
Service Newsletter

March 22, 2004

SNL04-1

TITLE

PRATT & WHITNEY CANADA PT6A COMPRESSOR TURBINE (CT) BLADE FRACTURES

TO

Cessna Caravan and Projet Service Stations and Applicable Owners Of Record

MODELS AFFECTED

All 208, 208B and 425 Airplanes

DISCUSSION

The purpose of this Service Newsletter is to transmit Pratt & Whitney Canada Service Information Letter SIL No. PT6A-125: PT6A Compressor Turbine (CT) Blade Fractures. SIL No. PT6A-125 provides operational recommendations for engines suspected of experiencing an over temperature condition or accelerated CT blade creep.

OWNER NOTIFICATION

On April 5, 2004 a copy of this Service Newsletter will be sent to applicable owners or record.

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SERVICE INFORMATION LETTER

Subject PT6A Compressor Turbine (CT) Blade Fractures

Applicability All PT6A engines

Introduction

Pratt & Whitney Canada (P&WC) wishes to provide operators of all PT6As with operational recommendations that stem from recent investigations of certain CT Blade fractures that have occurred on the Small PT6A Family of engines. These recommendations are made to help operators become more aware of the impact that certain operational situations may have on CT blade reliability, and consequently help reduce the future occurrences of Hot Section distress. All pilots of PT6A powered aircraft and the Owner/Chief Pilot/Maintenance Director or their delegates should carefully review these recommendations.

Discussion

P&WC has completed a review of some aspects of PT6A operation that could result in either an overtemperature (referred to herein as "overtemp") condition or an acceleration of CT blade creep commonly referred to as stretch. Either scenario will lead to reduced CT Blade life, reduced engine durability/reliability, increased operating costs and could likely result in CT Blade fracture and total loss of engine power. Further, a CT Blade fracture due to an overtemp event may occur without any noted deterioration in engine performance.

It is also important to note that CT Blades subjected to an over-temperature of any type may not fracture when the overtemp occurs, but could result in a CT blade fracture/loss of engine power during a subsequent flight.

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1.Overtemp Conditions

An overtemp condition is when the temperature of the engine exceeds the Maximum allowable temperatures as defined in the Pilot Operating Handbook (P.O.H.) and the applicable Engine Maintenance Manual. All PT6A Maintenance Manuals contain Overtemp charts that provide instructions for CT blade disposition based on the severity of the event. The two charts present in all PT6A Maintenance Manuals address overtemps that occur during the normal starting sequence, and during all other operational modes. One type of overtemp event has been identified which may result in physical damage to the blades that cannot be detected by dimensional (stretch check) inspection, and therefore requires destructive testing to determine if the properties of the blade material have been weakened.

P&WC has recently received field data from an operator who had optionally installed "engine monitoring equipment" which facilitated the detection of an overtemp occurring during inadvertent cut-off and relight. During taxi the pilot inadvertently moved the fuel condition lever from Low Idle into Cutoff and back to Low Idle in a very short time resulting in a short-term sub-idle overtemp. P&WC has determined that this type of overtemp event can result in a change to the CT Blade microstructure referred to as solutioning that can also adversely affect the creep properties of the CT Blades. The Charts in the PT6A Maintenance Manuals for Overtemp do not explicitly address this condition and some operators may erroneously have used the "Overtemp on Starting " chart to determine what maintenance actions were required.

An example of CT Blades that were likely exposed to an overtemp condition are shown in Fig.1, these blades were in operation prior to being discovered during an H.S.I., cracking is evident on the trailing edge of some blades. Fig. 2 shows a CT disc assembly following a CT blade fracture event.

