

**International Maintenance Review Board Policy Board (IMRBPB)
Issue Paper (IP)**

Initial Date: 27 Apr 2018
IP Number: IP 183
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Title: Corrosion Prevention for Rotorcraft

Submitter: Hexagon US Federal

Applies To:	
MSG-3 Vol 1	
MSG-3 Vol 2	X
IMPS	

Issue: The Corrosion Prevention and Control Program (CPCP) is a monitoring document that helps operators show their national authority and themselves that they control the corrosion of their aircraft to corrosion Level 1 or better. The CPCP is based on the structural Environmental Deterioration (ED) analysis.

When the legacy MSG-3 fixed-wing document was adapted for helicopters, (Revision 2011.1) the CPCP requirement process was copied without modifications, except those imposed by the transfer of Rotor & Drive systems SSI's to Supplemental Analysis. The CPCP requirement logics inherited from the fixed-wing document is not a good/direct fit for helicopters for several reasons:

1. CPCP requirements are only required for Structural Significant Items (SSI's), **not** Other Structure.
2. A corrosion program is **not** universally mandated by all national authorities for rotorcraft.
3. Some corrosion inspections defined on SSI's fail to be consistent with the CPCP definition; they are failure finding tasks, **not** preventative tasks.

Problem: The CPCP requirement logics inherited from the fixed-wing document is not a good/direct fit for helicopters. There are three fundamental problems with the current CPCP requirements in Volume 2.

1. CPCP requirements are only required for Structural Significant Items (SSI's), Other Structure is not covered.
On rotorcraft, SSI's (or MSI's subject to supplemental analysis) are generally limited to primary structure and Principal Structural Elements (PSE's) which represent a small part of the rotorcraft airframe. The largest part of the airframe is considered Other Structure, which is not addressed by the CPCP logics. Some operators flying in corrosive environments follow the idea of CPCP and have expressed a real need for Corrosion Prevention methodologies and practices in their maintenance programs.
2. A corrosion program is not universally mandated by all national regulatory authorities for rotorcraft. All operators, OEM's and regulatory authorities agree on both the interest and the aspect to report corrosion. So the CPCP approach and philosophy remains valid. However, all regulatory authorities do not require a CPCP as a reporting document and this generates ambiguousness. Since some authorities require the "Control Program" aspects of CPCP they remain necessary; however the "Corrosion Prevention" aspect needs to be enhanced.
3. Some corrosion inspections defined on SSI's fail to be consistent with the CPCP definition; they are failure finding tasks, not

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preventative tasks. The logics need to be expanded allowing corrosion prevention tasks be developed as additions and/or to compliment corrosion finding tasks. These tasks to include but not limited to; cleaning, application of protective compounds, preservation of topcoats, moisture reduction (including clearing of drain paths), etc.

Recommendation (including Implementation):

Revise language in sections ~~2-3-9.5~~, 2-4-2.5, 2-4-3.2, 2-4-4.1 and added glossary definition for Corrosion Prevention (CP) as outlined below:

~~Section 2-3-9 Supplemental analyses for Rotors / Drive systems~~

~~5. CPCP Requirements~~

~~The selection of ED tasks on metallic parts of Rotors / Drive systems MSI's must be consistent with the CP and CPCP requirements of [Section 2-4-2.5].~~

Section 2-4-2 Scheduled Structural Maintenance

5. Corrosion Prevention and Control Programs (CPCP)

A Corrosion Prevention and Control Program should be established to maintain the aircraft's resistance to corrosion as a result of systematic (e.g. age related) deterioration through chemical and/or environmental interaction.

The program is expected to allow control of the corrosion on the aircraft to Corrosion Level 1 or better. The CPCP should be based on the ED analysis, assuming an aircraft operated in a typical environment. If corrosion is found to exceed Level 1 at any inspection time, the corrosion control program for the affected area must be reviewed by the operator with the objective to ensure Corrosion Level 1 or better.

Complimentary to a CPCP, ~~a Corrosion Prevention (CP) task requirement can be determined as part of the ED analysis assuming a rotorcraft operated in a typical environment.~~ CP tasks may be applied to both SSI and Other Structures.

CP tasks are defined as, but not limited to:

- a. Scheduled cleaning of ~~SSI and~~ Other Structure from corrosive substances, which may otherwise support propagation of corrosion.
- b. Scheduled preservation of ~~SSI and~~ Other Structure with one or more applicable consumables, which provide temporary protection of the surface from corrosion processes. The consumables shall have no negative impact on any of the materials/paints or equipment of the rotorcraft. The function of an item and/or functional system and maintenance tasks shall not be influenced by the consumables in a negative way.

