

Extreme Coatings™

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Case History # 2006-2

Polymer Degradation

Injection Molding

This proprietary process is designed to produce very thick sheets of engineered materials that are then machined for use in unique processes. The raw materials are very expensive, ranging from \$40 to \$50 per pound and contamination is cost prohibitive. Feed screws are removed and cleaned at least every other day to ensure that a new product run will not have residual contamination. These are usually small runs that without careful oversight can lead to expensive scrap. Typical materials include PEEK and PolySulfones and other high temperature engineered polymers. Process temperatures are as high as 750° to 850° F (400° - 450°C).

Present feed screws are nitrided and work adequately in this process. The nitrided screw concern is roughening of the screw surface from an aggressive cleaning regime. The customer estimates that a nitrided screw will last from 6 to 9 months before repeated cleaning damages the screw and allows too much material to adhere to the surface. At this point the 90 mm feed screw is replaced.

The customer consulted their feed screw manufacturer to explore other solutions to this rapid screw “wear”. Hard chrome was ruled out as it has a temperature ceiling of 750°F (400°C). Other hard surfacing options are very thin, on the order of 10 to 20 microns (.00025” - .0005”), not sufficient material for this process.

A 90 mm general purpose screw was coated with XC1000 tungsten carbide and polished to a 16/32 (0,2-0,4 Ra) mirror finish. Initial results have been very positive and the customer reports cleaning is easier which allows the screw to be cleaned machine-side and reinstalled. This has significantly shortened the time between process changes and increased their productivity. The customer plans to test purging to an acceptably clean condition with this high polish coating.