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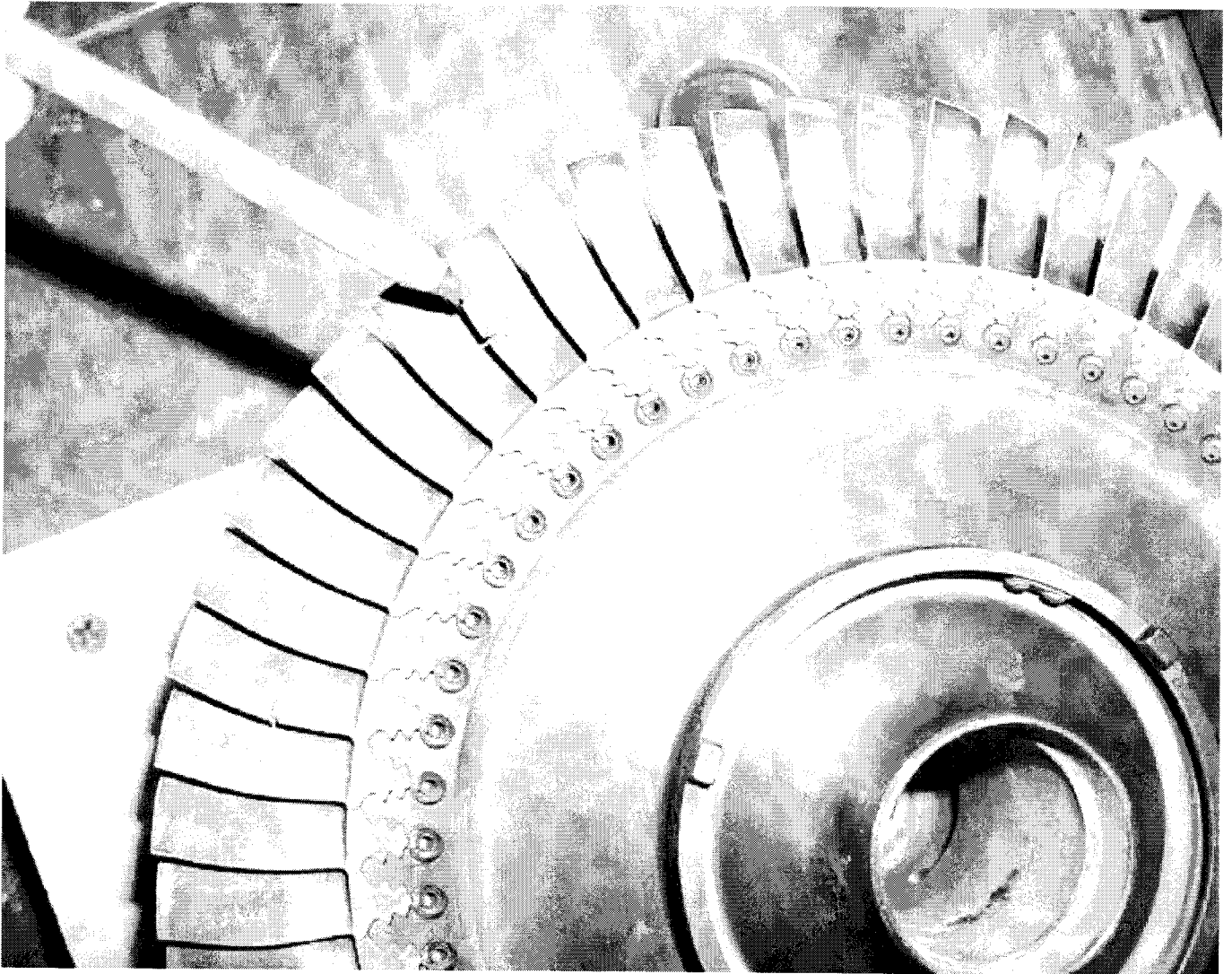


