Energy and Water Technology optimisation services - EWTOPS by JBA Consulting

CASE STUDY | PROCESS ANALYSIS - COMPRESSED AIR USAGE AT BRADFORD UNIVERSITY

Challenge

Although the Estates Department of Bradford University had invested heavily in more efficient equipment, they were interested in EWTOPS process analysis services, as they had never performed a detailed review of the processes dictating their energy consumption.

Consequently, Bradford University commissioned JBA Consulting to complete a detailed process analysis of their compressed air usage in two buildings – Richmond Workshop and Chesham building, each containing engineering workshops and scientific laboratories. Specifically, they were aiming to identify energy waste and reduce costs relating to the operation of the compressed air systems.

Solution

A site visit to understand the processes within each of the buildings quickly revealed the most pertinent issue – air quality requirements. As a result, it was highlighted that significant amounts of waste were related to inappropriate moisture levels being present. The scope and aim of the study narrowed into minimising the uncertainty regarding compressed air usage (required flow rates) in the two workshops and calculating the moisture content of the compressed air to recommend a range of air drying solutions.

Results and analysis

For the Richmond Workshop, the results and analysis illustrated:

- Large discrepancy between the theoretical and actual compressor load factor. Theoretical compressor load factor was calculated to be 88% based on process requirements guided by observations during the site visit. The meter readings suggested a compressor load factor of 7%.
- The compressed air quality for the drying process of polymers is not clearly defined, and the process is not reviewed for compliance. However, this study showed that the compressed air contained significant amounts of water, which was detrimental to the process requirements - Air quality requirements vary for different processes.

> “The work that Andrew undertook on hydraulic and compressed air systems was an excellent case example of being able to take a complex problem, collate and interpret data and provide the University with clear insight into financial paybacks and improved end use applications.”

- Time required for drying is dependent on the moisture content of the compressed air resulting in potential energy savings if the moisture content was reduced at the point of compression.

For the Chesham building, the results and analysis illustrated:

- Very few permanent users of compressed air but many extensions of the system leading to laboratories and other 'make-shift' points that appear to require low and intermittent volumes of air
- Flow rates of users do not relate to the average daily use indicating either additional users of compressed air or a series of leaks in the distribution network
- High moisture levels in the compressed air were also found to be a problem, once again resulting in significant energy waste while the air lines were drained – with the compressors still running

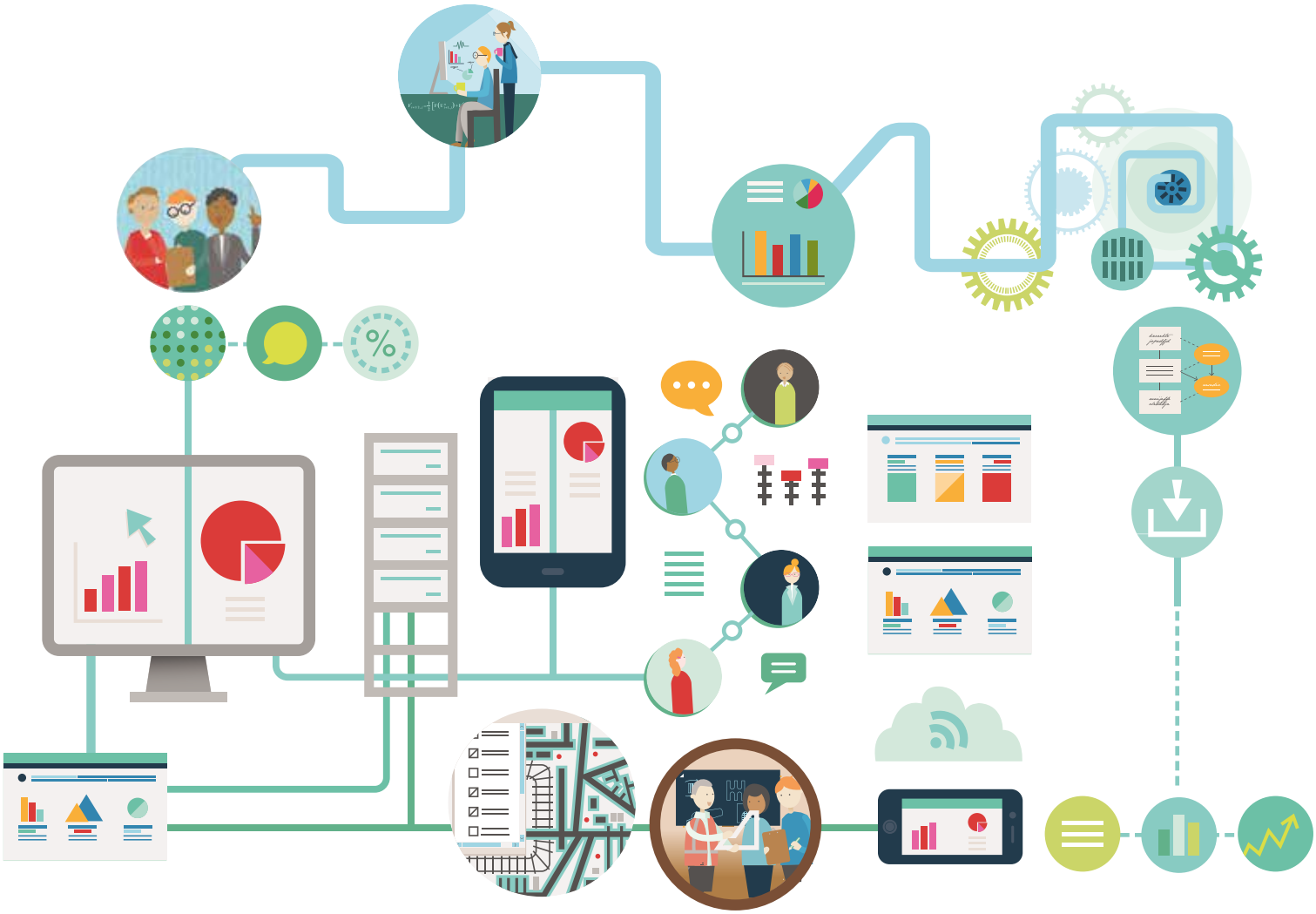
Benefits and recommendations

A holistic approach to applying process analysis helped direct the University Estates Department of Bradford University to identify and prioritise the requirements of the users of the buildings to maximise their return of the study and determine the following actions.

Further recommendations included:

- With different requirements for different processors, recommend localised compressors and air blowers instead of the existing centralised plant
- Air leakage test should be carried out in order to determine the discrepancy between the apparent air usage on the date of the site visit and the theoretical requirement
- 30-minute air monitoring or electrical energy meters loggers to be installed on air compressors to increase the understanding of air volume usage and usage profiles

EWTOPS process analysis can be applied to any industry or process to find energy and cost savings beyond the 'low-hanging fruit'. It takes into consideration all factors of energy consumption and uses a multivariate and iterative approach to identifying the significance of these variables. For example, the variables in the manufacturing industry could include the quality of production product, or the temperature of the storage of raw materials.



Contact: Andrew Collier | Tel: +44(0) 1756 693 075 | andrew.collier@jbaconsulting.com
www.jbaconsulting.com | twitter.com/JBAConsulting