



Intelligent Melt Pressure Control

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This particular process is a standard extruder system consisting of eight extruders feeding an array of spinners to form a polypropylene and polyethylene web.

DESCRIPTION OF THE PROCESS

The web is used under road and rail to form a one way waterproof membrane rather like a huge nappy liner. The control equipment was made of five separate units including a slidewire based controller, input converter, shunt calibration unit, transducer power supply and a melt pressure indicator with retransmission. All five units were replaced with a single 900 EPC.

operator. Screw speed is slowly increased until the melt pressure is close to the desired setting and then switched to automatic control. This is very time consuming and a large amount of scrap is produced if there are eight extruders to start up as in this case.

This process problem is common to any extruder system where melt pressure is controlled by the screw speed. It can take several minutes for the polymer to reach the melt pressure probe before which the extruder under automatic control would run at maximum speed to try and achieve the control setpoint. An automatic system was required which would detect that there was no polymer at the head and run at a preset output and switch to automatic once the pressure increased on the polymer reaching the pressure transducer.

DESCRIPTION OF THE PROBLEM

Control afforded by the original control equipment was very poor causing rapid variations in screw speed and an extended start up time. On almost all extruder systems of this sort the initial start up is carried out manually by the

DESCRIPTION OF THE SOLUTION

Each of the extruders were fitted with a single 900 EPC to replace all five of the original units.

HARDWARE

DC Retransmission	-	Measured Value
DC Retransmission	-	Setpoint
Dual Relay	-	Alarms
Dual Relay	-	Shunt Cal Relay/Alarm
DC Control	-	4-20mA Control Signal

The EPC included user wiring and program logic.

Calculated Value 1:

CV1 Input 1	-	Process Variable
Operator	-	Subtract
CV1 Input 2	-	User Value 1
CV1 Output	-	Nothing
CV1 Upper Limit	-	2
CV1 Lower Limit	-	-100

Program Register 1:

Logic Reg 1 IP1 Inv	-	Invert
Logic Reg 1 IP1	-	Dfit VI 1
Logic Reg 1 IP2	-	None
Logic Reg 1 OP	-	Auto Man LP1

User Value 1	-	2
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Manual Function	-	Frcd Ips only
Manual Tracking	-	Manual Track
Setpoint Rate Limit	-	Enabled
Digital Input 1	-	Setpoint 2

BENEFITS AND FEATURES

Using a single instrument overcame the serious calibration errors introduced by using five separate units. The main start up problem was overcome by utilising user wiring. This simply put the instrument into forced output if the measured value was less than user value 1. In practice the output was held at 15% until sufficient polymer reached the transducer to give a pressure reading of two bar. As soon as this value was reached the controller reverted to automatic control. Manual tracking would then switch the control setpoint to the

actual value giving a bumpless transfer and increase the setpoint to setpoint 1 (20 bar) at a rate determined by the setpoint rate limit.

This gave an extremely smooth start up initiated by a single button press by the operator. All eight extruders would settle at the "drool" setpoint and then the operator would throw a switch to activate the normal running control setpoint (SP2) on all extruders.

This system decreased the start up time by 80% and reduced the scrap to an absolute minimum.

MARKET OPPORTUNITIES

As previously stated virtually every controlled melt pressure extruder has the same start up problem. This solution can be retrofitted by existing extruder system or incorporated into new installations. The pay back time of employing the 900 EPC must be a matter of weeks because of the reduction in scrap and fast start up times.