CASE STUDY

Die Casting :
Solving Powder Paint Adhesion Issues on Aluminum Castings

DIE SLICK® 1548 C & POLY SLICK™ 31

The Challenge

A leading die caster of aluminum and zinc alloys in the US was experiencing problems with the powder painting of castings. The customer thought the die and plunger lubricants beings used were causing blistering on the castings after being coated with a powder paint. This was triggering a high volume of defective castings (25-30%) and the customer turned to Quaker Houghton to:

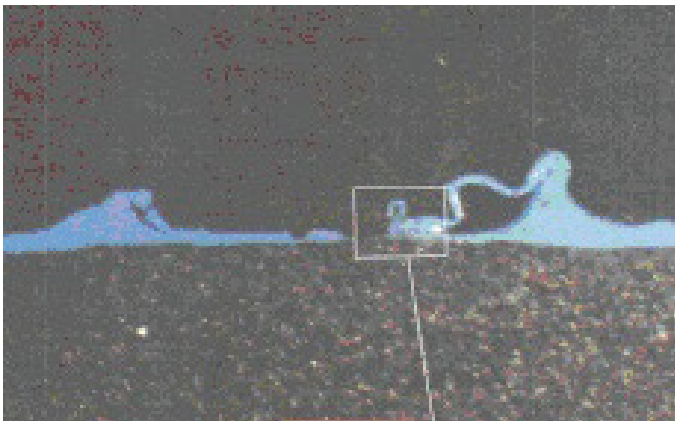
- Determine the cause and eliminate blisters that were appearing on the aluminum castings after the powder coating

The Solution

Quaker Houghton collaborated with not only the customer, but with the paint supplier, paint vendor, and die manufacturer to get to the root cause. An on-site audit of the existing die caster, powder painting process and materials was conducted. Sample castings were sent to an alternative powder paint source to test for similar results but the alternative powder painted parts had the same out-gassing results as the original parts. Competitive die and plunger lubricants were tested on the same machines where the current Quaker Houghton DIE SLICK® 1548 C and POLY SLICK™ 31 plunger beads were being used. This substitution resulted in an increased amount of porosity after x-ray analysis on the castings so the customer immediately halted use of the competitive products.

Finally, castings were sent to Quaker Houghton's laboratory to test for any possible residue that might contribute to out-gassing from the die spray/plunger lubricant. Fourier transform infrared spectroscopy (FTIR) and X-Ray analysis were performed which revealed black flakes just below the metal surface. These flakes were possibly from the die steel caused by extreme heat check (cracking) or nitride flaking.

Quaker Houghton sent raw castings for shot-peen process, which demonstrated improved results. This revealed that the poor die quality was the primary cause for the blistering issue and the dies were sent out for shot-peen process to alleviate some of the heat checking on the die.



The blister in the cross section (above) shows a collapsed bubble causing loss of paint thickness in the center of the blister

The Benefits

As a result of these collaborative efforts, Quaker Houghton was able to:

- Identify the root cause (die condition) of the out-gassing blister condition
- Successfully reduce defect rate by 97%

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The Product

DIE SLICK® 1548 C is a concentrated wax free semi-synthetic emulsion formulated to minimize residue buildup on the die parting face without sacrificing performance. It contains a unique blend of natural and synthetic components that enhance its lubrication and release properties.

POLY SLICK™ 31 is a dry beaded, high performance plunger lubricant. This product is a unique blend of waxes and additives that attracts heat and rapidly spreads on the chamber surface. POLY SLICK™ 31 works by producing a friction reducing film that applies pressure additives where needed. The film reduces soldering while providing maximum lubrication.

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