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- c. Scheduled replacement or preservation of protective coatings on ~~SSI and~~ Other Structure (e.g. primers, topcoats, anodize).
- d. Moisture/humidity reduction activities or devices including cleaning of drain paths, debris removal, elimination of dust accumulation, etc. on the relevant ~~SSI and~~ Other Structure, or even on the entire rotorcraft.

2-4-3 Damage Sources and Inspection Requirements

2. Inspection Requirements

Inspection requirements in relation to the damage sources are as follows:

- a) Accidental Damage (AD), stress corrosion and some other forms of corrosion are random in nature and can occur any time during the aircraft service life. In such cases, inspection requirements apply to all aircraft in the fleet throughout their operational lives.
- b) Most forms of corrosion are time/usage dependent and more likely to occur as the fleet ages. In such cases, operator and manufacturer experience on similar structure can be used to establish appropriate maintenance tasks (including CP and CPCP tasks) for the control of environmental deterioration.
- c) The deterioration of non-metallic structures such as composites has to be taken into consideration when establishing maintenance tasks. Appropriate inspection levels and frequencies should be based on existing relevant service experience and manufacturer's recommendations.

2-4-4. SCHEDULED STRUCTURAL MAINTENANCE DEVELOPMENT

1. Procedure

The procedure for developing structural maintenance tasks is shown in the logic diagram (Ref. [Figure 2-4-4.1]) and described by a series of process steps (P1, P2, P3, etc.) and decision steps (D1, D2, D3, etc.) as follows:

- a. The structural maintenance analysis is to be applied to all aircraft structure which is divided into zones or areas (P1) and structural items (P2) by the manufacturer.
- b. The manufacturer categorizes each item as structurally significant (SSI) or Other Structure, on the basis of the consequences to aircraft safety of item failure or malfunction (D1).
- c. The same procedure is repeated until all structural items have been categorized.
- d. Items categorized as Structural Significant Item (SSI) (P3) are listed as SSI's. They are to be categorized as safe-life or damage-tolerant (D5), and are additionally subjected to AD/ED/~~CP~~/CPCP analysis (either as metallic or non-metallic structure).
- e. Items categorized as Other Structure (P4) are compared to similar items on existing aircraft (D2). Maintenance recommendations (including CP tasks) are developed by the Structures Working Group (SWG) for items

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- which are similar and by the manufacturer for those which are not, e. g., new materials or design concepts (P5). All tasks selected by the SWG (P6) are evaluated for zonal transfer (D9) and will either become zonal inspection candidate (P20b) or will be included in the scheduled structural maintenance (P20a).
- f. The manufacturer must consider two types of AD/ED analysis; for metallic structure (P7-P9) and for non-metallic structure (P10-P14). Each SSI may consist of one or the other, or both.
 - g. Task requirements for timely detection of Accidental Damage (AD) and Environmental Deterioration (ED) are determined for all metallic SSIs (P7). These can be determined for individual SSIs or groups of SSIs which are suitable for comparative assessments on the basis of their location, boundaries, inspection access, analysis breakdown, etc. The manufacturer's rating systems (Ref. [Subject 2-4-5]) are used to determine these requirements. The manufacturer may propose a validated S-SHM application(s) as long as it satisfies the detection requirement(s) ~~and may select CP tasks based on the ED analysis that effectively increase resistance to corrosion between successive inspections.~~
 - h. For each SSI containing metallic structure (damage tolerant or safe-life), the maintenance requirements are determined (P8) such that the expectations of the CPCP (Ref. [Heading 2-4-2.5]) are fulfilled.
 - i. The inspection requirement of the ED analysis is compared with the requirement of the CPCP (D3). If they are similar or identical, the ED task will cover the CPCP requirement. If the CPCP task requirement is not met, the ED task has to be reviewed and/or additional and separate CPCP tasks have to be determined (P9).
 - j. The process (P7, P8, P9) is repeated until all metallic SSIs are examined.

Glossary Definition – [Proposed](#)

[Corrosion Prevention \(CP\)](#) Identified corrosion preventative tasks designed to effectively increase resistance to corrosion in metallic structure.

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Status of Issue Paper and date:

Active

Recommendation for implementation:

Retroactive: N

Important Note: The IMRBPB IPs are not policy. An IP only becomes policy when the IP is adopted into the processes of the appropriate National Aviation Authority. However, before formal adoption, the IP content may be incorporated by the MRB applicant on a voluntary basis with the agreement of all parties as detailed in the program PPH.