

## “Green” Coating Removal at Wichita

Manufacturing Research and Development (MR&D) employees at Boeing in Wichita, Kansas are working with a new coating removal process. Partnering with a vendor, Applied Chemical Technologies, they have developed a method of cleaning the buildup of coatings on paint booth grates using water at approximately 195°F and a strippable material called Actocoat 1501GC. The product contains microspheres, 40 micron in size, that enclose a gas, which expands when exposed to elevated temperatures. As the polymer microspheres expand, they pop the coating and any attached paint off the floor grates.

The old process used a power washer to get the paint off, and usually involved using quite a bit of hand chipping with a chisel and hammer. This activity was very time consuming and the grates never got totally clean. All the power washing created a large amount of contaminated wastewater to send to the in-house Industrial Waste Treatment Plant.



**Figure 1 - Before caked coating removal**

With the new process, 2-foot-by-3-foot fiberglass floor grates are dip-coated with the Actocoat coating before placing them in paint booths. After two weeks of use, the grates are caked with paint and ready to be cleaned. A 10-minute soak in a tank of heated water strips the grates. Globes of paint, along with the coating,

float to the surface and were skimmed off using nets. A quick spray of water with an ordinary hose removes any residual paint and the grates were ready for another cycle. This process has been accepted for implementation at Wichita and locations for implementation within the facility are now being investigated.

A dip-coated grate has a caked buildup of sprayed temporary protective coating (Figure 1). Stripped coatings float in the immersion tank (Figure 2) and the clean grate is ready for reuse (Figure 3).



**Figure 2 - 10 min. soak in 195 degree F water**

Actocoat 1501 GC has a dry coating thickness of approximately 4 mils when dip-coated. So far, this new material has been able to remove substantial amounts of paint. Even when the one - inch square holes in the grates are completely plugged, the microsphere coating removes all the paint. Paints tested with Actocoat 1501 GC include a corrosion inhibiting interior epoxy primer (used on all parts except for exterior skins), a temporary protective coating, a peelable coating, a corrosion inhibiting adhesive primer, a structural adhesive primer for metal-to-metal assemblies, and a structural adhesive primer for acoustic panels. The adhesive bonding primers seem to be more of a problem to remove than other types of paints, though they can still be removed with this technology.



Figure 3 - After caked coating removal

## SHEA M&P Natural Work Groups - a networking resource

Boeing's future material requirements reflect the diversity of its new programs, such as the International Space Station, the "Sonic Cruiser" commercial jetliner and the RAH-66 Comanche helicopter. While these programs represent an extensive array of manufacturing and service needs, there is often enough synergy among product requirements to realize savings from parallel development and data sharing. Boeing engineers are seeking better materials to meet the ever-increasing number of environmental

The heated tank water can be reused for successive stripping operations. However, if chromated coatings are stripped, appropriate disposal is required when the tank is emptied.

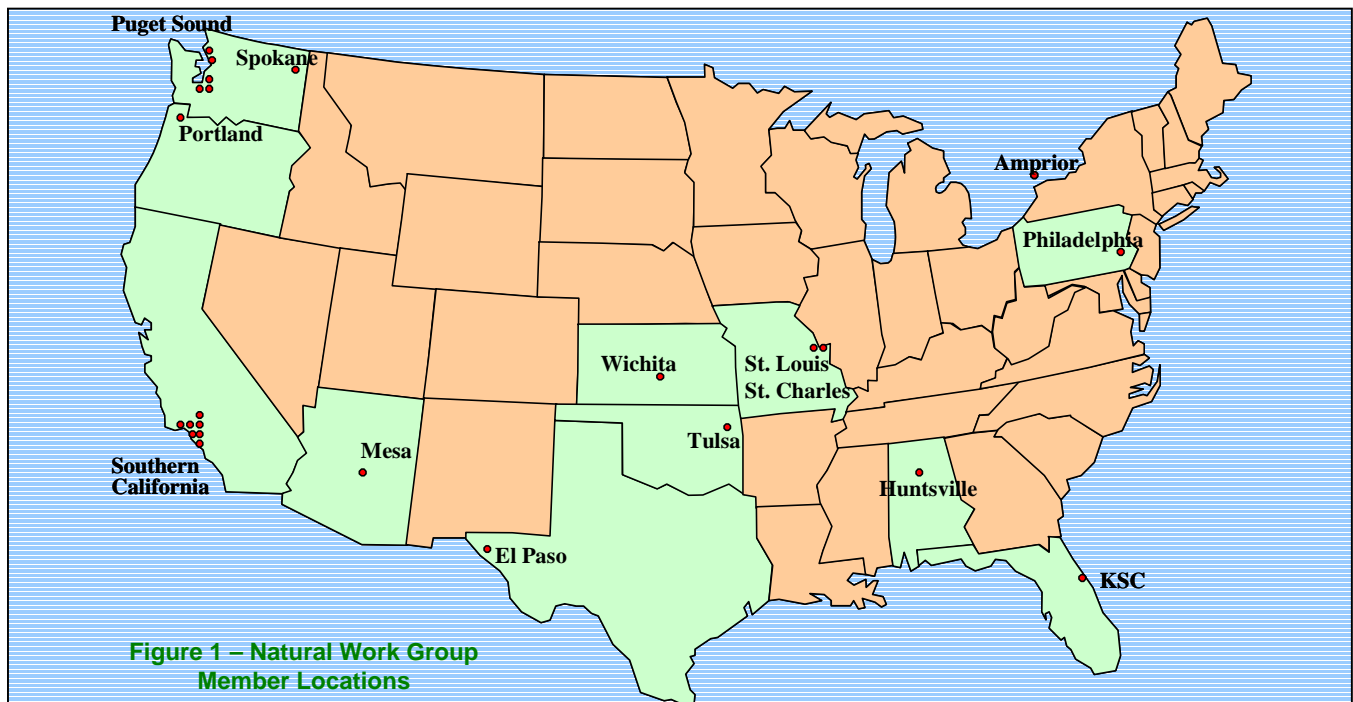
MR&D is also testing another strippable microsphere coating, Actocoat 1280. This coating is activated at a higher temperature, 250° F. On 28 January 2001, stainless steel part frames in the hand spray maskant area were stripped with razor blades and scrapers and Actocoat 1280 was applied. These maskant frames go through a high temperature oven several times a week, so a coating was needed that would not be affected by the oven temperature. On 28 April 2001, an attempt was made to remove the coatings using the maskant oven to heat the coating to 250° F to pop the coatings off the frames. At 188° F a sprinkler tripped off, so the oven could not be used. The coatings were scraped from the frames and the frames were re-coated with Actocoat 1280. The next attempt to strip these frames using the oven or infrared heat is scheduled for the end of June,

