

Energy saving by servomotor and induction heating

By Tat Ming Technology Co. Ltd.

Aug 21, 2008

The crux of energy saving is reducing waste. Servomotor and induction heating are proven ways to reduce waste. They could be applied to injection moulding machines with awesome results.

Energy is 'lost' in a motor during conversion from electrical power to rotational power. Lost energy turns into heat and is wasted. Similarly, there is lost energy in a pump, a hydraulic motor and a hydraulic cylinder. The hydraulic oil temperature is raised as a result.

Up until recently, the most common way to save energy in an injection moulding machine is the use of variable displacement pump or frequency inverter. Both work on the principle of variable flow rate to match with periods of low flow rates in an injection moulding cycle to reduce waste. Servomotor does it the same way but servomotor is more efficient than the conventional induction motor.

Fully electric machines use at least four servomotors. Its ability to save power is well-known. A less costly design is to use one servomotor to drive a pump, but still retains most of the energy saving of a fully electric machine.

Servomotor is different from induction motor in lower rotor inertia and variable rotational speed. It speeds up or slows down according to the flow rate requirement of the cycle. Due to the use of permanent magnet, it is more efficient than induction motor especially when the load is low. Energy waste is reduced.

The use of low flow rate of a variable displacement pump serves to reduce heat up of the servomotor during a long holding pressure time. This is not possible when the fixed displacement gear pump is used. Such heat up also shows up in fully electric machines, but they could not have used this method to 'unload' the servomotor since there is no hydraulics.

Conventional heating by heater bands rely on heat conduction through the barrel wall to reach the plastic. There is contact resistance at the heater-barrel interface too. Induction heating generates heat through eddy currents induced in the barrel material. The induction is done by driving 20 kHz to 40 kHz power through coils around the

barrel. The coils are wound on top of the barrel insulation which wraps around the barrel to reduce heat loss. Unlike heater bands, the induction coils are not hot. The coils are made of thick copper wire with little resistance. Very little heat is generated (wasted) at the coils.

Copyrighted by Tat Ming Technology Co. Ltd., August 2008

Unit 919, Tower A, Regent Centre,

63 Wo Yi Hop Road,

Kwai Chung, Hong Kong.

Tel: (852) 2790-4633, Fax: (852) 2797-8774

Email: tatming@netvigator.com

Web site: <http://www.tatming.com.cn>