TECHNICAL INSTRUCTION
HAC06-001 Rev N/C

Chapter 05 Life Limits and HEICO PMA Part Usage

PART NUMBER APPLICATION

All

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Title: Chapter 05 Life Limits and PMA Part Usage.
Issue Sequence Number: HAC06-001

1. Reason

This purpose of this HEICO Aerospace Technical Instruction (TI) is to instruct customers concerning the Pratt and Whitney and GE Aviation All Operator Wires (Attachments 1 and 2) dated 19 May 2006 and 27 January 2006, respectively. Within these documents, issues are raised regarding the applicability of Chapter 05 Life Limits when using Replacement Parts approved under Parts Manufacturer Approval (PMA).

Useful references are listed below:

1. CFR 14 Part 21 Subpart K: Approval of Materials, Parts, Processes, and Appliances
2. FAA Order 8110.42-Parts Manufacturer Approval Procedures
3. HEICO Aerospace Technical Instruction HAC03-001, General Instructions for Continued Airworthiness
4. MARPA Report MA-05-1102, Proposal for Guidance Material for a PMA Continued Operational Safety (COS) System

Contact HEICO Technical Services for assistance or questions regarding this Technical Instruction at:

- Telephone: 954-961-9800 (8AM to 5PM EST)
- FAX: 954-987-7585
- Email: ts@heico.com

2. Discussion

2.1 General Instructions:

To receive FAA approval, all HEICO replacement parts must meet the airworthiness requirements applicable to the product (airplane or engine) on which the parts are installed and that they perform their intended function. It is also a requirement that all design, materials, processes, test specifications, system compatibility and interchangeability are supported by an appropriate test and substantiation plan for FAA review and approval.[1]

[1] 14 CFR §21.203(Replacement and Modification Parts) and FAA Order 8110.42 (Parts Manufacturer Approval Procedures)

Also, unless specified in Appendix A of the FAA Approved HEICO TI HAC03-001 (General Instructions for Continued Airworthiness), the Type Certificate Holder (TCH) Instructions for Continued Airworthiness (ICA) that are accepted by the FAA are valid for the product with the HEICO part installed. (Reference FAA Order 8110.42).

Since Chapter 05 Airworthiness Limitations-Time Limits are part of the product (engine) ICA, these limits have been reviewed and are FAA approved when the HEICO parts are installed, operated, maintained, inspected, and repaired in accordance with the Type Certificate Holder ICA.

In conclusion, the relevant FAA Approved Chapter 05 Life Limits are not affected when HEICO parts are installed in the eligible products listed on the PMA supplement.

2.2 Frequently Asked Questions:

The following questions and responses are provided as guidance to help HEICO customers understand the issues in connection with the P&W All Operators Wire

Question 1: I am operating or am considering the use of FAA-approved HEICO compressor blades. Do the Chapter 05 life limits still apply to the engines operating these parts?

HEICO Response: Yes! The FAA approved test plan for HEICO Airfoil products addressed the requirements of 14CFR §33.14 (Start-stop cyclic stress) for the interfacing parts.

Question 2: Has HEICO reviewed system compatibility issues for its FAA-approved compressor blades? Is the assessment FAA-approved?

HEICO Response: Yes on both counts. HEICO's FAA approved test plan for all airfoil parts required a system safety assessment of the consequences to the next higher assembly and product (engine) should the part fail its intended function. This assessment was included in the design report which was FAA approved.

Question 3: If a service event should occur involving a HEICO PMA Part, will HEICO investigate the part and develop the appropriate management plan to prevent future occurrences and maintain flight safety?

HEICO Response: Yes. HEICO takes full responsibility for the Continued Operational Safety (COS) of our parts, including failure investigation and a field management plan to maintain flight safety.

Question 4: Pratt and Whitney or GE tells us that they cannot make any assessments regarding compliance of Chapter 05 Airworthiness Limitations (Rotor Life) with HEICO PMA parts installed. Can you comment?

HEICO Response: Pratt and Whitney and GE cannot make an assessment of their rotor lives with the HEICO part installed, as they are not privy to HEICO design data. As part of the FAA approval process, it is HEICO's responsibility to show the FAA that these limits have not changed. HEICO has sought and obtained FAA approval that these limits have not changed.

3. Material Information

This TI will be maintained and the latest approved revision posted on the HEICO web site at http://ipc.heico.com.

