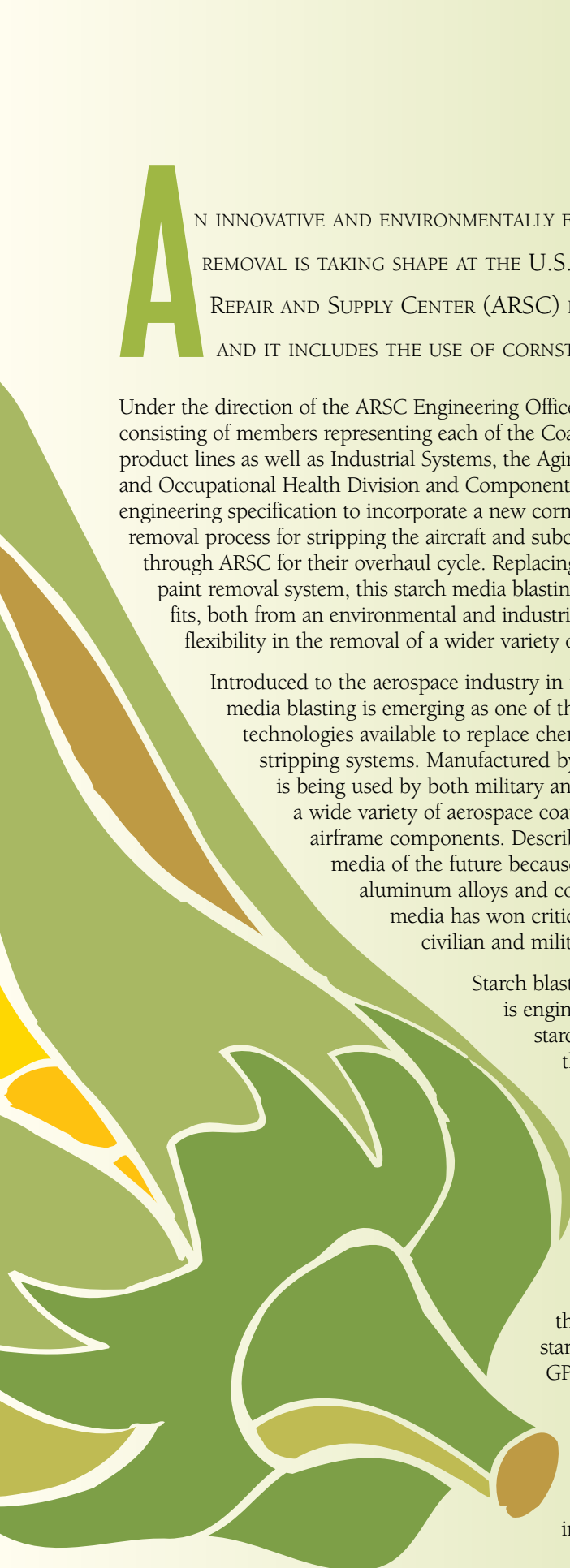




Using an
Environmentally
Benign Substance
to Remove Paint

Cornstarch and the Coast Guard



AN INNOVATIVE AND ENVIRONMENTALLY FRIENDLY IDEA IN PAINT REMOVAL IS TAKING SHAPE AT THE U.S. COAST GUARD'S AIRCRAFT REPAIR AND SUPPLY CENTER (ARSC) IN ELIZABETH CITY, NC AND IT INCLUDES THE USE OF CORNSTARCH AS A BLAST MEDIUM.

Under the direction of the ARSC Engineering Officer, a working group, consisting of members representing each of the Coast Guard's individual product lines as well as Industrial Systems, the Aging Aircraft Branch, the Safety and Occupational Health Division and Component Repair have developed an engineering specification to incorporate a new cornstarch blast media paint removal process for stripping the aircraft and subcomponents that flow through ARSC for their overhaul cycle. Replacing the current plastic media paint removal system, this starch media blasting process will provide benefits, both from an environmental and industrial standpoint and allow more flexibility in the removal of a wider variety of paints/coatings.

Introduced to the aerospace industry in the early 1990's, starch media blasting is emerging as one of the premier paint removal technologies available to replace chemical and plastic bead paint stripping systems. Manufactured by ADM/Ogilvie, eStrip™ GPX is being used by both military and commercial groups to strip a wide variety of aerospace coatings from airframe and airframe components. Described as the dry stripping media of the future because of its gentle nature on aluminum alloys and composite materials, the starch media has won critical acclaim in both the civilian and military test programs.

