PLASTIC EXTRUSION OPERATION IMPROVED
by
IMPROVMENTS TO ELECTRIC THERMAL FLUID HEATERS

A manufacturer of extruded PVC goods heated the extruders used in the process with cabinet style portable electric thermal fluid heaters. The heat transfer fluid used was a high quality name brand "white" mineral oil.

The plant had experienced continual problems with poor fluid life, pump seal problems and carbon deposits fouling the extruder heating jackets. Upgrading the heat transfer fluid from standard "hot oils" to premium "white" heat transfer oils showed a marked improvement, but the basic problem remained. Fluid life remained at a short 90 to 120 days. While this was double to triple the fluid life experienced with conventional "hot oils", the plant still endured the expense of purchasing (and disposing of) new fluid, the labor involved with changing fluid and filters, and the maintenance expense of repairing pumps and heating jackets.

A preliminary fluid analysis showed evidence that the fluid was highly oxidized but was also partly thermally cracked. An evaluation was undertaken to determine the possible sources for the fluid degradation. The following findings were recorded:

1. The heater expansion tank was extremely close to hot circulating lines and the expansion tank temperature (at the fluid surface) was 350°F. The expansion tank was open to atmosphere, allowing atmospheric oxygen access to the fluid at all times.

2. The degassing line inside the heater cabinet was made of materials not compatible with high temperature organic fluids. Further, two valves in contact with that fluid were made of the same material.

3. The watt density of the electric heating elements was high, a situation which would allow the fluid's allowable film temperature to be exceeded under certain process conditions.

4. There was no written procedure in effect for the operation of the heaters. Thirteen (13) of twenty (20) heaters in the plant were found to have the degassing valves OPEN, allowing fluid at full temperature to circulate through the expansion tank. This situation would further accelerate fluid oxidation.

5. There was no fluid testing program in place to monitor fluid condition so that fluid could be changed BEFORE carbon build-up problems could cause outages.

A specification was written and vendors were identified for replacement thermal fluid heaters with proper piping materials, lower watt density heating elements and a relocated expansion tank.

A procedure was written and employees were trained in the best methods to use in operating thermal fluid heating equipment.

A fluid testing program was instituted too monitor fluid life and change BEFORE maintenance problems were seen.

Fluid life was increased to over one (1) year. Payback on this project, including fluid replacement costs, spare parts, labor and outside consulting fees was approximately two years.