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# Car parts maker saves £294,000 a year with ABB drives

A manufacturer of injection moulded plastic parts for the automotive industry is saving £294,000 a year on energy costs by using ABB variable speed drives (VSDs) on its moulding machines.

Calsonic Kansei of Sunderland makes injection moulded plastic interior and exterior trim for cars, with its major customer being Nissan. Working with ABB authorised value provider Quantum Controls, as well as energy consultants Integral Energy UK Ltd., Calsonic Kansei was able to cut energy use on injection moulding machine 3, at its Pennywell site, by 50 percent.

Integral Energy was called in by Calsonic Kansei to conduct an energy appraisal at all three of the company's sites. Peter Cassidy is a director of Integral Energy: "We were asked to review the best energy savings opportunities for Calsonic Kansei, and also completed their registration to the CRC energy saving scheme.

"VSDs were only one aspect of the energy reduction plan, but a sizeable one nevertheless. Although we also offer implementation, we needed technical specialists for the drives' aspects and this was handled by Quantum".

"Quantum performed very well. With the help of ABB, they conducted data logging on the moulding machine as part of a trial and estimated that a 35 percent energy reduction could be achieved. This was a big step in the project; the point when Calsonic saw what was possible."

The moulding machine uses a star/ delta started, 55 kW 4-pole motor to drive a hydraulic power pack. The motor runs at full speed continuously, the load it takes varying with the demands on the machine. Moulding actions such as clamping and injection require a lot more pressure, and hence load, than other actions like opening the die. In low load conditions, the hydraulic oil is circulated back to the tank, yet the motor still runs at full speed. Logging of the motor current showed the average load to be around 29 kW.

After consulting with Calsonic Kansei maintenance staff, and inspecting the hydraulic circuit drawings, ABB and Quantum decided to keep the control philosophy as simple as possible, using step speed control via digital inputs, rather than the more complex method of fitting a pressure transducer to provide an analogue feedback.

Calsonic Kansei staff identified suitable signals from the control system and fitted extra relays to provide the digital signals. Signals for the "clamp closing" and "injection" phases of the duty cycle were identified as periods where there would be high demand on the hydraulics, while at other times, the demand was considerably less. It was estimated that a lot of energy could be saved, as for a typical 57 second cycle, the hydraulic rams are only working for 10 seconds for the opening and closing of the injection tools.

The VSD was interfaced with the existing pump start control so that no change in operational procedures was necessary. The "clamp closing" and "injection" signals were then connected and the VSD was programmed so that if either or both these signals were present, the VSD would drive the motor to full speed. Conversely, if both signals were not present, the VSD would drive the pump at a lower speed.

The VSD was programmed so that the lower speed would be at 35 Hz and the full speed would be at 45 Hz - 70 and 90 percent of rated speed.

John Guthrie of ABB says: "Although these settings were picked simply to verify operation, another part of the trial involved reducing the speeds further in order to find the lower end of the operating range. The original settings proved to be a good balance between the energy savings and the response of the hydraulics and their effect on the cycle times of the machine. We could have gained even better performance from the machine if we had the correct nameplate data from the motor, as well as producing further energy savings by activating the VSD's energy optimisation program."

Once the settings were decided upon and the operation of the machine was considered satisfactory, the data logger was refitted to assess the energy consumption. Dropping the lower speed to 35 Hz, when the motor is under much lower load, reduced the absorbed power to around 7.5 kW, where it was previously about 25 kW. At the top end, power is also down to a maximum of 60 kW as opposed to 68-70 kW previously.

The trial machine had a cycle time of 65 seconds, using reduced power for around 40-45 seconds per cycle. This means power across the whole cycle has been reduced, pulling the entire load profile down. Because of this, the motor, hydraulics and other mechanics will be under less load throughout all stages of the cycle, which should lead to less wear and tear, reducing maintenance costs.

Les Parker, European HSE Manager for Calsonic Kansei, says: "We achieved the predicted 35 percent saving during the trial, following which Quantum proposed converting 27 machines, a project that took a year to complete. Since completion, Quantum has studied all the VSDs and fine-tuned the frequency to optimise our energy saving. We are now getting 50 percent energy saving, equating to £294,000 a year. This has exceeded our goals and we have achieved payback in only eight months instead of the predicted 10 months.

"We have some strict energy and environmental targets, one of which is to reduce CO<sub>2</sub> emissions year-on-year to 2016. We have achieved all this and more with the VSD project."

Calsonic Kansei was also able to shelve a project to install a new supply transformer, as the energy saved released supply capacity in the existing infrastructure, saving a proposed capital investment of £750,000.

Parker also appreciated Quantum providing training on the operation and set up of the drives: "If anything goes wrong with the VSDs, we can disconnect and go back to the original set up in 45 seconds – Quantum trained us to do that."

Cassidy says: "It made sense to use Quantum, with their technical capability and track record of high performance. Calsonic Kansei also has a high opinion of ABB – it is a well-respected brand and Integral Energy is happy to be associated with it based upon our recommendation. We would not recommend anyone but Quantum unless instructed to."

A proposal for a trial at the company's Washington site could see another 20-30 VSDs being employed, bringing further significant energy savings.

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