Starch blast media as the name implies, is engineered from corn and wheat starch that comprise the heart of the system. Upon initial review by ARSC personnel, the wheat starch was scrutinized and rejected due to the fact that high humidity affected its performance greatly. Further review of the alternative media revealed that humidity did not affect the performance of the cornstarch blast media (eStrip™ GPX), and it would fit perfectly with the stripping system.

The new media is non-toxic, biodegradable, and an engineered polymer media derived from corn, an inexpensive renewable source.

A patented multi-step process takes cornstarch, a fine powder, and transforms it into crystalline-like abrasive particles that resemble plastic abrasive media. Starch blast media can be used in the same dry stripping systems after cleaning/purging and some minor modifications to the existing equipment.

While conventional dry stripping has proven effective in a production facility like ARSC, the aggressive nature that dry stripping (i.e. glass beads, plastic, etc.) has on aluminum and composite structures led the ARSC engineering staff to look for a better way to accomplish the stripping process. The availability of this blast media process fits with the engineering concerns related to the surface alteration and/or damage often related to the use of plastic abrasive. Testing data have already been generated by commercial and military entities so much of the "leg work" to incorporate the new system is already in place. Testing has shown that the starch media removes a wide variety of coatings, from common polyurethane/epoxy paint systems to more sophisticated systems such as rain erosion resistant coatings and radar absorbing materials. ARSC engineers also tested the removal of vinyl from aircraft interior panels, the removal of sealants from components and/or fuel cells, and the removal of paint from cadmium-plated parts where the plating was left intact. The selective layer stripping without substrate damage was unlike anything ARSC had seen before and an example of the potential benefits to be derived from this system.

The whole process began over two years ago when the HH-65 Product Line Technical Services became aware of a problem with the stripping process of HH-65 floorboards. These floorboards were taking a severe beating and being damaged from the overhaul process—a better way to recondition them was badly needed. A procedure to strip the



Cornstarch blast media straight from the manufacturer container.



Stripping empennage area.



While some minor chemical stripping is required in some sensitive areas, the majority of the stripping is accomplished using the cornstarch media.



An HH-65B Dauphin helicopter undergoing ground tests prior to final painting.

floorboards had to be found that would not damage the product, and would be friendly to both the environment and the people using it.

(NOTE: HH-65 Product Line Technical Services is part of the HH-65 Product Line Division. In the Coast Guard, a Product Line is a division where the aircraft maintenance, overhaul, and day-to-day technical/engineering services are provided to the field. ARSC serves as the warehouse where aircraft parts are stored and shipped out to the field as the need arises. Each product line is its own entity, driven by the needs of the field units and the Coast Guard in general.)



An HH-60J Jayhawk airframe with the stripping process complete.

Aviation Maintenance Technician Chief Dan Lupton researched and discovered technical literature on the manufacturer, ADM/Ogilvie, and the innovative process that they had developed. Consulting with the company on the requirements for conducting testing on Coast Guard aircraft/aircraft parts led to an on site visit by both the company that manufactures the media ADM/Ogilvie and the U.S. distributor, Midvale Environmental Technologies. After examining the facilities, and making some minor modifications to an in-house blasting cabinet, the plastic bead media system was converted to the new cornstarch blast media system and readied for testing. In March 2003, the stripping process on the first floorboards began. Preliminary results revealed a quick turnaround time for the floorboards (four days versus ten), and no damage to the base material when removing the coatings present. The system performed exactly according to specifications.

eStrip™ GPX has many advantages that will be helpful to the introduction of the process at ARSC:

- **Equipment Compatibility**
The blast media can be used in existing equipment without limitation.
- **Moisture Resistant**
The blast media withstands condensation and upon drying will return to a granular state.
- **Long Product Life**
The blast media has a low break-down rate that reduces product consumption.
- **Ultraviolet Fluorescent**
The blast media is detectable under black light making for easy detection during post-strip inspection.
- **Materials Compatibility**
The blast media removes virtually every coating from common epoxy and polyurethane paints to low observable coatings.
- **Effective on Most Metallic Surfaces**
The blast media is safe for aluminum alloys, with no significant mechanical effects and leaves an acceptable finish on soft clad aluminum.