4. Revision and Approval History

Initial Release June 08, 2006

ATTACHMENT 1 – Pratt and Whitney AOW

Source: Customer Technical Service All Operator Wire

Message Body: All Operator wire - All P&W Commercial Jet Engines to reflect changes to Chap 05

To: All JT3, JT4, JT12, JT8D, JT9D, PW2000, and PW4000 Operators

Subject: Information Regarding Applicability of Airworthiness Limitations - Time Limits Section Information

Applicability: JT3 - All Models, JT4 - All Models, JT12 – All Models, JT8D - All Models, JT9D - All Models, PW2000 - All Models, PW4000 - All Models

This is: All engine models/ 72-00/CTS:RCS: 06-05-19-01

(A) Wire Contents:

This All Operator Wire contains information regarding the applicability of Airworthiness Limitations - Time Limits section information contained in the Airworthiness Limitations section of our commercial engines manuals. The clarifying statements discussed in this All Operator Wire apply to all models of JT3, JT4, JT12, JT8D, JT9D, PW2000, and PW4000 series commercial engines. The clarifying statements are consistent with information already contained in the PW6000 Engine Manual in Chapter 05.

Note: The PW6000 Engine Manual incorporates the clarifying statements discussed in this All Operator Wire in Chapter 05 (see section (B), Reference 3). The clarifying statements are consistent with existing European Aviation Safety Agency (EASA) and proposed FAA regulatory material provided to all engine manufacturers. Specific regulatory references are contained in section (B), References 1 and 2.

(B) References:

Federal Aviation Administration, Action: Notice of proposed rulemaking, Docket No. 2006-23732, as published in the United States Federal Register on February 2, 2006.

European Aviation Safety Agency, Certification Specifications for Engines, CS-E Book 2 - Acceptable Means of Compliance, Subpart D - Turbine Engines; Design and Construction, AMC to CS-E515 Engine Critical Parts, effective November 24, 2003

PW6000 Engine Manual, PN 5407764, Chapter 05, Airworthiness Limitations, Task 05-10-01

(C) Discussion and Background Information Relative to Engine Part Life Limitations

Design and testing of life limited engine parts to prevent a hazardous effect is a longstanding commercial engine certification requirement. The primary requirements are contained in the Code of Federal Regulations, Title 14 Aeronautics and Space, in three sections of Part 33. These include: 1) Paragraph 33.14 which identifies a requirement to establish low cycle fatigue operating limitations (stop/start cycles) for each rotor structural part which could hazard the aircraft, 2) paragraph 33.62 which identifies a required stress analysis for each engine rotor, spacer and rotor shaft, and 3) paragraph 33.4 appendix A which, in part, identifies a requirement for a separate "airworthiness limitation section" in the "principal manual" and to provide in this section mandatory replacement times, inspection intervals and related procedures required for type certification.

Service experience with engines certified to these requirements has been good however, unanticipated technical issues have occurred that have led to the issuance of Airworthiness Directives to address potentially unsafe conditions. This experience, as well as manufacturing anomalies and the need for damage tolerant assessment has led the FAA and EASA to propose new and uniform standards for the design and testing of life limited parts for aircraft engines. One outcome of these initiatives has been to place greater emphasis on the interrelationship between a) the type certificate holder's engineering plan that establishes the life limits (including the need for a damage tolerant approach to establishing life limits), b) the type certificate holder's associated manufacturing plan to ensure the key critical features of the life limited parts are closely controlled and are in agreement with the engineering plan and c) to define the need for a type certificate holder service management plan to ensure that maintenance and repair processes defined for the parts are consistent with the requirements of the engineering and manufacturing plans for the parts.

Consistent with the need to establish a close link between the type certificate holder's engineering plan, manufacturing plan and service management plan, reference 2 discusses the use of clarifying statements in the Airworthiness Limitations - Time Limits section of the Engine Manuals (principal manuals). The following clarifying statements were incorporated in Chapter 05 of the PW6000 Engine Manual at the time of engine certification and is consistent with reference 2:

"The following airworthiness limitations have been substantiated based on engineering analysis that assumes this product will be operated and maintained using the procedures and inspections provided in the Instructions for Continued Airworthiness supplied with this product by the Type Certificate holder, or its licensees. For engine critical parts and parts that influence engine critical parts, any repair, modification, or maintenance procedures not approved by the Type

Certificate holder, or its licensees, or any substitution of such parts not supplied by the Type Certificate holder or its licensees, may materially affect these limits."

