

Advances in Chromate Free Conversion Coatings

Presenter: Mr. Mark Chapman, Pantheon Chemical, Phoenix, AZ

Abstract: Hexavalent Chromium (HC) is the industry standard for corrosion protection on aluminum substrates prior to painting on an aircraft. HC is very toxic and its discontinued use is an EPA pollution prevention priority through the 1993 Executive Order 12856.

Recently, a non-chromated surface pretreatment (NCSP) technology has been proven as a viable HC replacement for aluminum pretreatment; additionally, it eliminates toxic acids and solvents used in the aircraft painting process. This new NCSP significantly improves the adhesive bond between the substrate and its intended coating (or adhesive) by cleaning and then depositing an atomically thin organic coating that chemically bonds to the substrate surface. This enhanced bond improves the corrosion protection of the coating equalling and surpassing HC.

This revolutionary technology has already been adopted by the United States Air Force (USAF) and is in use on over 1,000 aircraft including the F-16. In addition, the Air Education Training Command (ATEC) of the USAF has issued a directive implementing a new policy to replace the use of HC (Alodine). This policy affects 13 AF bases and the technology will be utilized on all trainer planes except for the T-6 which has not yet been included in the Technical Order (TO).

The USAF has benefited from using the NCSP in several different aspects including labor and cost savings. For example, by deploying this new technology in the F-16 program, the USAF saved 19.4 hours in labor alone equating to \$776 in cost per aircraft painted.

The non-corrosive NCSP works on multiple substrates such as aluminum, magnesium, steel and composite materials such as Kevlar and fiberglass. This advanced technology is non-toxic, non-hazardous, chrome free, biodegradable and the cutting edge of the aerospace industry's environmental future.