

ENERGAIR CASE STUDY



BRITVIC
BOTTLING PLANT

BRITVIC PLANT REDUCES COMPRESSED AIR GENERATION COSTS BY 30% AND ACHIEVES ANNUAL CARBON SAVING OF 772 TONNES.

A recently completed energy efficiency improvement programme at the Britvic Beckton bottling plant has resulted in substantial energy savings and a positive impact on the company's carbon emissions allocation.

The program employed independent auditors to review and make recommendations on improvements to the high-pressure air generation system on site. The recommendations resulted in a new EnerAir control system for each existing piston compressor, the integration of a new compressor and the installation of an overall management, control and PC visualisation package from EnerAir that provides integrated live control and reporting functions

for the entire system, including the cooling, air preparation and building ventilation systems.

Kevin Cunningham, on the Britvic site management team comments, "Minimising the environmental impact of our operations is important to Britvic and reducing Energy Consumption is a key aspect of that policy. We were aware that a large part of our energy expenditure is in compressed air and commissioned energy auditors Air Compression Technology (ACT) to benchmark and audit the high-pressure compressed air system during October 2004. ACT collated all the operational data, analysed it and then met with us to discuss the plant operational requirements in detail. From this meeting we were able to establish accurate estimates for



the possible savings and create a clear strategy for delivering and maintaining tangible energy, cost and carbon savings."

Graham Coats, Director of EnerAir Solutions Ltd, adds "PET bottling plants tend to work on far higher pressures than normal automated production lines, typically 40bar as opposed to ~7bar, requiring more power and often providing a greater opportunity for energy saving. With the recent rises in energy costs and the experience we had gained from systems we have completed on other PET plants, we were confident significant savings could be realised."

The table below summarises the improvement in system performance since the introduction of the compressor management/control system. The system has achieved the energy gains by optimising the installed compressor set, stabilising the system pressure and allowing a careful but precise reduction in the system operating pressure. Further energy gains are expected in the short term through effective management and further fine-tuning of the system.

	KPIs	Result
1	Generation efficiency	Improved on average by 5.46%
2	Cost per delivered m3	Decreased on average by 5.26%
3	Annual generation costs	Decreased by 29.36%
4	Annual kWh used	Net saving of 1,797,131 kWh
5	Net annual carbon saving	Saving of 772 tonnes

Note: All summary calculations are based on the cost per unit of electrical energy @ £0.032/kWh and is based on the system being operational for 8,400 hours/annum.

Kevin Course, of Air Compression Technology Ltd, the independent Site Auditor, "Importantly from the client's point of view the results are also highly measurable; we now remotely collate data on a weekly basis from the on-site EnerAir communications module. The data is analysed and reported back to the client on a quarterly basis. The reporting and ongoing support from ACT Ltd. ensures that Britvic is able to continually maintain optimum efficiency levels (measured in input kW against output m3/min) regardless of any future change in their compressed air demands."



This installation also presented a number of practical challenges for EnerAir to overcome, not least that the original control cabinets for the four original high-pressure reciprocating piston type compressors had to be replaced in order to update to the new control technology. A recently installed fifth compressor was also integrated into the system and only required the replacement of its PLC controller.

Graham Coats, "The EnerAir SX unit manages the sequencing and duty cycles of the compressors, but because the original solid state controls did not afford any of the connectivity or fine tuning required to optimise the system, we built a new state-of-the-art compressor controller for each compressor. The new controls allowed us to fully utilise the variable load capability of the compressors and sequence the different sizes of compressors on site to match demand in the most efficient combination possible. The control installation included new cabinets, I/O modules, an Airmaster machine controller, user interface panel LCD HMI, terminals, switchgear, cabling and commissioning."

The previous control system required a complex sequenced start-up and shutdown procedure that required a long list of checks and switches to complete. Now, the process has been automated to the point where a single physical start button pressed either locally or on virtually the PC will carry out the complete timed and sequenced start routine including all the parameter checks and power switching. This improvement not only saves time for the operating crew, but it also contributes towards increased plant safety.

The compressor control elements were supplied by (EnerAir sister company) CMC Controls based in Belgium, one of



the world's leading suppliers of onboard compressor machine controllers and custom compressor control HMIs. Once installed, the energy savings are derived from applying a combination of system pressure optimisation principles, matching air generation closely to demand, ensuring compressors are working at their optimum efficiency and only running when they are needed.

Air pressure sensors are fitted throughout the system and used to feed live data into EnerAir 'EnerSoft – Analysis' data manager software that is hosted on an onsite PC, this collates and records all the data and makes it available online to ACT Ltd. where it is compiled into specific Key Performance Indicator (KPI) reports. For day-to-day maintenance monitoring The complete compressed air system, from compressor, through to the dryers, cooling system and out across the plant is represented visually on screen in a Windows XP environment using EnerAir's EnerSoft – Visual software package, with key indicators such as system pressure and efficiency displayed clearly on screen as analogue style dials.

The data is updated every few seconds and so the information seen on screen is virtually live, Britvic are able to predict and plan for any changes made to the plant and report effectively on incremental positive changes made to keep efficiency maximised.



Kevin Cunningham,
"The project has been judged a real success as we have achieved all our predicted goals for energy saving and improvement in control and reporting. The system will now continue to reduce energy usage and improve efficiency on an ongoing basis. Based on the success at Beckton other Britvic Group company plants are now also implementing similar carbon saving upgrades."

In an additional stage of process integration at the plant; the air dryers, compressor water-cooling system, and ventilation system are integrated into the overall management and optimisation package. A triplex dryer arrangement was installed and connected

to the management system, valves on the discharge pipes are operated and closed based on the quality of air treatment - if a dryer goes into a fault state or changes to a high dewpoint mode, another dryer is started-up, the valve on the unit that requires attention is closed and the airflow is directed to another dryer. The system will even automatically alert the relevant service provider that the dryer requires servicing.

The new process control system also monitors pressure and the dewpoint (air quality) at the point of entry into the bottle blowing hall, it monitors and meters the amount of compressed air delivered to each of the blowing machines, allowing Britvic to use the efficiency values and the line-flow values to cost each bottle blower precisely. The flow is held in the permanent memory of the EnerAir I/O box making the device both a reliable and tamper proof data logger.



Two additional control panels were built for the HVAC system, delivering the same style of fine control that has been applied to the compressors, and replacing what was again a crude, but standard ventilation and temperature control system. The water is pumped around the system and so more CMC control equipment was employed to



manage the pump. Temperature and flow sensors were placed at key stages around the cooling system and inside the building; the feedback loop was then connected through a controller and to the extraction fans in both towers. The system optimises energy usage, heats the building when required and is fully integrated into the control and visualisation packages.

Graham Coats, 'the completeness of the system and the level of data logging at the plant provides an unparalleled level of diagnostic ability. Comparing data from different areas of the system, we can track down a fault far faster than would ever be possible using physical methods. Prior to the system being installed a potential fault could have been attributed to a huge list of potential causes, now however, being able to drill down into the individual machine controllers and view the data files of individual components, a problem can often be narrowed down to a single component or a very precise part of the process and solved with out it ever affecting overall production."





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