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ABB drives to cut £175,000 off Land Rover compressor costs

The Land Rover plant at Solihull in the West Midlands is set to save £175,000 a year on energy costs for its compressors after fitting ABB variable speed drives.

The plant, with a capacity of 200,000 vehicles a year, produces several Land Rover models, ranging from the Defender 90, 110 and 130 series to the Range Rover, the Range Rover Sport and the Discovery. The compressors in the plant are used to supply air for a wide range of pneumatics tools and air using equipment, including local tools and jigs, spot weld robots, paint mix houses, smoke vents and air fed masks.

The six compressors produce either 6/7 bar oil-free air used for sub systems and tooling or 12 bar used for the robot systems. The compressors, of a two-stage screw configuration, were driven by a fixed speed motor incorporating a soft start panel used only on compressor start-up. The compressors used a pressure loading switch, off-loading when the upper pressure limit had been reached.

As well as being wasteful by unloading pressurised air that has not been used, this system also lead to excessive wear and tear on the compressor, caused by constant starting and stopping as the demand for air varied.

Adrian Whitehead, maintenance process leader with Land Rover, says: "Energy costs were a concern because the air from the compressors is so widely used throughout the plant. Although it seems to be a hidden cost because people always expect it to be there, compressed air is a huge energy user in the plant, making improving the facility a viable way of meeting our energy and CO₂ reduction targets."

The company yardstick for this type of project is that it should have a payback time of one year or less and should reduce CO₂ emissions by 7.5 tonnes for each £1,000 invested. Overall, the Solihull site is aiming to reduce its CO₂ emissions by 42,000 tonnes by 2012.

Whitehead asked CompCare Compressed Air to look at the compressor application and recommend a solution that would cut the energy use.

A trial was conducted on the site's no. 3 compressor, chosen for its low loading rate of just under 4,000 hours compared to its total run time of 14,800 hours. CompCare installed a 400 kW ABB variable-speed drive (VSD) loaned by ABB Drives Alliance member Central Electrical. This wheeled unit featured flying leads for quick and easy installation.

Glyn Griffiths of CompCare says: "The loan drive allowed Land Rover to have a free trial run, so that they could see what benefits they could get from a full project without risk."

The drive produced a constant air pressure, rather than the coarse on/off control of the existing systems. By monitoring energy use over a period of a week, it was shown that using a VSD on this compressor could save £1,000 per week in energy costs, a total of around £48,000 over a working year.

Following the trial, CompCare retrofitted five ABB industrial drives to the compressors at a number of compressor houses around the plant, in sizes ranging from 110 kW to 500 kW. The application included

the fitting of a variable speed oil pump to maintain oil pressure in the compressors during slow speed running.

Projected annual savings for the completed project are £175,655, with an average payback time of one year. CO₂ will be reduced by 1,532 tonnes, giving a reduction of 7.8 tonnes per £1,000 of investment. This exceeds Land Rover's expectations and achieves four percent of the Solihull plant's total CO₂ reduction target. An auxiliary fan to provide forced cooling allows the compressor motors to be run at even lower speeds, saving an additional 10 to 15 percent in energy costs.

Says Whitehead: "CompCare gave us great service and their engineers have helped us achieve significant savings. Reduced running temperatures also help to lower stress on the motors, reducing wear and tear. Lower noise levels in the compressor houses also make for a better working environment.

"We are already looking for other applications for VSDs and are experimenting with using ABB drives to cut the power demand of our air handling units."

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