Australian Government
Civil Aviation Safety Authority

AIRWORTHINESS BULLETIN

Reciprocating Engines – External Corrosion **AWB** 85-017 **Issue** : 1
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1. Effectivity

Australian registered aircraft fitted with a piston engine

2. Purpose

To alert owners, operators and maintenance personnel of the potential effects of environmental corrosion on the external surfaces of an engine and engine mounted components.

3. References

- FAA - Special Airworthiness Information Bulletin (SAIB) No: NE-14-13
- FAA – Advisory Circular 43-4A
- FAA – Advisory Circular 43.13-1B Change 1
- Teledyne Continental Motors – Service Bulletin No: SB96-12
- Teledyne Continental Motors – Service Information Letter No: SIL99-1
- Lycoming – Service Letter No: L180B

4. Background

Major piston engine manufacturers clearly stipulate that their products are sensitive to corrosion and ageing issues, this can in turn significantly impact the operation and continuing airworthiness of an engine if not adequately monitored and controlled.

Susceptibility to corrosion is influenced by a number of factors, including but not limited to, geographical location, season and usage.

After any period during which regular corrosion-preventive maintenance is interrupted, the amount of maintenance required to repair accumulated corrosion damage will usually be quite intensive and costly.

The presence of significant levels of intrusive surface corrosion and pitting damage can also provide a degree of stress-concentration which even under normal engine vibratory stresses can result in fatigue crack initiation.

There is no single solution that will ensure corrosion prevention on an installed aircraft engine. The owner/operator is ultimately responsible to recognize the conditions that are conducive to corrosion and take appropriate precautions and actions, as necessary.

5. Recommendations

Environmental corrosion is a naturally occurring process which can inevitably affect the continued airworthiness of the engine, engine mounted components and accessories. To help combat and identify conditions that could progress to the point of adversely affecting engine airworthiness, the elected aircraft maintenance schedule should include the following provisions:

a) General

i) High temperature ceramic finishes, paints and protective barrier coatings enhance the engines ability to resist corrosion and surface fatigue from moisture, salt air, extreme operating temperatures, etc.

(1) Using an inspection light and mirror thoroughly inspect these external finishes to ensure that they remain intact. If any damage or deterioration in the protective finish is identified, immediate action should be taken to rectify the condition in accordance with the engine manufacturers and/or material manufacturers approved instructions.

Note 1: Surface corrosion of the base metal may spread under the protective coating and cannot be recognised by either the roughening of the surface or powdery deposits. Instead, the protective coating will be lifted off the surface of the base metal in small blisters which result from the pressure of the underlying accumulation of corrosion by-products.

ii) The Original Equipment Manufacturers (OEM) preservation procedures for stored and inactive aircraft engines provides an effective means for combating and minimising the corrosion condition and should be adhered to.

b) Engine Cylinders and Cylinder Studs.

i) Cylinder assemblies and their related components are subjected to a severe operating environment. Although many operational factors can contribute to the deterioration of a cylinder's durability, the loads resulting from combustion pressure and operating temperatures are the highest. Pitted surfaces in these highly stressed areas as a result of corrosion can cause ultimate failure of the part.

(1) Using an inspection light and mirror thoroughly inspect the external surfaces of each cylinder. The cylinder surfaces should be maintained in a condition free of surface corrosion and pitting. If surface corrosion is present it should be removed and the affected surfaces treated in accordance with the engine manufacturers specified instructions.

Note 2: The removal of external cylinder barrel material that results in a reduction of the barrel wall thickness may be prohibited by the engine manufacturer regardless of location. Consult manufacturer's data for specific instructions.

Note 3: Cylinders which show heavy external corrosion or pitting which is characterised by holes or fissures of indeterminate depth and direction should be replaced.

ii) Carefully examine cylinder studs and nuts for evidence of corrosion. If a protective coating, such as a cadmium coating is damaged and/or pitting corrosion exists on any of the surfaces to the extent that it cannot be removed by polishing or other mild abrasive, the part should be replaced.

c) Engine Accessories and Hardware

i) Inspect for surface corrosion, corrosion pitting and associated brown oxide staining. Affected parts should be repaired/replaced according to the particular equipment manufacturer's instructions.

(1) Any corrosion treatment should involve the following steps, as a minimum;

(a) Cleaning and stripping of the corroded area;

(b) removing as much of the corrosion products as practicable;

(c) neutralising any residual materials remaining in pits and crevices;

(d) restoring protective surface film; and

(e) applying temporary or permanent coatings or paint finishes.

Note 4: In the absence of specific manufacturer's instructions, reference may be made to publications such as FAA Advisory Circular (AC) 43-4A " Corrosion Control for Aircraft' which deals with the sources of corrosion as well as steps maintenance personnel can take to address the identified corrosion condition.

Note 5: In the absence of approved maintenance data, reference may also be made to CASA AWB 02-045 and FAA Advisory Circular (AC) 43.13-1B Change 1 "Acceptable methods, techniques and practices - Aircraft inspection and repair." which may be used for minor repairs to eligible engines.

6. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link e-mail address:

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or in writing, to:

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