



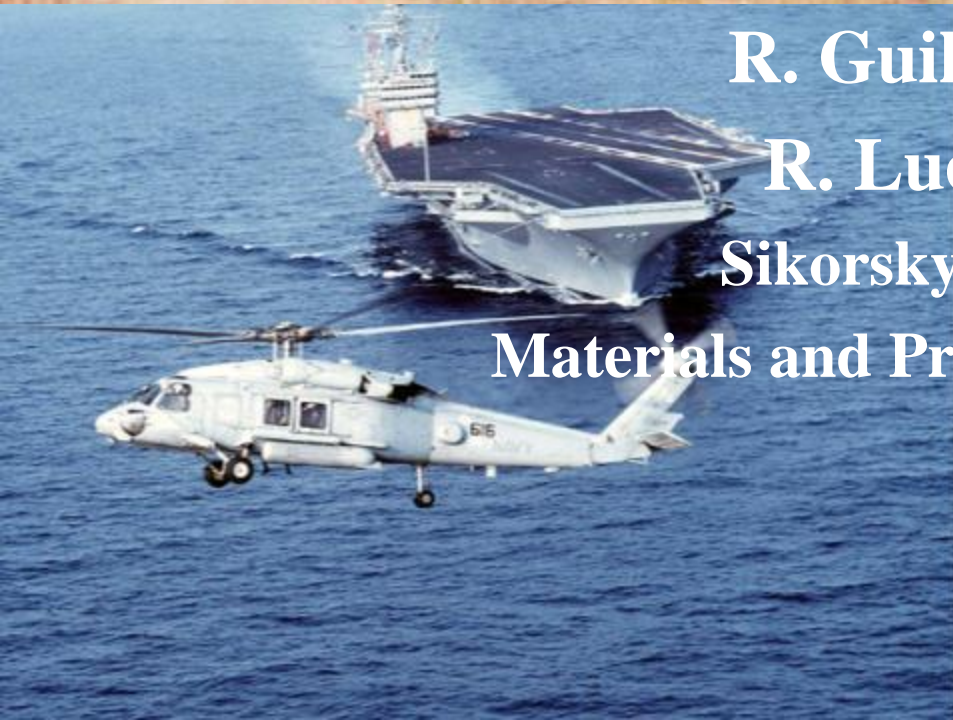
Enhanced Corrosion Protection for the H-60 Helicopter

R. Guillemette

R. Luchenta

Sikorsky Aircraft

Materials and Process Engineering



Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE FEB 2010		2. REPORT TYPE		3. DATES COVERED 00-00-2010 to 00-00-2010	
4. TITLE AND SUBTITLE Enhanced Corrosion Protection for the H-60 Helicopter				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Sikorsky Aircraft, Materials and Process Engineering Enhanced, 6900 Main Street, Stratford, CT, 06601				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES 2010 U.S. Army Corrosion Summit, Huntsville, AL, 9-11 Feb. U.S. Government or Federal Rights License					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



H-60 Corrosion Performance

- DoD Corrosion Prevention and Control directives emphasize fleet readiness as well as cost and man hour reductions through “designed in” corrosion resistance
- Corrosion improvements incorporated into UH-60M and MH-60S/R



Corrosion Drivers

- Faying surfaces (mostly interior airframe)
 - Primer-only insulation between mating parts
- Hardware and fasteners
 - Dissimilar metals
- Water traps
- Antennae and electrical grounding points
 - Mounting surfaces with low resistivity requirements have minimum finishes
- Wear surfaces
 - Vibration → wear → corrosion



Design for Corrosion Prevention





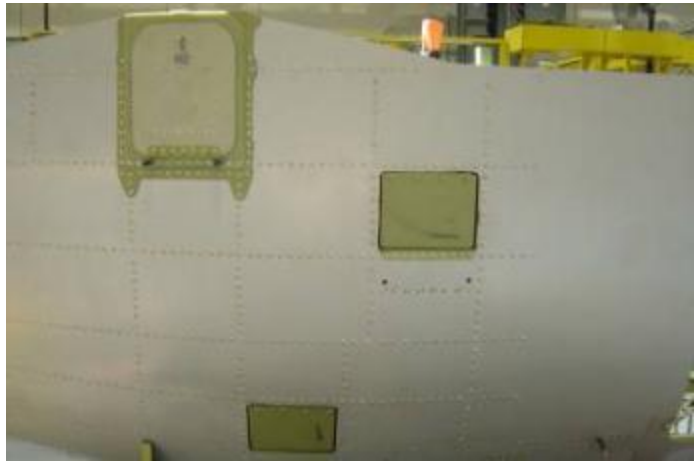
MIL-DTL-64159 Exterior Topcoat for UH-60M



