Hand-Held Energetic Paint Stripping Process

Background:

This task assessed the status of energetic-based depaint processes. The assessment focused efforts on manually applied systems having a reasonable level of technical maturity (e.g., minimum of a working model). Laser and other ablative systems are currently used within the DoD, and commercial community, but these systems are intended for larger scale applications. Manually applied energetic depaint systems are believed to offer great potential to augment larger systems in lieu of using toxic chemicals. Other applications for this technology may be extended to field use for inspection and field repair.

Recent laser and plasma technologies developments have been reported and suggest manually applied depaint systems may be approaching technical maturity. This CTIO assessment identified energetic depaint systems complying with the above criteria. Feasibility testing was used to support any recommendations of a energetic depaint system warranting further development on the basis of which of these systems have the greatest potential to provide benefit to the Air Force.

Project Sponsor/Customer: WR-ALC, AF wide
Period of Performance: Jul 99 - Feb 01

Objective:

This project will test materials for assessing stripping effectiveness of energetic processes. The specimens prepared provided sufficient quantities of test materials to assess hand-held energetic paint stripping processes, with some spare test panels for contingencies. Testing included tests for Fatigue Crack Growth Rate, Tensile Strength, and Low Cycle Fatigue. Test specimens will be prepared with two types of metal, 2024-T3 bare and 7075-T6 bare.

Status:

The Bare 2024-T3 aluminum test materials have been conditioned by stripping with the laser systems to the equivalent of 2 strip cycles. The various test panels have been sent to AFRL/MLSC for fabrication into test specimens, and for tensile strength, fatigue, and fatigue crack growth rate testing. The materials characterization testing was

subcontracted to the University of Dayton Research Institute (UDRI) since they provide technical staffing to the specific AFRL facility where the tests will be accomplished.

Surplus materials were supplied to WR-ALC/TIEDM for physical damage assessments. This is reasonable because the previous material assessment done by WR-ALC was done with 2024-T3 clad substrate materials. This testing may give some indication of whether there are any possible differences in damage potential due to the clad versus the bare alloy condition. To date the physical damage assessments conducted by WR-ALC have indicated there is a very thin heat affected zone on the materials laser pulsed to the equivalent of two strip cycles (one actual strip cycle plus one cycle of laser pulse on the stripped substrate).

Some test materials were conditioned by the Craig Walters Associate's laser stripping system and were used for test specimens for materials properties testing per the Test Plan. Other test materials were conditioned by General Lasertronics Corporation's laser stripping system and were also used as test specimens. Energetic stripping processes were tested at both these corporations. Three concerns were identified during the testing; substrate temperature rise, low strip rates and incomplete stripping.

Project Plan: Jul 99
Test Plan: Jan 00
Final Report: Planned completion Sep 01
As of Date: Apr 01