

A cast-iron solution for energy management

Automation solution from Mitsubishi Electric delivers a significant energy saving per tonne at Brockmoor Foundry.

Reducing energy consumption is becoming increasingly crucial as a method to simultaneously drive profitability and boost sustainability. This is particularly tough for industry players whose operations are characterised by energy-intensive operations, such as foundry and casting processes. When Brockmoor Foundry, a leading cast iron producer, wanted to improve its energy management system, Mitsubishi Electric's automation solutions offered unprecedented visualisation and control. This was key to helping them work to achieve significant energy reductions.

Limiting energy usage is perhaps every company's ambition, as it reduces both operational expenses (OPEX) and carbon footprint. These, in turn, help businesses to improve profitability, sustainability and market resilience – all aspects that drive competitiveness in an increasingly challenging marketplace.

Succeeding in this task requires the identification of operations and facilities that are using excessive energy before the process can be optimised. The first step is to map out a comprehensive and detailed overview of energy systems and how their infrastructures operate.

The latest digital technologies in industrial automation are ideal instruments to drive effective power management by facilitating the generation, analysis and visualisation of large volumes of data in real-time. Aware of the benefits of such a strategy, Brockmoor Foundry decided to invest in a new control system to enhance its energy efficiency.

Casting the right actors

Located in Brierley Hill, West Midlands, the company is among the top five largest iron foundries in the UK. It is also one of the few in the country that can cast, machine and paint products within the same plant - which is divided into two sections. One area hosts the main foundry operations, whilst the second

site contains the machine and grinding shops as well as painting, technical and quality control departments.

Thanks to its multiple facilities and variety of equipment, Brockmoor Foundry can manufacture ductile iron with different metal grades to support a broad range of applications. To remain competitive though, it had to reduce energy costs.

The processing facility contributes to driving more sustainable, circular practices, as it plays an important role in the national recycling of iron. However, the nature of the metalworking activities conducted leads to a considerable use of energy for melting infeed materials and powering key machines.

In particular, the foundry section is the most energy-intensive, with consumption up to eight times higher than the second site. In effect, the foundry site requires up to 6,500 kWh, and 4,500 kWh of this is used by the induction melting furnaces.

To improve the energy efficiency of its facility, Brockmoor Foundry decided to implement an extensive energy monitoring system that would identify inefficiencies to support effective energy reduction plans.

To specify and install a highly effective setup, the company turned to Mitsubishi Electric and its innovation partner, BPX.

Gary Hinson, Chief Electrical Engineer at Brockmoor Foundry explains, “We have a large installed base of Mitsubishi Electric automation components, such as PLCs, and have a good understanding of how these operate. We also benefit from a very good, (30-year-long) working relationship with Mitsubishi Electric and BPX’s specialists. It was only logical that we would contact Mitsubishi Electric to support us in developing and implementing a suitable solution for energy monitoring and control.”

Creating the mould

The existing setup enabled the cast iron manufacturer to monitor the runtime of a number of selected pieces of equipment, with a few HMIs for operators to

have basic insights on energy usage. Initially, Brockmoor Foundry planned to upgrade this by looking at the daily consumptions of different areas within the foundry over a 7-day monitoring period and subsequently analyse the data obtained.

To create a more accurate, responsive setup, Mitsubishi Electric suggested the use of multiple energy meters, distributed across the factory. These would send timed metering pulses to controllers, which communicated with HMIs to help the staff visualise both current and historical energy usage by different assets across the site.

Stephen Thornton, Key Account Manager & Team Leader - Key Account Team South at Mitsubishi Electric, adds: "Thanks to the solid collaboration that we have established with Brockmoor Foundry as an end user, they were happy for us to propose a performance driven solution and suggest the most suitable components to realise it. The only requirements were for the devices to be cost-effective, scalable and compact so that they could fit within the existing infrastructure".

To address these needs, Mitsubishi Electric selected the ME96 series of electronic multi-measuring instruments as meters, the small yet high-performance functionality of the IQ-F PLC utilising the FX5U and 3x FX5UC PLCs, the popular GOT 2000 HMIs as well as the innovative GT SoftGOT2000. This last item is a software product that can turn any up-to-date computer into a web-based HMI, supporting highly convenient remote monitoring.

The ME96's measure power consumption across the foundry and send the data generated to six iQ-F series PLCs via a multi-drop function supported by Modbus RTU RS485 communication protocol. The controllers are connected to existing MELSEC Q- and L-series PLCs as well as all the various physical and web-based HMIs. All these components were promptly reserved and delivered by BPX, the largest distributor in the UK of Mitsubishi Electric's solutions, holding the country's largest independent stock of the automation vendor's industrial control and factory automation products.

Enabling technologies for energy efficiency

The system, which was developed, installed and commissioned in a record time of three months, provides a highly granular and comprehensive overview of power consumption as well as actionable insight on how to reduce it. Even more, thanks to the web based SoftGOT2000, multiple members of staff can easily look at the energy performance of the foundry and its stations at any time of the day. This supports prompt responses aimed at optimising energy use if and when anomalies are detected.

In addition, the solution records when key pieces of equipment, such as extraction fans and compressors are running, as well as monitoring airflow to machines using compressed air. As a result, Brockmoor Foundry was able to cut the energy required to process a tonne of iron from 1,450 kWh to 1,200 kWh.

Gary Hinson comments: "We are very happy with the products, support and resulting solutions delivered by Mitsubishi Electric. Thanks to this new setup we have been able to truly step-up our capabilities, reaching a completely new level in effective energy management. This is why we are now working together to implement a similar framework across the second section of our plant."

Stephen Thornton concludes: "The energy monitoring system that we created is easy to upscale, meeting Brockmoor Foundry's requirement for a modular solution and supporting the company as it advances its operations. We look forward to expanding this setup to cover the entire foundry complex.

"We are also delighted with the positive feedback received. At Mitsubishi Electric, we are committed to delivering value-adding solutions rather than simple pieces of hardware, and we are proud of our work when our customers see this too!"

Image captions:



Image 1: Mitsubishi Electric selected the ME96 series of electronic multi-measuring instruments as meters

[Source: Mitsubishi Electric Europe B.V.]



Image 2: Stephen Thornton, Key Account Manager & Team Leader - Key Account Team South at Mitsubishi Electric

[Source: Mitsubishi Electric Europe B.V.]