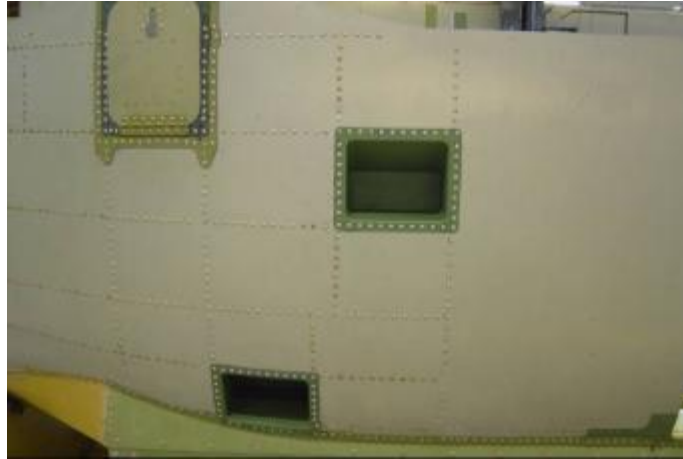
- Improved Weather Resistance / UV Stability & Resistance (degradation that allows moisture to reach primer and base metal)
- Improved Flexibility (cracks in paint near rivets, faying surfaces allow moisture intrusion)



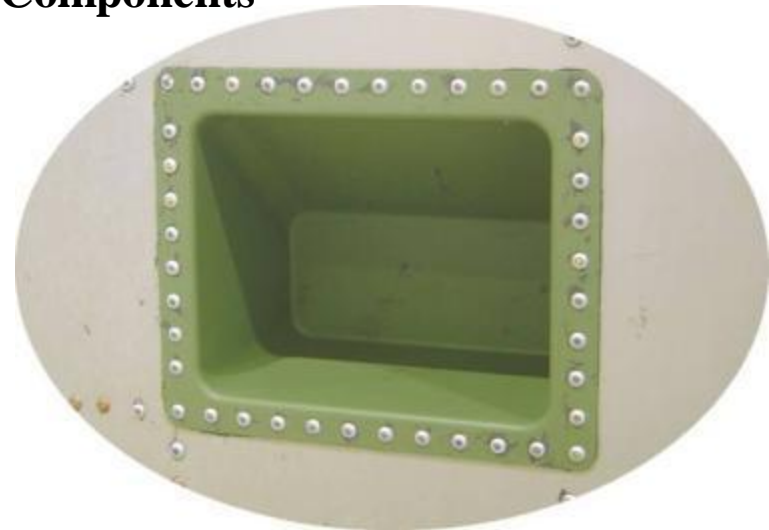
High Speed Machined Airframe Components



Sheet Metal Components

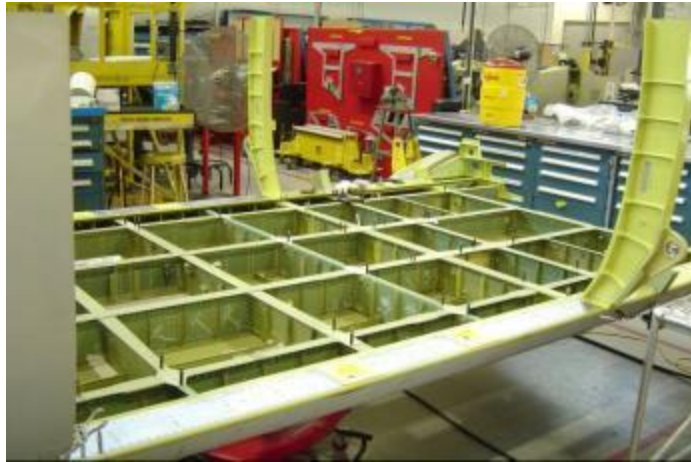


HSM Components





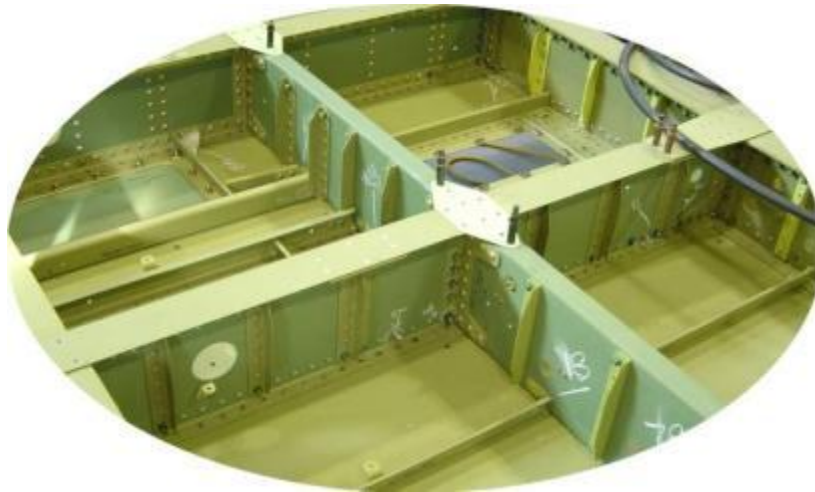
High Speed Machined Airframe Components



Sheet Metal Components



HSM Components





Corrosion Benefits of High Speed Machined Components

- Replaces multiple sheet metal parts
- Eliminates mating surfaces prone to crevice corrosion
- Eliminates holes prone to corrosion
- Eliminates dissimilar fasteners prone to galvanic corrosion
- Added clear polyurethane at detail level; topcoat of faying surfaces and nut plate locations
- Reduced assembly time and shop waste material
- Environmentally friendlier – reduced solvent from cleaning, reduced chromated sealant, reduced waste



