

Reducing your plant's energy consumption is good for both the environment and your profitability. **Nadya Anscombe** speaks with energy expert Robin Kent about how to make extrusion operations more efficient



Save your energy

When looking to reduce their energy usage, compounders often concentrate their efforts on the main processing equipment, such as the extruder. However, ancillary apparatus such as materials handling equipment can also play an important role in keeping energy usage down.

According to Robin Kent, managing director of consulting engineering company Tangram Technology, approximately 40% of the energy costs in polymer processing are the result of electric motor usage, yet motors are often neglected when considering energy usage.

The motors in the main processing equipment, such as extruders, are obvious when energy is considered, but the majority of motors are "hidden" in other equipment such as compressors, pumps and fans. His research has shown that the energy cost of a motor can exceed the purchase cost in just 500 hours of use.

Kent's top tip for saving energy is the use of variable speed drives (VSDs). "These are probably the best method for controlling motor speed in response to varying process demands," he says. "As with most electronic components, prices have fallen and performance has risen dramatically in the last few years."

VSDs take the fixed frequency AC supply and convert

this to a variable frequency AC supply. This controls the power usage and mechanical power output so that the motor can run at the most efficient speed for the motor and the process. The control of the motor speed is based on feedback from the process, such as flow rate, temperature or pressure, so that the process control can be improved.

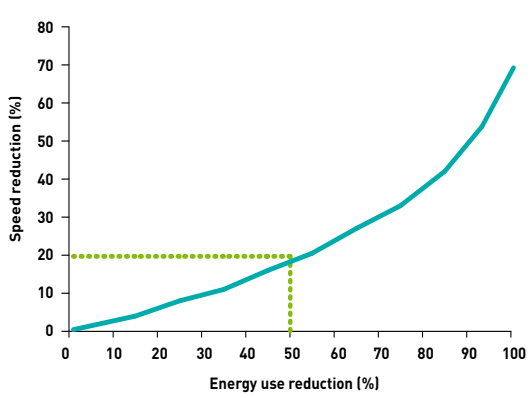
"Using a VSD to reduce the speed of an AC motor by 20% reduces the energy consumption by around 50%," says Kent. "Small decreases in the speed of pumps and fans can lead to large decreases in energy use."

The use of VSDs also applies to extruders. "The initial cost of energy efficient extruders may be higher, but they will give rapid returns on the extra investment," says Kent. Most older extruders use DC motors to provide speed control of the extruder screw. Kent recommends investing in newer extruders which are often available with an option for the supply of VSD-controlled AC motors to give speed control. "VSD-controlled AC motors can be retrofitted to many extruders and this is also a recommended option," says Kent.

Energy use in an extruder is a sensitive measure of the extruder condition and can be used as a diagnostic

Why burn money? Robin Kent says: "Getting energy management wrong can be fatal to a site"

The energy savings for VSDs are significant even for small reductions in speed. For example, a speed reduction of 20% reduced the energy used by 49% and a speed reduction of 50% reduces the energy used by 88%.



tool. Increasing energy consumption is an early warning of deterioration of the machine condition.

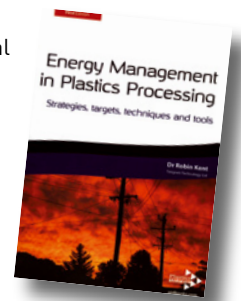
As well as monitoring energy use of all motors on a site, Kent also recommends wise use of barrel insulation, particularly for masterbatch manufacturers. Masterbatch mixing will often use large amounts of externally applied heat from barrel heaters, and barrel insulation can be used to greatly reduce energy usage. "Barrel insulation can be fitted for around £1,500 (€1,700 or \$2,100) and can have payback periods of less than 12

months," says Kent. But he warns that too much insulation in the wrong place can lead to overheating and a runaway process. He strongly advises compounders should first carefully monitor the use of heater bands on their equipment and then decide where exactly to apply insulation. "If a heater band is always on, then this area could benefit from some insulation," says Kent. "In compounding, it is usually equipment forward of the screw tip, such as transfer pipes, die head cutters and melt filters that benefit from insulation."

For compounders, energy costs generally represent the third largest variable cost, after materials and direct labour. "This is not a green issue, it is not a carbon management issue, it is a real business issue and in many cases is a survival issue. Getting energy management wrong can be fatal to a site," says Kent.

For more information see Robin Kent's book, *Energy management in plastics processing*, published by *Plastics Information Direct*. The 270 page book costs €105/\$135.

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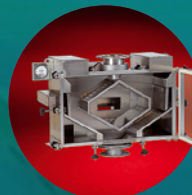
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