CASE STUDY

POWDER PAINT ADHESION ON ALUMINUM CASTINGS
DIE SLICK® 1548 C & POLY SLICK™ 31

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

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

THE SOLUTION
Quaker Chemical Corporation (“Quaker”) 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 outgassing results as the original parts. Competitive die and plunger lubricants were tested on the same machines where the current Quaker 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’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 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. As a result of these collaborative efforts, Quaker was able to:

» Identify the root cause (die condition) of the outgassing 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.

THE EXPERTISE

The Quaker DIE SLICK® family of die lubricants provide excellent emulsion stability and exceptional solder resistance at aggressive temperatures, increasing your performance and production. The Die Casting product line offers a complete package of value-added fluids including plunger lubricants, quenchents, fire-resistant hydraulic fluids, ladle coatings, trimming lubricants, cleaners and machining fluids. This case illustrates the importance of supplier relationship, support and correct fluid selection. Proper selection and application of the die lubricant can result in substantial cost benefits. That is why Quaker focuses on developing solutions with the highest performance without compromise, fluids that sharpen your competitive edge.