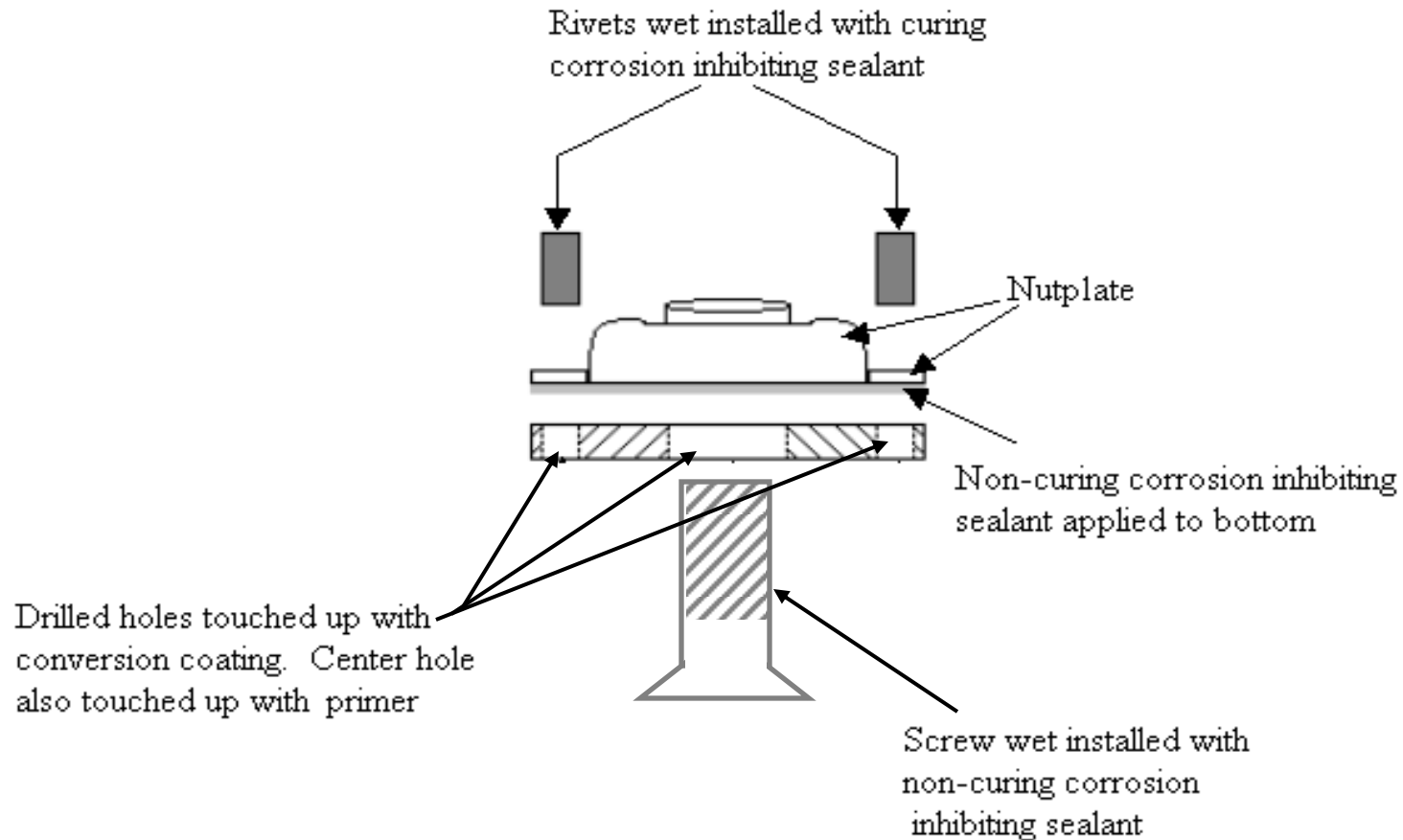
Wet Installation of Interior Fasteners

- Wet installation for low water level regions
- Removable fasteners installed with non-curing sealant
- Permanent fasteners installed with curing sealant





Added Protection for Nutplate Installation





Rivetless Nutplates

- Easier and faster installation
 - Eliminates 9 installation steps
- Improved corrosion resistance
 - Eliminates dissimilar metals
 - Eliminates two holes
- Improved fatigue life
- Meets NASM25027 torque and push out requirements
- Easier Replacement
 - Can replace threaded nut insert without removing entire nutplate



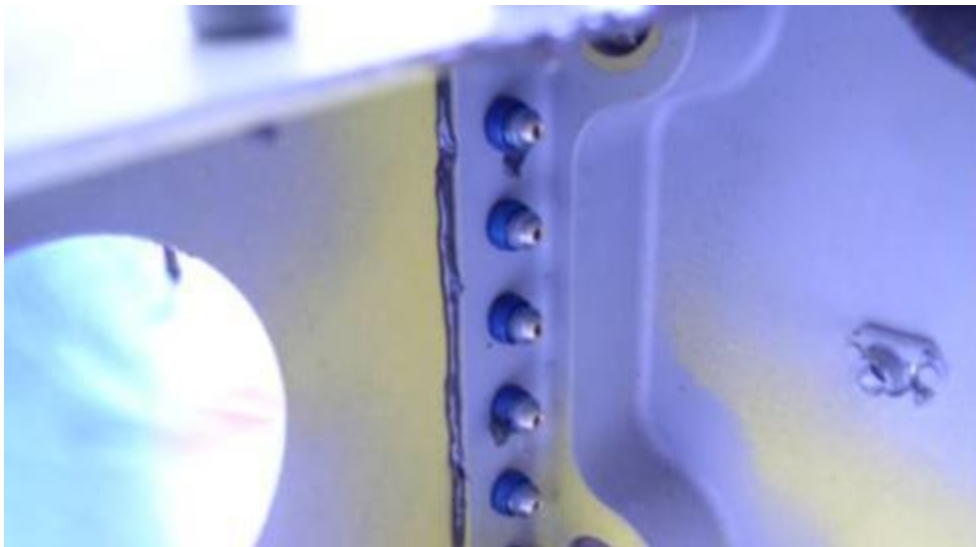


Rivetless Nutplates





Added Faying Surface Sealing



- Interior faying surfaces traditionally anodized and primed only
- Enhanced protection incorporates sealing mating surfaces with polysulfide sealant



Improved Sealing Materials

AMS 3265 Sealant

- Corrosion inhibiting
- Non-chromated
- Polysulfide base; compatible with currently used AMS-S-8802 material

