Resource Navigator Club Member

Central Joinery

Case Study

Compressed Air Energy Savings

Company Overview

Left, Central Joinery factory and offices, recently constructed in a purpose-built unit

Central Joinery was established in 1993 and has specialised in the manufacture of staircases and other prefabricated joinery products for the building and refurbishment industry. The company employs 45 staff, and is located in Cadley Hill Industrial Estate near Swadlincote. Customers include Persimmon Homes, Crest Nicholson and Various Builders Merchants such as The Wolseley Group, Buildbase, Jewson etc. Turnover has increased by 20% over the last 3 years.

When the factory was built, compressor manufacturers were contacted, and two 60 cfm compressors were installed to meet the compressed air requirements of the production area. These have served the company well, and the company's management believed that there was little opportunity to optimize compressed air delivery, as the system was relatively new and free of leaks.

Initial Measurement and Analysis

As part of an RNC energy visit, low cost temperature loggers were used to check the behavior of the compressors. This revealed that the temperature of one unit cycled up and down, while the other remained relatively stable. Interpretation of this data suggested that only one compressor was doing useful work, though both were normally left running during working hours.

Opportunities and Actions

Based on the above, the opportunity was identified to save energy by turning off one of the compressors.

Initial Outcomes

Having turned off one of the compressors, no adverse impact on air line pressure was observed. The compressor room was cooler and quieter however, and maintenance costs were reduced in line with the reduction of 'powered on hours', though the magnitude of the energy and cost savings could not be accurately assessed in the absence of electrical data.

Case Study produced on 29th November 2007

Further Measurement and Analysis

To investigate the situation in more detail, the RNC team used a three phase electrical data logger to investigate the behavior of the air compressor in use on a typically busy day.

This determined that while switched on but not providing air, a compressor draws 8.5kW, and that while providing air to the receiver and plant, it draws 14.5kW. It was also noted that even during the busiest part of the afternoon, the compressor was nor delivering air for more than a third of the time. This suggests the following conclusions.

- That the peak air requirement is around 20 cubic feet per minute (cfm).
- That the original specification of a pair of compressors offered about six times overcapacity.
- That even with only one compressor on at a time, there is ample capacity and significant waste of energy.

Left, electrical data logging for one of Central Joinery's compressors

Given the operating hours of the facility, it can now be seen that turning off the second compressor will save 17MWh, £1,700, and the emission of over 7.3 tonnes of CO_2 per year. It will also result in a £735 annual savings on running and servicing the compressors.

If a variable speed drive (VSD), 30 or 40 cfm screw compressor, were to be installed at a cost of £3,300 to £3,700 (the existing compressors could be retained as back up equipment), it is likely that this would save more than £500 per year, suggesting a likely payback time of less than seven years. If an interest free Carbon Trust loan, repayable over four years, were to be secured however this burden would be significantly reduced, and likely increases in energy prices are also likely to reduce the payback time. Should one of the existing compressors fail out of warranty and need replacing, it is likely that a VSD replacement will only cost a few percent more than a conventional machine, the additional capital cost required being recoverable in a small number of months of use. Consideration is being given to funding such a purchase using a loan from the Carbon Trust.

Although only one of the compressors is now used at a time, their use is alternated to even out ware and tear on the machines. It has been noted that one of these machines provides an operating pressure between 6 and 7 bar, while the other delivers between 7 and 8. As users of the air are happy with the lower operating pressure, both compressors should be set to operate in the lower pressure range. This should cost nothing to implement, and reduce the running costs and carbon emissions from the compressor with the higher output pressure by about a further 10%. Experiments should be undertaken to see if the line pressure can be reduced further without adverse effects on performance.

Total on-going annual savings due to this RNC identified to date amount to £2,435.

Lessons to Learn

Many businesses operate multiple compressors. Few have assessed their peak and average demands for air accurately. Many, if not most manufacturing businesses, would benefit from checking the efficiency of their compressor configurations, as reducing overcapacity can contribute to the viability of the business, especially as energy prices continue to increase.

Case Study produced on 29th November 2007