(D) Clarification of Chapter 05 Life Limits Data Contained in JT3, JT4, JT12, JT8D, JT9D, PW2000, PW4000 Series Engine Manuals (principal manuals)

We believe that it is important to clarify to those entities who operate and/or maintain our products that the life limits we publish apply to parts that are maintained in accordance with maintenance practices, repairs and/or modifications either released directly by Pratt & Whitney or developed and released by other entities with the technical involvement of Pratt & Whitney or through the use of parts sold by Pratt & Whitney or authorized to be sold by Pratt & Whitney in support of our type certified products. We are evaluating making changes to our Engine Manual (principal manual) of JT3, JT4, JT12, JT8D, JT9D, PW2000 and PW4000 series engines to add the same note to Chapter 05 that appears in the PW6000 Engine Manual discussed in paragraph C (see bold text). We expect to make a final decision regarding the changes to our Manuals within the next 90 days.

Pratt & Whitney is clarifying its' position regarding the applicability of it's Chapter 05 life limits in recognition of the changing nature of the commercial engine industry in regard to maintenance, overhaul and repair practices. In the past almost all major repairs performed on P&W engine parts were developed and released by P&W or by repair sources approved by P&W. This was especially true for major repairs on time limited rotating parts in which the design and execution of the repair could affect the ability of the part to comply with the analytical assumptions that underlie it's published life. In addition parts attached to P&W life limited parts (blades, airseals, spacers etc.) were typically provided by P&W as new replacement parts. Today the Maintenance, Repair and Overhaul (MRO) market includes many different companies, including P&W, competing for the maintenance, repair and overhaul business for commercial jet engines. This has led to the development and release of many FAA approved repairs, including complex repairs to P&W rotating, life limited parts, and to parts attached to these life limited parts, which have never been analyzed by P&W. Similarly deviations to maintenance practices contained in our Manuals can occur which can affect the underlying technical assumptions that were made when the part lives were established. Finally P&W is aware of the availability of turbine and compressor blades for certain of our commercial engines certified through the Parts Manufacturer Approval (PMA) process of the FAA. We believe that PMA airfoils have been certified without knowledge of P&W technical data regarding the loads imposed by P&W supplied airfoils on our life limited rotating parts.

Accordingly P&W has concluded it is important for us to clearly state the limitations and conditions that are associated with the publication of our major rotating part life limits. This All Operator Wire and the changes we are considering making to our manuals address our primary concerns in these areas.

In clarifying our position regarding the applicability of our Chapter 05 life limit data, Pratt & Whitney recognizes that our customers may encounter certain questions. The attachment to this All Operator Wire provides questions and answers to assist customers of P&W engines in evaluating the actions they may need to take as a result of the information contained in this All Operator Wire.

(E) Design Changes

No changes to the design of parts for JT3, JT4, JT12, JT8D, JT9D, PW2000, PW4000 or PW6000 series engines are anticipated as a result of the actions discussed in this All Operator Wire. It should be noted that all engine parts sold by Pratt & Whitney and all inspections, repairs, modifications or other documents issued by P&W are assessed, by P&W, to be in compliance with the information contained in this All Operator Wire.

(F) Federal Aviation Administration Actions

None

(G) Conclusion

This All Operator Wire clarifies our position regarding the applicability of the life limit data that appears in Chapter 05 of the Engine Manual (principal manual) of our commercial engines. We have also provided information to assist in the evaluation of actions to be considered in recognition of our clarified position regarding the Chapter 05 life limit data published by P&W.

If you have any questions regarding this subject, please do not hesitate to contact me.

United Technologies Corporation
Pratt & Whitney
Commercial Engine Business

Robert C. Sperry
General Manager, Customer Technical Service
Large Commercial Engines
Phone: 860-565-1636
Fax: 860-755-4738

Attachment to All Operator Wire

Customer Questions that May Arise in Connection with the Information Discussed in this All Operator Wire

Question 1: I am operating a P&W engine with an FAA approved repair to a major rotating life limited part, or to a blade or other part attached to a life limited part, and the repair was not developed by or in partnership with P&W. Will P&W endorse the applicability of its' Chapter 05 life limits to the engines operating these parts?