Conductive Sealant

- Corrosion inhibiting
- Non-chromated
- Nickel-fillers provide electrical conductivity
- Qualification testing underway



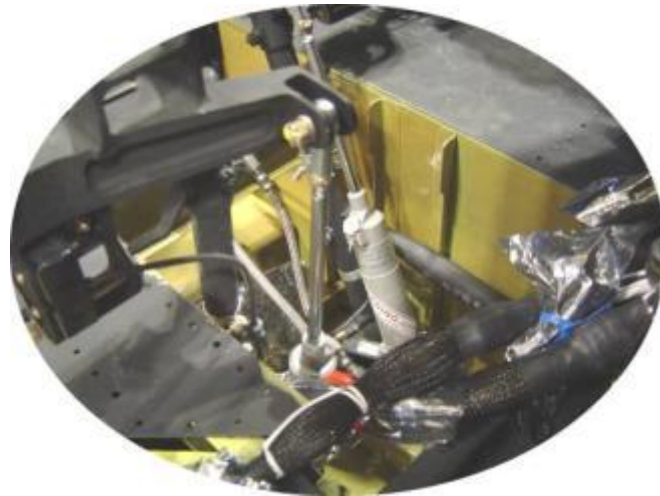
Fluid Fog Filming

- Non aerosol, lanolin based corrosion preventative material
- Fluid film sprayed into lower tub and bilge areas of Navy aircraft
- Lanolin material wicks into crevices and displaces water

