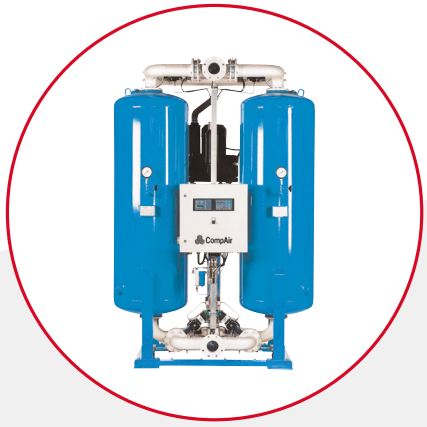
- Observation of current compressor configuration, including compressor house location and conditions
- The amount of power, flow and temperature required for full survey
- The estimated time required for leak survey
- Consideration of site shift patterns and current electricity costs
- Advice on any obvious misuse of compressed air

Gardner Denver reporting

What our energy audits include

From here, the supplier will be able to advise if the site will benefit from an energy audit. A typical report from Gardner Denver, for example, will then include the following:

- An overview of the compressed air system
- A power and flow report
- Temperature data
- An air leakage survey
- A report on pipework issues
- Potential energy saving opportunities
- A proposal of how to implement these suggestions



Case study

BPI Heanor

Gardner Denver distributor Aircare Compressors used detailed energy audits to help plastics company BPI Heanor replace their old drying system with a more energy-efficient solution that paid for itself in just one year.

Following detailed audits, Aircare engineers recommended BPI replace the 10 point-of-use purged desiccant dryers used at their Heanor site with a single CompAir A488TVT Zero Purge desiccant dryer. Replacing these dryers with one efficient, highly-reliable machine reduced BPI's maintenance costs considerably, with a payback period of only one year.

"We now use one central machine to ensure all air is dried properly throughout the site, which makes for a big increase in terms of reliability."

Andrew Terry,
Engineering Manager
BPI Heanor

Auditing **performance**

A compressed air audit will highlight key areas and factors that reduce a compressor's overall efficiency. This can give compressor owners and operators a clear picture of how much these inefficiencies cost, and identify simple opportunities to improve productivity, safeguard product quality and reduce site downtime. Areas targeted by energy audits include:

Pipework leakages

Pipework leakages are a large factor in compressed air energy wastage, accounting for 35 per cent of total air consumption. There are many reasons for leaks in a compressed air system, including shut-off valves and manual condensate valves being left open, and leaking hoses, couplings, pipes, flanges and pipe joints. Such oversights and deterioration can be expensive – according to the Carbon Trust, just one 3mm leak could cost a company over £700 a year in wasted energy.

Commercially-available flow meters can be used to evaluate compressed air generation and downstream inefficiency costs. However, because leaks often recur in different locations, identifying and minimising them can difficult. An energy audit can help identify leaks and ensure they are managed effectively.

Contamination

Compromised piping can also lead to compressed air contamination, as unsealed joints, cracked pipes and open valves letting air out can also let moisture and contaminants in via osmosis. This can result in reduced productivity, downtime and product spoilage, all of which is expensive to resolve.

Implementing a more thorough maintenance regime based off these findings can reduce the likelihood of blocked inlet and downstream filters or contamination, resulting in lower overall running costs.

Auditing **performance**

Heat loss

Energy audits can also be used to quantify a compressor's possible heat potential. Because 94 per cent of compressor-generated heat is recoverable, this can prove invaluable for companies looking to make operational efficiencies.

Heat can be recovered through a variety of processes. This includes installing an energy recovery unit fitted to the oil circulation system, or through space heating – recirculating warm air from the compressor to a local area.

This energy can also heat water supplies in manufacturing processes where heated water is required, such as central heating, hot water washing and steam systems.

Bad piping

The layout and age of a company's pipework can compromise overall compressor performance. For example, old or incorrectly-sized pipework can result in pressure loss, which can reduce the efficiency of your compressed air system. This is also the case for systems that include too many bends, tees or fittings.

Any loss in air pressure must be compensated for by the compressor expending more energy, which increases inefficiency and total cost of ownership. An energy audit can pinpoint areas in the pipework system where upgrades might be required to reduce pressure drops, leading to a more efficient system.

