

QC-10[®] MOLD MATERIAL

High Strength Aluminum for Production Injection Molds



ALCOA MOLD & TOOLING
TECHNICAL FACT SHEET

DESCRIPTION

Cold Spray Process is an emerging technology that was originally developed in the mid-80's. It is a powder consolidation process in which relatively small particles (ranging in size from approximately 5 to 100 micrometers in diameter) in solid state are accelerated to high velocities (typically 300 to 1200 meter/second) in a gas carrier, and subsequently develop a coating or deposit by impacting an appropriate substrate. Various terms were used to refer to this technique: "kinetic energy metallization," "kinetic metallization," "kinetic spraying," "high-velocity powder deposition," and "cold gas-dynamic spray method".

To date, significant improvement has been made on feedstock powder development, process optimization and equipment; so that the cold sprayed materials have comparable or superior strength and ductility to bulk materials. The technology has been used for dimensional restoration and has been qualified for use on military aircraft and in various commercial applications.

The Alcoa teams, in conjunction with various outside sources, have successfully demonstrated the use of cold spray technology for the repair of QC-10[®] High Strength Injection molds. Significant trials have been conducted utilizing coupons made from scraped QC-10[®] injection mold pieces. Additionally, cosmetic repairs on Automotive Textures have been achieved by utilizing Cold Spray repair technology and re-texturing the repaired area.



Figure 1. Cold spray demonstrated for dimensional restoration of QC-10[®] High Strength Aluminum Mold plate (1" diameter repair in the center; Edge / Corner repair in the lower left of the sample). Bottom half of the plate has been textured after cold spray repair (color match achieved for potential for cosmetic repair).



Figure 2. Left – QC-10[®] mold piece with various damages; Middle – Cold spray repaired mold piece; Right – After surface finish.

Alcoa is actively promoting Cold Spray Technology with mold builders, molders and OEMs, as an alternative repair process of QC-10[®] molds as the industry is transitioning to aluminum for high volume production molds. For additional information on QC-10[®] mold repair with cold spray and other technologies, contact David Duff at David.Duff@alcoa.com

