

Impact Assessment of AETC Depaint Operations for Alternative Dry Media Blast (DMB) Processes

Background:

The advent of the National Emission Standard for Hazardous Air Pollutants (NESHAP) and the associated requirements for minimal release of hazardous air pollutants has compelled the Air Force to adopt mechanical paint stripping technology to replace traditional chemical strippers. Dry media blasting (DMB) has been widely accepted as a replacement technology, though there have been continual concerns about the effects of the blasting process on the mechanical properties of thin-skinned aluminum and composite material structure. The Air Force currently uses Type V acrylic which has been shown not to damage either thin-skinned aluminum or graphite/epoxy composite laminate. However, Type V acrylic can damage glass/epoxy composite if extreme care is not taken to control the blast parameters. The sensitivity required of the blasting process to prevent damage has effectively negated the use of Type V acrylic for depainting this composite material.

DMB using Type V media (acrylic) as the abrasive component is the process used to strip the protective coatings systems from aircraft currently maintained by Air Education and Training Command (AETC). The T-1A and JPATS airframes contain significant quantities of 0.025-inch-thick materials, and concern was expressed regarding use of this DMB form on these aircraft, because data regarding acceptable DMB with this combination of media and material thickness is very limited.

While it would be advantageous to AETC to be able to use their current process for these aircraft, this is a matter that must be validated through development of reliable data characterizing various aspects of this process, and possible alternative DMB processes. Therefore, the Air Force Coatings Technology Screening Committee (CTSC) identified a technical requirement regarding DMB on thin aluminum alloy substrate materials typical to the T1-A and JPATS aircraft.

Project Sponsor/Customer: HQ AETC, JPATS SPO, T-1 SPO

Period of Performance: Mar 97 - Dec 97

Objectives:

Efforts under this project focused on categorizing AETC facilities currently using Type V DMB, and the potential impacts that might be imposed by converting operations for use of an alternative media. This was accomplished by on-site surveys at Randolph, Sheppard, and Columbus AFBs. These efforts provide a definition of current facility requirements for comparison with facility requirements associated with use of a media other than Type V. The alternative media that are being evaluated in this project are Polymedia™ Lite and polymerized wheat starch media.

On-site surveys were used to identify equipment modifications and/or other areas of these depaint operations that would experience any impact due to conversion for use with one of the two alternative media under consideration. Media blast equipment manufacturers were consulted to obtain cost estimates for equipment conversions for an alternative media. Two commercial users of one of the DMB processes based on wheat starch media were polled to gain information from their experience with this media.

Status:

Project findings determined that the cost to convert AETC operations to a wheat starch media based DMB process would probably be a minimum of \$120K per site. The projected expenditures for conversion to Polymedia-Lite™ are substantially less at approximately \$2.5K per site. These cost estimates are only for any additional equipment required for each DMB process.

Other issues have been identified that are less tangible, but do have potential to impact AETC depaint operations. Actual costs associated with these issues will require further investigations if required. These include the following:

- Hazardous waste disposal would become the responsibility of base management for spent wheat starch since no recycling program exists for this type of media at this time.
- The space for the additional equipment required for wheat starch DMB is limited, or not available at all sites.
- Utilities (power for additional equipment) required for wheat starch DMB are not available at Randolph AFB, and may not be available at Sheppard and Columbus AFBs.

- Productivity is likely to vary due to lower paint strip rates associated with the alternative DMB, but this requires additional quantification.
- Additional labor and time may be required to pre-treat the wheat starch media for optimal performance.
- The existing systems would require extensive purging of the media currently used to prepare the blast equipment for use of the wheat starch media.
- Questions were raised by AETC staff regarding issues such as increased potential for media intrusion and paint adhesion subsequent to stripping with an alternative DMB process.

Indications from commercial users of a wheat starch DMB process indicated no specific problems with this process, other than reduced productivity. Northrup Grumman accepts the lowered productivity as the price to pay for managing risk of substrate damage. Stevens Aviation reverted to chemically stripping aircraft because of the increased throughput time. The lack of problems cited by both sources of information was predicated on use of the recommended blast equipment and storage facilities for the wheat starch media (water free environment).

If a conversion of AETC depaint operations to an alternative DMB process is deemed necessary, far less impact would be imposed if the process is based on Polymedia-Lite™. The projected costs associated with conversion for this media are more than \$100K less than conversion for wheat starch media. Other issues were also identified that would be more easily managed if a conversion is made to a Polymedia-Lite™ DMB process.

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