CARBON TRUST

Making business sense of climate change

Energy Efficiency in Plastics Processing

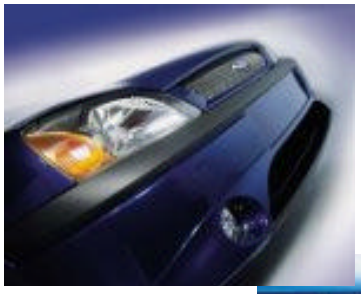
Case Study - Linpac Automotive Ltd

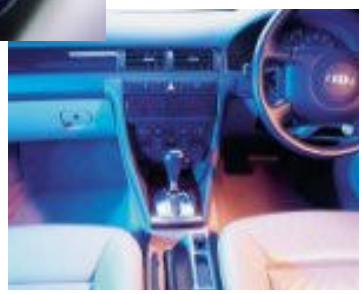
Retro-fitted motor controls

PMMDA

"It is now [Linpac's] intention to recommend this technology to all senior managers throughout the group..."

Rob Parkes
NRG Control





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Introduction

Purchasing the most energy efficient new technology machines is a vital step towards reducing energy usage. Despite this, the overwhelming amount of energy used in the plastics processing industry is in machines that are already in existence and operating successfully. These machines were not always originally designed with energy efficient operation as a priority.

The rate of replacement of the existing machines in the plastics processing industry with new technology machines is not rapid and there is a need to improve the energy efficiency of current machines as much as a need to invest in energy efficient new technology.

This Case Study looks at retrofitted motor controls using one technology but there is a range of similar technologies to improve the energy efficiency of existing motors and drives.

The company

The Linpac Group started in 1959 as a paper packaging company in Lincolnshire, serving local fresh food producers and has grown to become a £1 billion global business with core activities in packaging, materials handling and automotive components. The group employs over 10,000 people across the five continents and has seven major divisions, operating as a separate business centres, focused on specific process technologies, products and markets.

The LINPAC Automotive Division has three UK plants at Southend, Dunstable and Scunthorpe and another in Spain. It is a global supplier to the automotive industry producing interior and exterior trim components and is also active in trade injection moulding.

The Southend site has 325 employees and operates 35 injection moulding machines in the size range 250 tonnes to 2700 tonnes. The site also has facilities for gas injection moulding, co-injection moulding, PU

foaming, vacuum forming and automated assembly operations.

The actions

Retrofitting to save energy

Retrofitted dynamic motor speed controllers continuously regulate pump speeds throughout the moulding cycle and can achieve significant reductions in motor power consumption without affecting cycle time or process control. The systems are applicable to most makes and models of injection moulding machines currently available and are eligible for Enhanced Capital Allowances.

The machines and application

SyncroSpeed™ retrofitted motor controllers supplied by NRG Control were installed on two Negri Bossi NB720 injection moulding machines (90 kW motors) moulding a 2-impression armrest in ABS on a 71 second cycle. Before installation, detailed studies of the motor power variations during moulding were carried out. These estimated the potential savings to be 13 kW.

The motor controller consists of three main elements:

- A power hook-up, which places a high performance variable speed in circuit with the motor itself;

- An interface between the host machine and the motor control system;

- Software running on the motor speed controller that makes continual adjustments to regulate the motor speed via the variable speed drive.

In conventional operations if less than 100% of the hydraulic system capacity is needed then oil delivered by the pumps is excessive and any over-production is diverted without doing any useful work.

The retrofitted motor controller system follows the speed values set on the machine's display screen and regulates pump speeds and discharge rates to deliver the correct volume of oil. No extra oil is produced at pressure and the energy consumption of the machine is reduced. Where all the pump volume is required, such as during toggle lock to reach clamp tonnage in the minimum time, the controller runs the motor at full speed.

Large energy savings are possible during phases where no machine movement is needed and pump discharge is only required to maintain holding pressure (during injection hold and part ejection) during these phases the motor speed can be considerably reduced.

The benefits

The saving throughout the overall moulding cycle was 15.6 kW, half of the power consumption with the motor running at full speed. The saving on the second machine showed a similar pattern, with a reduction of 14.4 kW, a saving of 51%. These savings exceeded the predicted savings.

Comparative power consumption studies have been carried out before and after installation of this power control technology on a range of machines producing a range of products from 520 tonnes to 1100 tonnes and show savings of between 10 and 35 kW.

Transferring the lessons

The use of this technology is not applicable to all processors. The technology works best for fixed displacement, vane or gear pump machines with a motor size of 55 kW or higher using no accumulators and a cycle time of greater than 40 seconds operating for more than 6000 hours per year. For machines with other motors, operating conditions or products the potential savings and payback needs to be individually investigated.

The lessons learnt from the use of motor controllers at Linpac Automotive (Southend) show that retrofitting motor controls can have positive benefits and reduce the energy consumption of existing machines. Where the operating conditions are suitable the technology is readily transferable to other UK plastics processors and can be used to reduce energy usage and costs in many companies.

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