The Basics About the HH-65

The U.S. Coast Guard HH-65B Short Range Recovery (SRR) helicopter, a product of the Aerospatiale Helicopter Corporation, is designed for short-range search and rescue operations, patrol and observation, passenger transport, and cargo hook operations. The HH-65 Product Line Division at ARSC is responsible for performing depot level overhaul maintenance, technical support to the field units, and well as numerous aircraft upgrade projects. On average, 23 aircraft per year complete their 48-month overhaul cycle. During these overhauls, aircraft receive numerous avionics and airframe upgrades. Recently, ARCS began an aircraft re-engine project where all HH-65 aircraft will be retrofitted with new Turbomecca engines.



With its overhaul complete, this U.S. Coast Guard HH-65B Dauphin helicopter is heading out to a field unit.

- **Effective on Composite Materials**
A corn hybrid polymer can be applied to carbon fiber, fiberglass, and aramid (Kevlar®) with no significant effect to surfaces. Safely and efficiently strips most composite structures and parts from fiberglass radomes to graphite stabilizers.

Starch blast media is the cleanest, most environmentally responsible depainting media available, and is a 100 percent renewable resource.



An HU25C Falcon undergoing final checkouts prior to field unit delivery.



With its stripping and painting processes complete, this HH-60J Jayhawk helicopter is ready for delivery.



A view of the HU25 overhaul line.

Starch blast media is a non-toxic, biodegradable material that eliminates hazardous chemicals from the work environment.



- **Process Affords a High Degree of Control**

In many cases, coatings and paints can be removed selectively leaving the primer intact. The forgiving nature of the stripping process minimizes risk to the material being stripped.

- **Improved Environmental and Worker Safety**

The blast media is a non-toxic, biodegradable material that eliminates hazardous chemicals from the work environment. Additionally, it is the cleanest, most environmentally responsible depainting media available, and is a 100 percent renewable resource.

Midvale Environmental Technologies, the product distributor, has an abrasive recycling program where the used blast media is returned for recycling. The blast media residue, returned to the distributor, is evaluated and recycled into a product called StarZorb. StarZorb is an absorbent that will be used to collect hazardous waste at a licensed Treatment, Storage and Disposal Facility (TSDF). After the StarZorb is used, the TDSF will properly dispose of the used absorbent material. Essentially, the company is providing ARSC with a “closed loop” system. They will provide the material and then remove and dispose of the residue, vastly reducing the headache of waste disposal. Additionally, the



company is responsible for all record keeping on materials covered under the recycling program.

A lot of hard work by ARSC's HH-65 Tech Services, Aging Aircraft Branch, Engineering and Industrial Support Division, Component Repair Cell, the Safety and Occupational Health Division and all four aircraft product lines has provided ARSC with an opportunity to improve in three different areas:

1. Using a product that affords greater paint stripping flexibility;
2. Limiting the exposure of personnel to hazardous materials; and
3. Being a good steward of the environment.

(NOTE: The four aircraft product lines include the HC-130 Product Line, the HH-60J Product Line, the HU25 Product Line, and of course the HH-65 Product Line—all search and rescue helicopters. Currently, ARSC conducts all of the aircraft overhauls on these aircraft with the exception of the HC-130 Product Line where only major/minor aircraft modifications are accomplished.)

The benefits that ARSC is currently experiencing are worthy of consideration by any industrial organization and its personnel that have similar requirements.

ARSC implemented and started using the cornstarch blast media system for all four Coast Guard produce lines in March of 2004. To date, 14 aircraft and various large aircraft parts have completed production blasting with no

difficulties experienced.

During the last site visit, the inspector from the U.S. Environmental Protection Agency was extremely impressed and found the process to be in compliance with all existing regulations. The learning curve for this innovative paint process was minimized through extensive upfront training for all paint stripping personnel and the development of clear engineering specifications/maintenance procedures. Although the long-term benefits will not be fully realized for years to come, the initial evaluations/reviews have been extremely positive. The quality of the product coming out of this stripping process has been superior, and the switchover to this system has had no negative impact on the process flow-through days for Coast Guard aircraft and sub-components. ↴

Photos by Joe Ferguson.



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