

Cut your carbon

Modern electromechanical technology can help plant engineers to reduce the environmental impact of some of their operations, says Phil Burge

Hardly a day goes by without environmental issues making headline news. Combine this with the cost of fuel rising sharply and the need for many to comply with the CRC (Carbon Reduction Commitment) Energy Efficiency scheme, and it is easy to see why some plant operators are under pressure.

Meanwhile, the 2008 Climate Change Act, which made Britain the first country in the world to set legally binding carbon budgets (to cut emissions 80% by 2050), adds further urgency. With industry responsible for 25% of the UK's CO₂ emissions, while energy-intensive firms account for 45%, there is a clear responsibility to provide leadership.

So what can plant and factory operators do to reduce emissions? One option, currently gaining ground, is to use electromechanical technology in place of pneumatics or hydraulics. No one is suggesting wholesale change: conventional systems deliver high force and good repeatability for projects that need them. However, they also require supporting pipework and power units – and, in some applications, are unnecessarily powerful, bulky, noisy and expensive. Indeed, pneumatic systems typically consume 10–15% of a plant's electrical energy.

Quiet and efficient

Older electromechanical systems also frequently required large motors and costly control devices, as well as gearing. However, automation has undergone huge evolution, and modern systems are smaller, lighter weight and less power-hungry than ever. So today's technology can offer an efficient and cost-effective alternative to fluid power. What's more, it eliminates the risk of leakages and contamination of surrounding areas and machinery, and is typically far quieter and requires less maintenance.


Injection moulding is one example of machines formerly fluid powered, but increasingly using electromechanical automation. Not long ago, engineers dismissed electric injection moulding as too expensive. However, a growing number now realise the cost savings over the operating life of such machines, with equipment mostly paying for itself, through cost savings of up to £25,000 per annum, in just two years.

Electrically powered injection moulding machines generally consume less than 45% of the power required to drive hydraulic equipment. No great

surprise when servo motors draw power only when needed and spend only a fraction of the cycle time at peak consumption. Hydraulic machines, in contrast, run constantly and generate considerable heat that needs to be removed, using chillers. Hence, electromechanical alternatives require just 35% of the cooling energy.

One more point: the superior repeatability of electromechanical moulding machines, due to their streamlined drivetrains and closed loop control, means that one of the major costs – waste – is cut. Also, maintenance and unplanned downtime statistics are better. Hydraulic moulding machines require pumps, hoses, filters, tubes and valves – all of which need regular maintenance. Meanwhile, the powertrain of an electric machine is far simpler and plant operators report a rise in uptime of around 2%.

Another example is an industrial welding robot developed by SKF to provide an energy efficient alternative to pneumatic actuators for the automotive industry. Its electromechanical actuator system requires only a fraction of the energy needed for compressed air, meaning up to 90% savings. Indeed, data from one global automotive manufacturer recorded savings of 45,000kWh for four million welds per year per robot.

By the way, that system enables both the speed and quality of the welding operation to be significantly improved on its hydraulic forebears, through greater control of the entire process, while noise and maintenance requirements have also been reduced. 



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Pointers

- Pneumatics and hydraulics have their place, but require supporting pipework and power units
- Electromechanical control systems have undergone a revolution in size, weight and power consumption
- Choosing the newer technology eliminates risk of contamination
- Applications in plastic injection moulding machines have almost turned that industry on its head
- They typically consume less than 45% of the power required for conventional plant, making for payback within two years

Modern facilities management systems need to focus on electromechanical controls