A team is working to implement the Actocoat 1501 GC floor grate coating process in 12 down draft paint booths at Wichita.

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directives that arise from local, state, federal and foreign laws.

Besides the obvious desire for lighter, stronger, less expensive materials, perhaps the biggest incentive for new materials come from environmental, safety and health needs. Prime examples are paints, solvents and protective chemical treatments containing fewer volatile organic compounds and hazardous materials. There are numerous Boeing engineers working to qualify and implement these materials, and



they have a network of natural work groups to help coordinate their efforts. Currently there are a dozen groups involving about 230 people. The locations they represent are shown in

Figure 1. Officially, the groups are part of the SHEA Materials & Processes Committee, which acts as a company-wide focal on safety, health and environmental related material and process development activities.

The primary objective of the groups is to integrate and communicate chemical technology. Boeing is a big company and several mergers in recent years have brought in new data, resources and people. So there is a lot

to be shared; a lot of lessons learned that should not be learned a second time and, most of all, a big resource of people, experience and knowledge to be tapped.

In their first year of existence, 1998, the groups saved Boeing roughly \$200,000, primarily from sharing materials data that already existed at the various sites. The Handwipe Cleaning Group set up a Web page that year that listed all of the cleaners tested, cleaner used, and cleaning specifications used across Boeing. In 2000, the savings grew to almost \$6 million as more sites and people got on board. The different types of savings responsible are listed in Figure 2. A major portion of the savings was associated with

avoiding duplication of testing in the development of new materials and processes. This was thought to be so important that a formal procedure was set up to ensure the effort would continue.

The procedure

Group	Types of Savings						
	Testing	Shop Trials	Spec Prep	Training	Data Search	Travel	Report Prep
Precision Cleaning	X	X	X	X	X	X	X
Paint Primer	X	X		X	X		X
Sealants	X	X			X		X
Paint Stripping	X	X	X		X		X
Batch Cleaning	X	X	X		X		X
Handwipe Cleaning	X	X	X	X	X	X	X
Paint Topcoats		X					
Halon		X					X
Hard Chrome							
Deoxidizing & Anodizing	X	X	X		X		
Chem Mill Masking	X	X	X		X	X	X

**Figure 2 – Nature of Natural Work Group Savings**

requires that all of the participating Boeing sites prepare a list, called a statement-of-work, that shows their anticipated test needs for the coming year. These lists are then broken down into categories and distributed to the corresponding natural work groups.

For example, the Paint Topcoats Group would get a list of the various tests that the sites are planning to conduct on candidate topcoats. The group members would then look for duplication of effort and ways to minimize it.

Perhaps Seattle and Mesa had each planned to perform tests on some of the same new materials. Instead, the group might decide that Seattle will do all of the rheology testing and Mesa will do the humidity and salt fog exposure tests. Then both will share the data.

Some other types of savings were also documented. In one case, a group member attended a seminar and subsequently briefed his whole group in a video meeting. This saved the expense of having group members from

multiple sites attend. Engineers rarely enjoy paperwork, and in several cases, reports prepared at one site were used at other sites to save time and money.

There is a concerted effort to collect and save all of the data generated by the various groups. A common Chemical Reduction Database was set up and is used to document and share information. Data from tests will be available for comparison purposes years later when other materials are tested. Another benefit of the natural work groups has been to establish a network of technical specialists who can help each other in times of need. As the groups have matured, members have become more comfortable in dealing with one another. This helps displace the “not invented here syndrome” and lets a large company such as Boeing realize more of its potential synergy.

*For more information on the natural work groups and how they may be of help to you, contact Paul Stifel, (314) 232-1974, e-mail: [paul.stifel@boeing.com](mailto:paul.stifel@boeing.com).*

## ETF MACT Update – April 2001

*Courtesy of GE Aircraft Engines*

This update on the Engine Test Facilities (ETF) MACT (NESHAP) rulemaking is based on recent information (draft document) provided by the federal EPA. This rule is to be combined with the Rocket Engine Test NESHAP. It appears that for ETFs the EPA has determined:

- No controls would be required for all existing and most new engine test facilities.
- Controls would be required only for NEW engine test facilities testing internal combustion engines (IC) greater than 25 hp.

No details were provided on how the rule provisions would be expressed and whether there would be any administrative obligations for ETFs other than those that test IC engines.



*photo courtesy USAF*

**Jet Engine Test Cell**

EPA expects to propose the rule in the June/July timeframe.

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