P&W Response: No. P&W does not have the approved technical data associated with the repair. Without analysis of the approved technical data P&W is unable to state that it's published life limits will apply to parts utilizing the repair. The entity responsible for continued airworthiness of the engine may want to contact the company or person that received FAA approval for the repair to determine the FAA approved methodology that applies to the part or parts affected by the repair and to determine the life limits that apply.

Question 2: I am operating a P&W engine with FAA approved modifications to life limited parts such that the design features of the parts are not identical to the P&W supplied parts. The modification was not developed by or in partnership with P&W. Can I assume that the life limits published in Chapter 05 of the P&W manuals are applicable to the parts?

P&W Response: No. P&W does not have the approved technical data regarding the modification. Without analysis of the approved technical data P&W is unable to state that it's published life limits will apply to the modified parts. Additionally P&W believes that modifications to our parts that make the parts not in conformance with our type certified configuration should not continue to use the P&W part number for identification. The entity responsible for continued airworthiness of the engine may want to contact the company or person that received FAA approval of the modification to determine the FAA approved methodology that applies to the modified parts and to determine the life limits that apply.

Question 3: I am operating or am considering the use of a PMA turbine or compressor blade to be operated in a P&W commercial jet engine. The PMA part was not developed by or in partnership with P&W. Will P&W endorse the applicability of its' Chapter 05 life limits to the engines operating these parts?

P&W Response: No. P&W does not have the approved technical data associated with the PMA part. Without analysis of the approved technical data P&W is unable to state that it's published life limits will apply to engines using the PMA part. The entity responsible for continued airworthiness of the engine may want to contact the company or person that received FAA approval for the PMA part to determine the FAA approved methodology that applies to the PMA part and to determine the life limits that apply.

Question 4: In the situation of Questions 1,2 and 3, does a process exist for P&W to participate in the analysis of the part to determine if the P&W published life limits apply?

P&W Response: No. P&W does not plan to analyze the impact on its' life limited parts of repairs, modifications and/or parts defined in Questions 1,2 and 3.

Question 5: If a service event should occur involving a P&W life limited part in which the root cause of the service event is associated with a maintenance practice, repair or modification not approved by P&W or the use of an attached part not supplied or authorized for use by P&W, will P&W investigate the part and develop the appropriate management plan to prevent future occurrences and maintain flight safety?

P&W Response: P&W takes any malfunction or defect of its life limited parts very seriously. We evaluate each situation on a "case by case" basis. Our normal approach is to conduct an investigation regardless of the repair/modification/maintenance practice history of the life limited part and regardless of the type of attached parts that the life limited part has experienced. However if we determine through our investigation that the root cause is associated with maintenance practices, repairs, modifications or parts not approved for use by P&W, we will not normally develop and release a management plan. In such a situation our normal response would be to provide to the customer who experienced the event and to the FAA; the results of our investigation so that the appropriate actions can be taken to ensure continued flight safety.

Question 6: Will P&W provide Service Policy or Guarantee Plan financial allowances for events occurring on life limited parts on P&W engines where the root cause of the situation is directly associated with the use of maintenance practices, repairs or modifications not authorized by P&W or a part not supplied or authorized for use by P&W?

P&W Response: No. The P&W contractual commitments in our Service Policy or Guarantee Plans will apply and we will meet those commitments. They do not provide coverage for parts and services not authorized for use by P&W as described above. It should be noted that this response would also apply to parts other than life limited parts.

Question 7: What policies or actions have been or will be taken by P&W in assessing the compliance with Chapter 05 Airworthiness Limitations for non- P&W repair procedures or non-P&W authorized replacement parts incorporated into engines/equipment originally manufactured by P&W (or it's authorized suppliers) and maintained by Pratt & Whitney's Global Service Partners engine overhaul and component repair facilities?

P&W Response: If requested by the Customer in writing, and if P&W agrees, P&W's Global Services Partner facilities may perform maintenance services on this equipment using non-P&W authorized repair procedures or non-P&W authorized replacement parts that have been approved or accepted by the FAA or other airworthiness authority with relevant jurisdiction. In such instance, P&W and the applicable Global Services Partner facility will not be liable for any resulting failure or damage, and the Customer, by requesting P&W to perform the work, agrees to indemnify and hold P&W and its affiliates harmless against any liability resulting from the use of such procedures and/or parts. In such situations, the entity responsible for the continued airworthiness of the engine will be responsible for ensuring compliance with Chapter 05 Airworthiness Limitations.

Question 8: Will P&W provide its Global Material Solutions (GMS) customers the documentation verifying the Chapter 05 life limits for their new CFM-56-3 critical gas path and life limited parts?