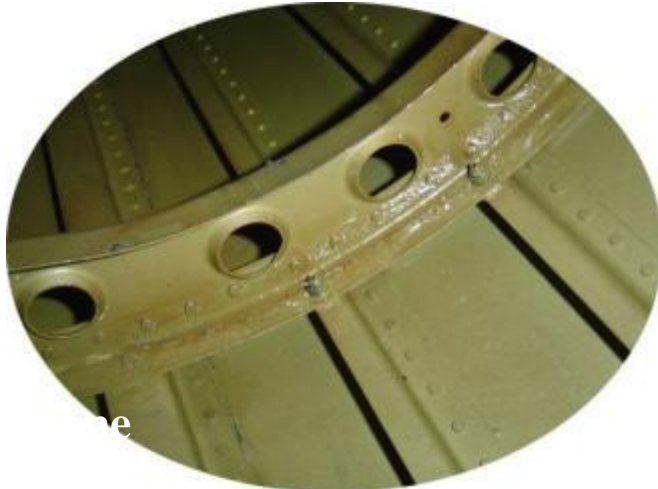




Dry-to-Touch CPC

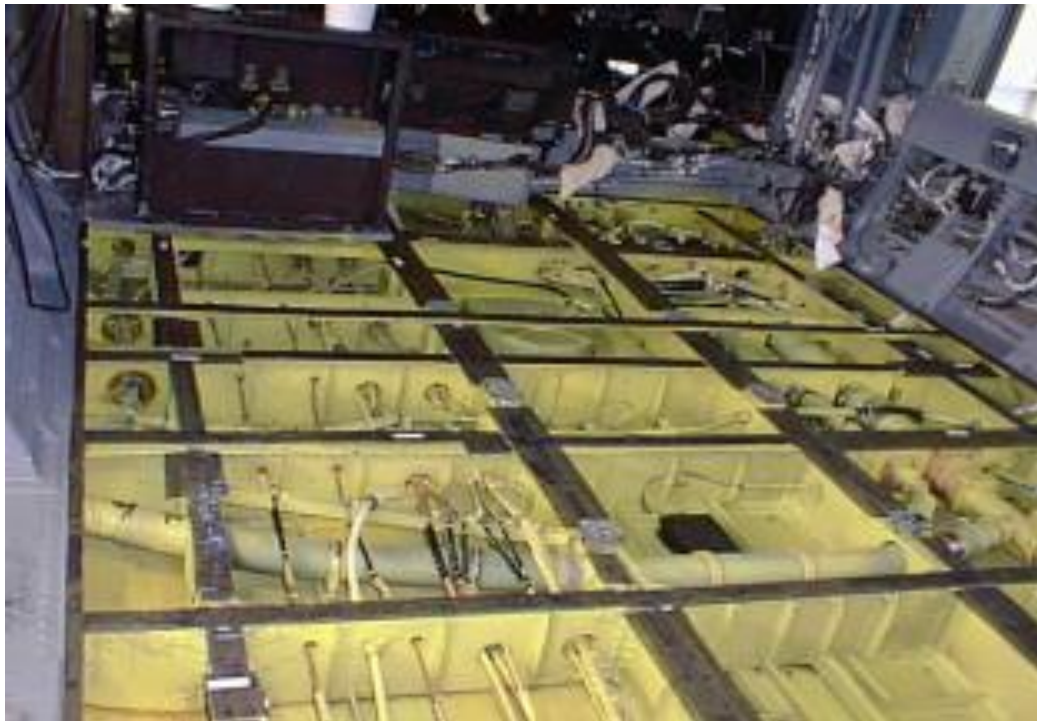


- Dry-to-touch, water displacing, corrosion preventative material
- Sprayed onto tail cone interior, lower tub, and bilge regions





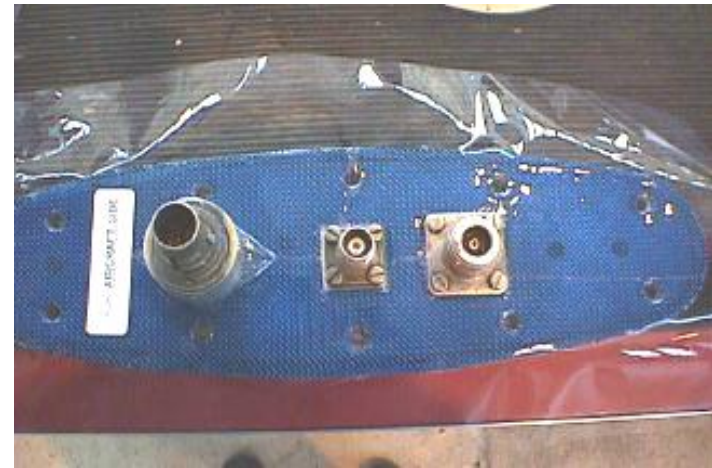
Polyurethane Gel Floor Tape



- Corrosion due to lack of “memory” in PTFE floor tape. Permanent set allows water entry when airframe flexes during flight
- Polyurethane gel floor tape, field tested by NAVAIR, has shown a significant improvement in corrosion performance for the H-60 cabin tub



Conductive Polyurethane Gel Antenna Gaskets



- Conductive polyurethane gel gaskets, field tested by NAVAIR, show significant improvement in corrosion performance
- Result is reduced maintenance and extended inspection intervals



NavalHawk Tail Drive Shaft

- Corrosion prevalent at titanium flange and aluminum tube
- Drive shaft faying surface is sealed with AMS-S-8802, but loss of adhesion can occur as the part flexes during flight
- Testing has proven that anodizing the titanium flange and using AMS 3265 corrosion inhibiting sealant will prevent corrosion





HVOF Coatings for Landing Gear Components

