PRAXAIR
SURFACE TECHNOLOGIES

Tungsten Carbide Coatings for Feedscrews

Problem

Injection and extrusion feedscrews are subject to abrasive, adhesive, erosive and corrosive wear from plastic compounds and their additives. As flight and root surfaces wear, machine efficiency is reduced. Even .002-inch wear on the screw diameter increases the critical gap between the screw and barrel, decreasing throughput. Worn screws contribute to lower productivity, reduced product quality, downtime, and screw repair or replacement costs.

Solution

To combat this wear problem, Praxair Surface Technologies applies highly wear-resistant tungsten carbide coating either to the entire screw profile (encapsulate) or just the tops of the flights (flight follow) at supersonic velocity. The Praxair coatings are tightly bonded, very dense, and extremely hard (over 70 Rc). They can consistently outwear conventional hardface welded overlays.

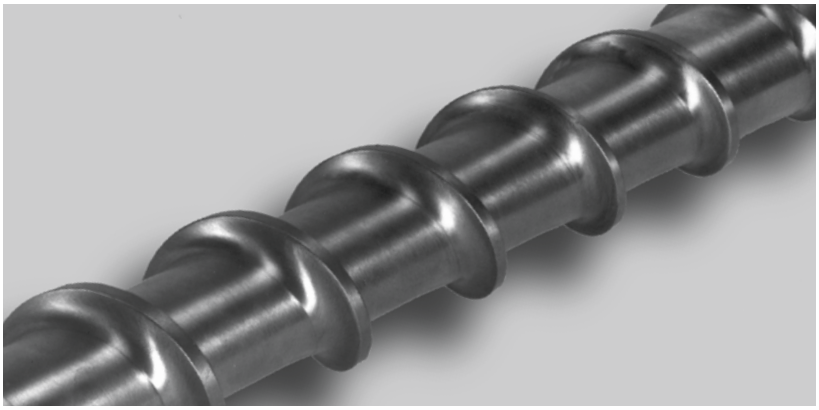
Results

This creates a screw surface that is unusually compatible with the most wear-resistant barrel materials, giving both components extended life. It means the critical screw-barrel gap remains tight, maintaining high throughput at low rpm. More thickness is available but just .003 to .004 inches of this tungsten carbide on the OD has consistently lasted three to five times longer than 1/8-inch-thick welded alloys previously used under the same conditions in the same machines.

When wear eventually does occur, Praxair can economically remove the worn coating and reapply the new surface without welding, further multiplying the useful life of the screw. This goes for worn tool-steel screws too. Praxair can reestablish proper diameter on used tool-steel screws worn up to .030-inch undersized.

Related Applications

Coatings applied by Praxair processes are effective on other plastics processing equipment such as knives (granulator, dicer, slitter), pelletizer plates, and chill, treater, embossing, and calender rolls.



Wear-resistant tungsten carbide coating lasts three to five times longer than welded repairs.

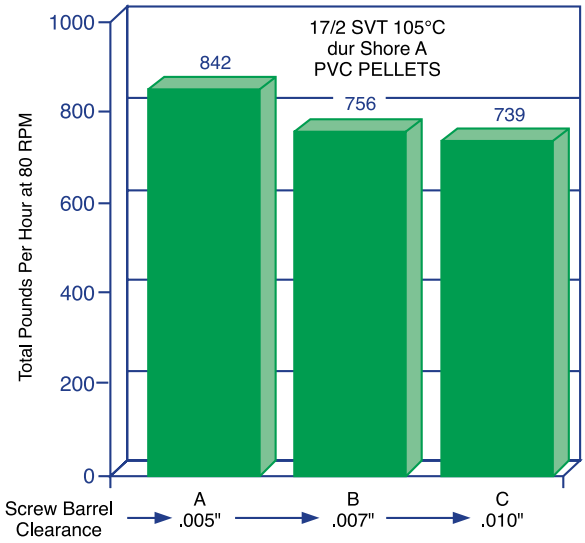
Praxair Coated Screws Maintain Throughput

Wear of .005 inches costs cable maker 100 lbs/hr in product

The graph to the right shows how critical screw barrel clearance is to production. A Praxair customer measured the production rate of its extruder where the gap was the only major variable. The results are typical of the many measurements made while monitoring production. A .005-inch gap is standard for initial clearance. If allowed to wear, an increased clearance of .010-inches results in a loss over 100 pounds of production.

A thin, hard (70 Rc) Praxair applied coating resists wear of the flights (and roots), resulting in a double benefit:

The useful life of the screw is significantly extended (as much as 4X). Higher production rate results from less wear with every revolution.



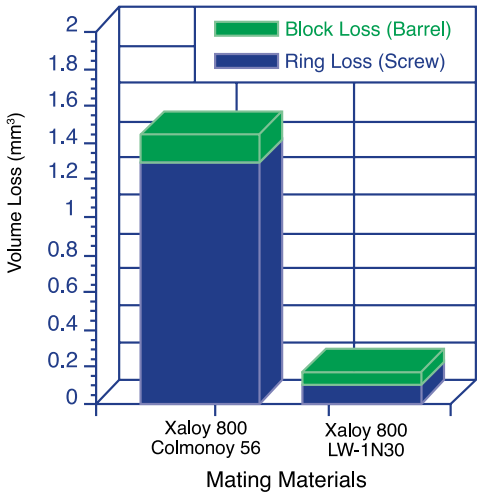
Praxair Coated Screws Are Barrel Friendly

The Alpha Wear Test consists of rotating a ring made from screw material at a certain load against a stationary block made from barrel material for a given number of revolutions. Wear is measured in volume loss and plotted.

This case compares the ring materials of Praxair LW-1N30 and Colmonoy® 56 when run against Xaloy 800. The wear on both components shows LW-1N30 coating to be more compatible with Xaloy 800 block.

This dramatically demonstrates the compatibility of LW-1N30 with Xaloy 800. Similar results occur with other bimetallic materials such as WEXCO 777.

Wear of Colmonoy 56 Compared with Praxair LW-1N30 (30-pound test load)



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Praxair Surface Technologies, Inc.
1500 Polco Street
Indianapolis, IN 46222

www.praxairsurfacetechnologies.com
psti-info@praxair.com

Telephone:
+1 317 240 2500

Fax:
+1 317 240 2255