

Case Study

Digital Combustion Control

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| Main activities | Whisky distillery producing 2 million litres of malt whiskey per year |
| Region | European Union |
| Energy Consumption | 16.6 GWh per year (gas and electricity) |



Project goals

To fit the existing steam boiler with a new combustion control system in order to ensure optimisation of fuel efficiency throughout the full firing range.

Main investments

The steam load varies leading to changes in boiler firing rates.

The original system included a combustion air modulating damper arrangement that was manually calibrated for low, medium and high fire conditions, set at the boiler annual inspection. This meant that at intermediate points, the boiler would operate inefficiently, and with only annual calibration, any drift in settings would remain uncorrected for a long period. The use of a damper to reduce air at the boiler also meant that the combustion air fan was operating inefficiently for long periods.

The system was improved by the following measures:

- An oxygen detector was installed in the boiler flue and used to adjust the fuel and air mix automatically; ensuring maximum efficiency throughout the whole firing range of the boiler.
- A variable speed drive control system for the fan motor allowed the appropriate amount of air to be delivered, replacing the combustion air modulating damper.

Benefits

Following the investment, the plant saved approximately 1.10 GWh of gas and 44,352 kWh of electricity per year. This corresponds to a reduction of 6.3% in total energy consumption against previous levels.

An additional technical benefit is that the new controls respond quickly to any changes in demand for steam, improving production rates, due to reduced downtime and steadier steam flows and pressures.

Applications

Any industrial process with steam generation: A 15% reduction in boiler excess air equates to a 1% improvement in boiler thermal efficiency; Reducing the speed of a motor by 20% reduces energy consumption by 50%.

| Investment type | Cost (€) | Energy saved (KWh/year) | Saving achieved (€/year) | Payback period from energy saving |
|---------------------------|----------|-------------------------|--------------------------|-----------------------------------|
| Combustion control system | 23,000 | 215,000 | 17,100 | 1.3 years |