- Hard chrome replacement with WC-CoCr coating applied by HVOF process
- New coating provides improved corrosion performance
 - HVOF process produces dense, wear resistant coating
 - Chrome plating is inherently microcracked due to internal tensile stresses, leading to corrosion underneath the coating
- Qualification program complete, ECP in process



UH-60M Corrosion Prevention Control (CPC) Implementation

General-

- Fittings: Anodize, Prime, Clear Polyurethane at Detail Level
- Wet Installation of Fasteners
- Switch from AMS-S-8802 to Corrosion Inhibiting Sealant
- Polyurethane Antenna Gaskets

Redesigned 1-Piece ESSS Fittings (no steel strap required)

Monolithic Structure High Speed Machining

Redesigned 1-Piece Transition Steps (no water entrapment)

Spray with Corrosion Preventative Compound

Replace Floor Sealant with polyurethane gel

Spray with Corrosion Preventative Compound



MH-60S Corrosion Prevention Control (CPC) Implementation

- General-**
- Fittings: Anodize, Prime, Clear Polyurethane , at detail level
 - Wet Installation of Interior Fasteners
 - Fay Sealing of Interior Assemblies
 - Switch from AMS-S-8802 to Corrosion Inhibiting Sealant
 - Polyurethane Antenna Gaskets