Figure 1

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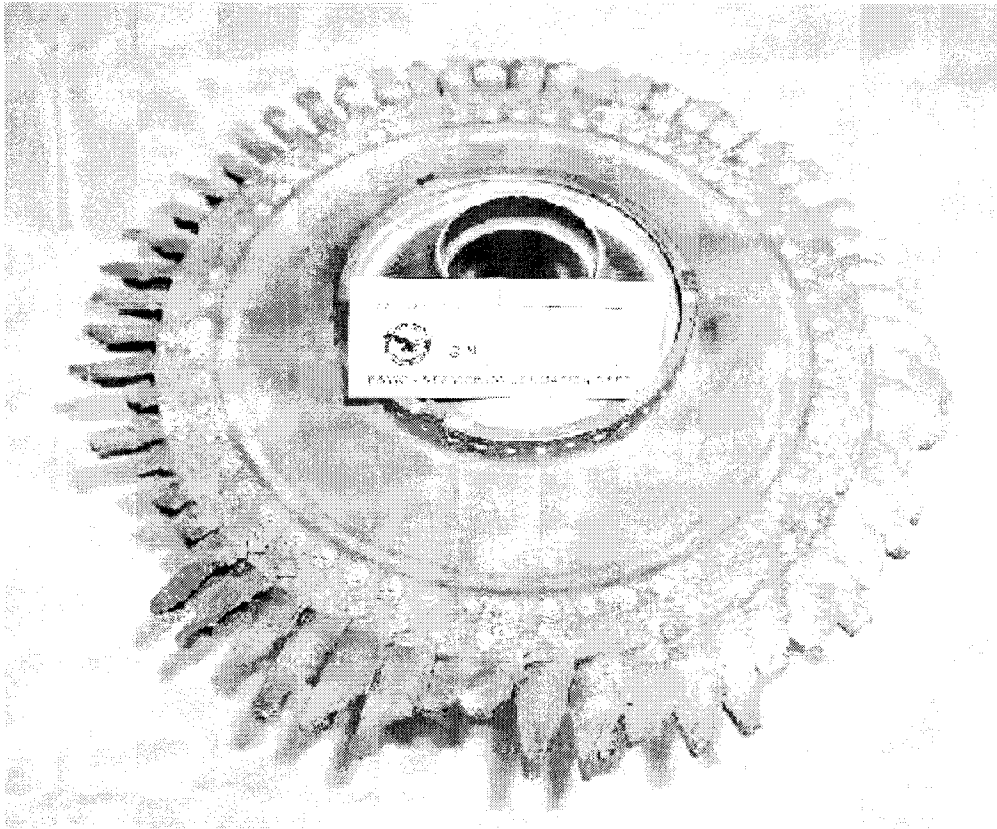


Figure 2

2. Conditions which lead to and may accelerate creep

During engine operation, CT blades are exposed to both high temperatures from hot gases and stresses due to centrifugal forces from engine speed. The cumulative time effect of this heat and stress cause the CT blade material to creep that is detectable by airfoil elongation also referred to as stretch.

The maintenance manuals for small PT6As require an inspection for creep, also known as stretch check, at 5000 hour Time Since New (TSN) and subsequently every 3,000 hours.

All PT6A engine models require a similar inspection to be performed at engine overhaul.

Engine Power Setting Limits for the various flight regimes are outlined in the P.O.H.

It is essential to use the correct power setting procedures to assure the integrity of the engine. Engines operated regularly beyond the recommended power settings of the P.O.H, but still below the defined temperature redline settings and engine maintenance manual over-temperature chart limits, may experience accelerated CT Blade creep. This effect is cumulative and could likely lead to reduced CT Blade life or

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CT Blade fracture and total loss of engine power occurring prior to the blade inspection interval stated in the maintenance manual or overhaul manual.

Recommendations

Overtemp Conditions

Follow the applicable Engine Maintenance Manual recommendations for all overtemp conditions.

Inadvertent Cutoff and Relights

P&WC is in the process of revising the PT6A maintenance manuals to add an instruction that will require a metallurgical analysis be conducted when this type of event has occurred.

Operators will be required to submit the CT blades to an overhaul level inspection and include a metallurgical analysis (cut-up) of two blades to determine possible changes to the microstructure

P&WC recommends that if an operator accidentally Cuts-off the engine during Taxi the engine should be allowed to completely shut down and then be restarted per applicable POH procedures.

Power Settings

P&WC recommends that operators fully adhere to the Power setting requirements specified in the P.O.H. for your specific application.

Sincerely,

PRATT & WHITNEY CANADA CORP.



Giovanni Mulas
General Manager, Small Turboprop Service Engineering
Customer Support

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