P&W Response: CFM56 parts developed by P&W Global Material Solutions will follow the same rigorous design, verification, test and production certification processes as a new engine program. GMS customers will receive warranty information, technical support and the appropriate documentation, including Chapter 05 life limit verification, where applicable.

Robert C. Sperry
General Manager, Customer Technical Service
Large Commercial Engines
Phone: 860-565-1636
Fax: 860-755-4738

ATTACHMENT 2 – General Electric AOW

GE
Aviation

CF6 Customer & Product Support Operations
One Neumann Way, Rm 285
Cincinnati, Ohio 45215, U.S.A.

T 513 552 3272
F 513 552 3329

GEAE.CSC@ae.ge.com

January 27, 2006

To: All CF6-50 Operators
Copy: All Reps (Information Only)

Message No.: 06/CF6/07

Subject: CF6-50 Non-GE Approved Stage 1 High Pressure Turbine Blades

The purpose of this wire is to describe GE Aviation's ("GE") technical position regarding the installation and use of non-GE approved PMA Stage 1 High Pressure Turbine Blades in GE CF6-50 engines.

Background: The FAA has granted Parts Manufacturer Approval (PMA) under 14 CFR 21.303 for a non-GE approved Stage 1 HPT Blade ("the "PMA Blade") as a replacement part for GE CF6-50 Stage 1 HPT turbine blade Part Number 1881M53P04.

Continued Airworthiness of the PMA Stage 1 HPT Blade: GE publishes and periodically updates Instructions for Continued Airworthiness (ICAs) for CF6-50 Stage 1 HPT Blades (including all inspection limits contained in GE manuals) in accordance with 14 CFR 33.5. The technical data contained within these ICAs has been developed and approved for use with Stage 1 HPT blades manufactured and/or approved by GE and maintained with repairs approved by GE. GE did not participate in the design, development or approval of the subject PMA Blade and has no information regarding the design characteristics, manufacturing processes, material, quality control processes, field experience or any potential effects arising from the use of the PMA Blade. Accordingly, GE is not able to provide technical advice or continued airworthiness support for the subject PMA Stage 1 HPT blade. In addition, Operators should be aware that technical support provided by GE concerning mating hardware such as the Stage 1 HPT Disk is based solely on the use of GE parts and repairs and does not account for use of PMA blades.

Chapter 5 Life Limits of the Stage 1 HPT Disk: As type certificate holder, GE publishes initial life limits for its Stage 1 HPT disk and maintains those life limits over time to take into account any GE-approved modifications, repairs and changes in design, as well as GE's extensive field experience. To meet this regulatory requirement, GE has developed a rigorous, FAA-approved methodology for determining and certifying life limits applicable to critical rotating parts such as Stage 1 HPT disks. This methodology incorporates stress analysis, thermal analysis, materials property data, life analysis, operating conditions, and field experience. In addition and extremely important, boundary conditions influenced by the blade/disk interactions are incorporated in the methodology and analyses noted above. Additionally, GE Design Practices and configuration control procedures are employed to ensure that configuration changes to each fielded design are fully evaluated including mating parts and functionally interfacing parts. In the case of HPT blades, the GE configuration control process includes evaluation of changes for potential impact on boundary conditions used to establish the disk loads, stresses, operating temperatures as inputs to re-assess life capability and life limits for the HPT disk. By contrast, GE has no such data or field experience relating to use of the subject PMA Blades.

GE does not know whether any comprehensive life analysis of the Stage 1 HPT disk was performed to support the installation of the PMA Blades or the effects that such installation might have on continued airworthiness of the Stage 1 HPT disk over time. Therefore, GE does not have the necessary data to support the application and use of its published Chapter 5 life limits for GE Stage 1 HPT disks when operated in conjunction with the PMA Blade. Operators should refer to the manufacturer of the PMA Blades to determine (i) which FAA-approved methodology it used for determining and certifying life limits applicable to critical rotating parts such as the Stage 1 HPT disk, and (ii) what life limits it determined utilizing its FAA-approved methodology.

GE reminds operators that tracking disk and blade configuration history per existing GE Master Tracking List recommended practice (defined in the Engine Data Submittal) facilitates review of possible issues resulting from use of PMA Stage 1 HPT blades, including interpretation and application of GE warranties and guarantees.

CF6 Customer Support Director