Extreme Coatings™

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Case History # 2004-1 Severe Abrasive Wear Feed Screw Design Injection Molding

Extreme Coatings has been coating feed screws for the plastics and rubber industry since 1997. This service is provided through feed screw manufacturers and equipment manufacturers. Feed screw design is not our area of expertise but we recognize that design can greatly influence overall wear. If a screw experiences an exceptionally high wear rate outside of the norm, we look to screw design for clues.

In this instance the customer had downsized a machine from 50 mm to 35 mm. This machine was dedicated and processed a Stanyl (nylon 4/6) material with a high fill level of 50% glass fiber. A carbide coated screw with .010" (0,125 mm) of XC1000 was wearing about .002" (0,05 mm) per month. This high wear rate does not fit the pattern of coated screws in similar processes.

Examination of the screw with some basic calculations revealed the solids load to be 70% higher than a standard 35 mm square pitch screw. This cut down screw retained the 50 mm pitch and overall length of the original 50 mm design. A correctly downsize screw should have had 35 flights versus 22 for this modified screw.

Nylon 4/6 processes at 50°F (10°C) higher temperatures than standard Nylon 6 or 6/6 materials. The customer was running this process "cold" in an attempt to shorten cycle times which resulted in the screw doing all of the melt work in a short compression section. Heat input to semi-crystalline materials is an important component to aid melt rates. This design may have actually reduced pellet temperature as the large solids volume reduced contact with screw flights and barrel wall.

Extreme Coatings recommended that the screw pitch be reduced to increase the number of flights in the screw. The customer agreed to try a new design with 27 flights and this design was coated and installed in December 2005. A reverse temperature profile and higher overall temperature settings were also suggested to match the material suppliers recommended process conditions.

The screw was measured after 12 months operation and found to have 0.13" (0,32 mm) total wear. While still high this is a more acceptable wear rate and screw design still contributes to premature wear.