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SERVICE INSTRUCTION

DATE: July 18, 2017

Service Instruction No. 1285F
(Supersedes Service Instruction No. 1285E)
Engineering Aspects are
FAA-Approved

SUBJECT: Non-Destructive Testing of Lycoming Engine Parts

MODELS AFFECTED: All Lycoming engines

TIME OF COMPLIANCE: During engine overhaul or as required

REASON FOR REVISION: Revised NOTICE on page 2 regarding grit blast medium

NOTICE: Incomplete review of all the information in this document can cause errors. Read the entire Service Instruction to make sure you have a complete understanding of the requirements.

This Service Instruction includes a directive advising **not** to use visible dye in Non-Destructive Testing (NDT) because it can adversely affect future results of NDT. This Service Instruction also identifies the necessary personnel qualifications and inspection procedure requirements for NDT to be done on Lycoming engine components. The purpose of the NDT is to identify the presence or potential of structural failures in an engine component. Non-destructive testing within the context of this Service Instruction includes Magnetic Particle Inspection and Fluorescent Penetrant Inspection.

The Magnetic Particle Inspection is an NDT process used for detection of discontinuities on the surface and/or sub-surface of ferromagnetic materials such as iron, nickel, cobalt, and some of their alloys. Fluorescent Penetrant Inspection is used to identify casting, forging and welding surface defects such as hairline cracks, surface porosity, leaks in new products, and fatigue cracks on in-service components.

Requirements for NDT Personnel

Personnel who complete the Magnetic Particle and Fluorescent Penetrant Inspections on Lycoming engine components must be qualified and certified to a written procedure in accordance with *NAS-410, Certification and Qualification of NDT personnel*. Also, personnel who make the “accept” or “reject” decisions during the inspections must be qualified and certified to at least Level II in accordance with NAS-410.

Inspection Procedure Requirements

1. There must be written procedures for the Magnetic Particle Inspection and the Fluorescent Penetrant Inspection that have been approved by someone who is qualified and certified to Level III in accordance with NAS-410.



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2. The procedures must identify:
 - Information requirements
 - Materials and equipment to be used
 - Instructions/steps to complete the inspection based on technique
 - Processing parameters

NOTICE: All procedure steps, process verification, materials, processing parameters, and techniques must comply with the requirements in ASTM E 1444 for the Magnetic Particle Inspection and ASTM E 1417 for the Fluorescent Penetrant Inspection.

3. The NDT Level III approved technique for the Magnetic Particle Inspection must be able to identify the smallest indication regardless of its orientation to the magnetic flux field. This technique must establish at least two magnetic fields, perpendicular to one another in a plane parallel to the surface examined. The technique must include all applicable processing parameters, including acceptance criteria, for correct inspection of the engine parts.
4. The Fluorescent Penetrant Inspection must use an NDT Level III approved technique that includes all processing parameters, including acceptance criteria for correct inspection of the engine parts.

Before NDT, Clean the Components

1. Remove all traces of:
 - Paint
 - Gasket materials
 - Oil
 - Grease
 - Dirt
 - Corrosion
 - Smearred metal
 - Plating
 - Chemical residues
2. Use any of the following cleaning methods as long as it is not harmful to the component or its intended function:
 - Vapor degreasing
 - Solvent degreasing
 - Ultrasonic cleaning
 - Chemical cleaning
 - Aqueous-based cleaning
 - Mechanical cleaning (such as grit blasting)

NOTICE: Grit blasting without etching can be an acceptable cleaning method if it can be demonstrated that a sufficiently fine abrasive (150 grit or finer) will not cause peening and can be removed by a detergent or alkaline cleaner.

Etching of the area(s) to be examined is to be done prior to inspection when evidence exists that previous cleaning, surface treatments, or service usage has produced a surface condition that degrades the effectiveness of the penetrant examination.

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Inspection Guidelines

1. The inspections must be done per established acceptance criteria to ensure component conformance.
2. A 3 power to 10 power magnifying glass must be used to evaluate indications.
3. **Do not use visible dye for these inspections, because visible dye penetrant materials have an adverse effect on future penetrant inspections, causing indications to be tightly closed and therefore missed during future inspections.**
4. If a Magnetic Particle Inspection is difficult to do on an odd-shaped part, the Fluorescent Penetrant Inspection can be used if the acceptance criteria are concerned about surface indications only.

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