

Improving the compressed air distribution system

The purpose of installing a compressed air distribution system is to deliver compressed air from the compressor house to the point or points-of-use. BCAS takes a look at improving the compressed air distribution system.

At the time of original design a number of factors will be taken into account including the total flow capacity of the system, operating pressures at points-of-use and exceptional flow demands. These factors will be used to determine the type of system, for example, a ring main, a combination of ring mains with sub headers, or a simple single line system.

Correctly sizing the pipework at this stage is critical to ensuring the pressure drop across the system – from the discharge at the compressor house to the point-of-use – is no more than 0.2 bar, generally accepted as best practice.

This is not a difficult process for an experienced compressed air engineer, however as time goes by requirements often change - driven by new processes, updated equipment and variations to production patterns. As these factors are difficult to accommodate in the initial design the impact on the performance of the compressed air distribution system must be understood to ensure that compressed air continues to be generated and distributed in an electrically efficient manner.

By recognising that every 1 bar of pressure drop represents a 7% increase in compressor energy costs, the energy manager or auditor can target aspects of the system causing compressors to operate unnecessarily or at pressures significantly above those required at the points-of-use.

The following points should be considered when looking for energy savings:

- Start in the compressor house: pressure



drop is the enemy of the energy manager – over pressurising the system to overcome inadequacies of design and installation is very expensive in terms of the consumption of electrical energy. Compressors operating at excessive pressures are easy to identify and the additional cost is also simple to calculate.

- Be sure the pressure drop across the air treatment package can be measured. Replacing undersized pipework and maintaining air treatment equipment provides a rapid pay back.
- For larger systems flow and simultaneous pressure monitoring provide accurate data, which should be used to modify the installed system and equipment accordingly.
- For the distribution system as a whole, leak detection is the best way to identify leaks, and the rate of leakage, allowing areas of most significant wastage to be rectified first.

- Redundant pipework should always be isolated.
- Zoning parts of the system used infrequently or only during particular periods ensures that even small leaks are not contributing to wasted energy.
- Look for opportunities to treat compressed air locally - centralised over treatment of compressed air is very expensive not only in terms of initial capital cost but also as a result of the costs associated with maintenance, energy usage and the pressure drop.
- Be conscious of high-pressure applications; a separate high pressure pipework system or localised compressor or booster may prove to be a cost effective way of satisfying a demand whilst allowing a reduction in the operating pressure of the compressors.
- Remember, lowering the operating pressure in the compressor house by 1 bar reduces the compressor energy costs by 7%.