

# ENERGAIK CASE STUDY



## AGGREGATE INDUSTRY



# Aggregate site cements energy savings on compressed air

“Aggregate site achieves 61% energy saving on compressed air at DSM plants using EnerAir intelligent air management system”

A compressed air audit conducted on a Dry Silo Mortar (DSM) production site in Scotland revealed that 56.07% of the input energy used was actually non-productive. This was as a result of an inefficient, but common cascade control system, originally installed to manage three 75kW Atlas Copco compressors. The audit also highlighted that using three compressors of the same capacity did not allow the system to efficiently match compressed air output to demand.

The solution was to install an EnerAir Metacentre compressed air management system, add a variable speed drive (VSD) and change the compressor line-up to

include a smaller 30 kW compressor. Offload energy usage was reduced by over 90% - combined with additional operating efficiencies achieved by the system, total energy savings have reached 61% or 182,728kW/h.

Compressor control specialist, Peter Tomlins, of EnerAir: “The savings made at the aggregate site have prompted the business to install EnerAir’s Metacentre management system at all of its UK Dry Silo Mortar (DSM) sites. There are also three more sites to be completed in other sectors within the Business. The beauty of this system is that we can accurately audit a site prior to installation so we know

what savings to expect. In every case so far, the actual savings have matched or indeed exceeded our initial calculations.”

The aggregate producer is currently investing more than £20 million over five years in the strategic development of its national mortar business, including the expansion of DSM production. Each of the DSM plants is capable of producing between 400 - 800 tonnes a day, or 100,000 - 200,000 tonnes per annum. Flexible production capacity means that they can be highly responsive to customers needs and tend to run close to 15hrs per day, making energy efficiency close to the top of the operational agenda for each site.

## What was the problem?

There are a number of reasons that air compressors pose such a problem for energy efficiency. Many sites still use fixed speed compressors operating on a cascaded pressure switch control system. While this method is seen as the norm for running compressors it is massively inefficient and with relentless energy price rises it is essential that sites work to develop more efficient methods.

When operating fixed speed compressors with a cascade control system the exact requirement of compressed air for a plant often falls between the combined capacities

of the installed compressors, as one compressor’s limit is reached the output is then doubled as the next compressor comes online. This arrangement uses far more energy than is required and leads to an increase in off load running, with the compressor system creating more pressure than is needed.

## The Audit trail

The compressed air audit conducted at the aggregate site ran continuously for 311.4 hours with a high frequency data log rate of every five seconds. The site consisted of three 75kW compressors, all fixed speed. Of the total energy consumed by each compressor, 56.07% of this energy was ‘non-productive’ adding thousands of pounds to the sites energy costs. The sites compressed air demand often fluctuated depending on the time of day, week and even year. This meant that with the fixed speed compressors operating with a rigid cascade method the site was rarely running at the ideal capacity in terms of efficient generation.

## Recommendation and action

There were two recommendations followed to improve the running of the plant that combined were able to reduce energy costs by well over 50%.







Two major changes to the existing compressor line-up were made. The first was to install a retrofit variable speed drive, giving a fixed speed compressor variable speed capability. This allowed compressed air generation to be varied more precisely, without reducing compressor efficiency.

The second step was to exchange one of the 75kW compressors with a 30kW compressor. The demand profile that had been recorded during the audit showed a large gap between the varying demand of the plant and the generation capacity. A smaller compressor, combined with the new variable speed capacity of one of the original compressors ensured that air generation could be matched closely to demand, making huge gains in energy efficiency.

The final step was to install a new EnerAir Metacentre compressed air management system. The EnerAir Metacentre management system is connected to sensitive pressure sensors on the air ring main which provided feedback on system pressure; it uses this data in real time to assess demand, while controlling all three compressors. The system selects the most efficient combination of compressors and compressor speed to accurately match demand.

Now installed the management system also provides maintenance updates every few seconds helping maintenance teams to identify faults in the compressor system far quicker than normal, reducing the risk of running a faulty compressor for many hours.

### **Validated results**

The EnerAir Metacentre compressed air management system keeps air pressure at the required 6.0 bar, a reduction from the 7.5 bar it was running at before. Coupled with the correct use of the VSD, the site has now reduced its offload (non-productive) energy usage to 1% rather than the previous 56.07%. With this dramatic increase in efficiency the total potential energy savings on this site amount to 182,728 kW/hrs based on a 3000hr year.

Not only has this installation helped to reduce non-productive energy, in turn helping the site to reduce its

carbon footprint, but with the savings of over 50% in energy costs the Metacentre management system will have paid for itself far sooner than was expected, and has reduced maintenance costs significantly.

Peter Tomlins: "To say our clients were pleased with the system is an understatement, from our point of view the EnerAir equipment 'does what it says on the tin', in most cases savings are above what is predicted. Capital repayment is up to three years on one of the sites but is as low as 9 months at another."





### Questions to be asked on all sites

With rising energy costs and ever increasing public focus on energy conservation it is important to consider ways in which energy wastage can be reduced. It is essential to ask questions of a current system to identify where improvements can be made: Has the demand profile been mapped? Are the compressors on the site the right combination of sizes? Has energy use been recorded and benchmarked so that the impact of any changes made can be validated? Are multiple compressors being controlled by an effective management system? Is a new VSD compressor the right solution, and can its capability for energy saving actually be realised?

Asking these questions will ensure that the potential savings on compressed air are realised. EnergAir has made the first step to identifying possible savings as simple as possible. The company has produced

a free online Compressed Air Energy Savings Estimator which can be found at [www.energair.com](http://www.energair.com). This provides users with an accurate estimate of potential savings, both cost and kW.

If required the user can then have a detailed report on how these saving are possible sent to them via e-mail. Not only is this service free and extremely easy to use but for the Scotland site the estimate provided by the website was accurate to within 1% of the final savings.

When reviewing a site's energy efficiency one of the most important factors to consider is compressed air. Compressed air can contribute towards a large percentage of a site's energy consumption. Many current 'solutions' fail to significantly reduce the offload energy and can be expensive to purchase as they usually result in the purchase of a new compressor without an adequate control system.

### Conclusion

EnergAir believes it is essential that people in this position challenge convention in order to make the right decision and ensure that any potential savings are actually realised.

Peter Tomlins: "We are able to help plants save money on their energy costs in a market where energy bills are soaring. The EnergAir Metacentre compressed air management system can be installed in virtually all compressor systems with savings noticeable immediately. Many customers find that once it is installed it will pay for itself within a year while also helping to ensure maintenance is carried out sooner and with more accuracy than was previously possible".







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