Internet of Things

The fourth industrial revolution

The fourth industrial revolution is driving every business to share and analyse asset data, and the Internet of Things (IoT) is showing no signs of slowing down.

IHS Markit forecasts that the market will grow from an installed base of 15.4 billion devices in 2015 to 30.7 billion devices in 2020, and then 75.4 billion in 2025.

This growth demonstrates that Industry 4.0 and the IoT offer tremendous opportunities to help organisations work smarter and more efficiently. In fact, experts are estimating that the data from these devices will yield insights that drive economic value of more than $11 trillion by 2025.

Taking this into account, it is clear that operators using compressed air can capitalise on the data-driven opportunities available through the IoT.

Industry 4.0's ability to drive companies to share and analyse data every step of the way is creating a real opportunity for compressed air users to consider how data can improve performance and help identify any inefficiencies.

Any initiatives that can help companies identify inefficiencies and assist with performance optimisation, leak reduction and practical air management processes should therefore be welcomed.

iConn

Smart flow management

Industry 4.0 and the IoT are, without doubt, the greatest opportunities available today to help organisations work smarter. To meet this need, Gardner Denver has introduced a new digital platform, iConn, to the market.

iConn is a cloud-based, air management platform, which has been developed to deliver advanced analytics, enabling operators to stay in control of their installation.

The system provides historic, real-time, predictive and cognitive analytics, allowing users to rectify potential issues before they happen.

iConn helps minimise fault incidences for increased uptime, and also provides detailed machine parameters and over-time trend analysis.

As a result, iConn can track real-time data to offer in-depth reports that track energy waste, where it occurs, and how. This enables plant managers to optimise system performance and improve overall efficiency.

The platform is particularly beneficial for businesses with multiple remote sites or unmanned installation, as it enables users to monitor compressor performance from a single location, via their mobile device, tablet or PC.

iConn is also an open platform, supporting ancillary and compressed air products from other brands. As such, it can help provide a platform that delivers truly meaningful compressed air insights, no matter who the manufacturer is.

Case study

Deutsche Fertighaus Holding AG

Deutsche Fertighause Holding AG, a market leader in Germany's prefabricated housing construction industry, used the iConn smart flow management tool to optimise energy use and preventative maintenance processes at their Simmern production plant.

DFH use Compair L-Series screw compressors to supply joinery machines, which engineers had to walk across large production halls to inspect. This is no longer the case – following the installation of iConn, the cloud-based platform gathers and records compressor plant data and makes it available in real-time from a computer or mobile device.

Irregularities, maintenance information, and even information on a stoppage are reported automatically to the user by iConn. It also lets DFH carry out proactive maintenance planning through an 'early warning system' for mechanical issues, and allows for easier remote energy auditing and remote monitoring.

"iConn has helped us achieve measurable success monitoring and optimising energy consumption. It is easy to operate, and saves us time visiting installations - we are simply better informed."

iConn by Gardner Denver

Sven Michels
Mechanical Maintenance Foreman
DFH Haus GmBH.

About Gardner Denver **Industrials**

Gardner Denver Industrials delivers the broadest range of compressors and vacuum products, in a wide array of technologies, to end-user and OEM customers worldwide in the industries we serve.

We provide reliable and energy-efficient equipment that is put to work in a multitude of manufacturing and process applications.

Products ranging from versatile low-to-high pressure compressors, to customised blowers and vacuum pumps, serve industries including general manufacturing, automotive, and waste water treatment, as well as food & beverage, plastics, and power generation.

Our global offering also includes a comprehensive suite of after-market services to complement our products. Gardner Denver Industrials, part of Gardner Denver Inc., is head-quartered in Milwaukee, Wisconsin, USA. Gardner Denver was founded in 1859 and today has approximately 6,500 employees in more than 30 countries.

For further information please visit www.gardnerdenver.com/industrials

Disclaimer:

Information contained in this publication is provided “as is” and without warranty. Gardner Denver disclaims all warranties, express or implied, and makes no warranty regarding the accuracy or applicability of the information contained in this publication, and is therefore explicitly not responsible for any damage, injury or death resulting from the use of or reliance on the information. No part of this publication may be reproduced or distributed for any purpose without written permission from Gardner Denver.

©2018 Gardner Denver. All rights reserved. Subject to technical changes.

Gardner Denver

enquires.red@gardnerdenver.com