



GO BEYOND

PWC WORKSHOP

WFP AVIATION SAFETY EVENT – NAIROBI KENYA – JULY 2022



EXPORT CLASSIFICATION

Check this box if presentation contains “no technical data” ☐ OR summarize the export classifications of all slides in this presentation as instructed below:

Instructions: Box 1 and one (1) of boxes 2-5 must always be completed	
	Classification:
1. Canadian ECL(s):	N/A
2. ECCN(s) (EAR):	
3. P-ECCN(s) :	9E991
4. USML (ITAR):	
5. P-USML:	

PROPRIETARY NOTICE

This document is the property of Pratt & Whitney Canada Corp. (“P&WC”). You may not possess, use, copy or disclose this document or any information in it, for any purpose, including without limitation to design, manufacture, or repair parts, or obtain TCCA, FAA, or other government approval to do so, without P&WC's express written permission. Neither receipt nor possession of this document alone, from any source, constitutes such permission. Possession, use, copying or disclosure by anyone without P&WC's express written permission is not authorized and may result in criminal or civil liability.

UNPARALLELED SUPPORT

AFRICA SUPPORT

FIELD SUPPORT REPRESENTATIVES

- Nicholas Kithinji – East Africa
- Tibebu Sileshi - Ethiopia
- Herman Strating – Southern / West Africa
- Norberto Galant - Southern / East Africa

MOBILE REPAIR TEAM

- Kumkum Abid - Kenya
- Imran Kassam - Kenya
- Leigh Van Zyl – South Africa

SALES

- Kaval Shah – Regional Sales Manager

24/7 SUPPORT

- CFirst
- MyPWC Portal



UNPARALLELED SUPPORT

EXPANDING OUR SUPPORT IN AFRICA

DEDICATED IN REGION FRONTLINE SUPPORT

- Technical Field Support
- Mobile Repair Technicians
- Commercial Support
- 24/7 Technical Helpdesk
- Digital Support Solutions

MOBILE REPAIR TEAM SERVICES

- Borescope Inspection (3D measuring capability)
- Hot Section Inspection (HSI)
- On-Wing Repair
- Troubleshooting
- Fuel Nozzle Flowing and Cleaning
- SB incorporation
- Maintenance Reviews



OUR ENGINES

OVER 105,000 ENGINES PRODUCED

General Aviation

500 – 1,900 SHP



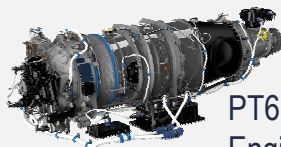
PT6A Small



PT6A Medium



PT6A Large



PT6 E-Series™
Engine

Regional Aviation

1,800 – 6,500 SHP



PW100



PW150

Auxiliary Power Units



PW900



APS

Helicopter

600 – 2,200 SHP



PW200



PW210



PT6T/B



PT6C

Business Aviation

900 – 20,000 LBT



JT15D



PW600



PW500



PW300



PW800

100+ ENGINES CERTIFIED IN THE LAST 25 YEARS

PW206C



Leonardo
AW109 Power

PT6A-52



HBC King Air
200GT

PW901C



Boeing 747-8

PW535E



Embraer
Phenom 300

PW210S



Sikorsky S76D

PT6C-67E



Airbus
Helicopter H175

PW210A



Leonardo
AW169

PW307D



Dassault
Falcon 8X

PT6E-67XP



Pilatus
PC-12NGX

APS2600



Embraer
E2 175

1995

2000

2005

2010

2015

2020

PW150A



Bombardier
Q400

PW308C



Dassault
2000EX

PW307A



Dassault Falcon
7X

PW207D1



Bell 429

PT6A-140



Cessna Grand
Caravan EX

PW127N



ATR 72-600

PW814GA/
PW815G



Gulfstream
G500/G600

PW306D1



Cessna Citation
Latitude

PT6A-65SC

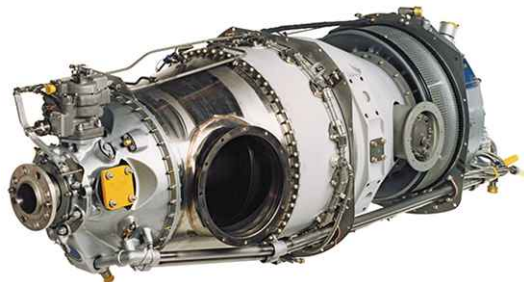


Cessna
SkyCourier

GENERAL AVIATION



PT6A Small



PT6A Medium



PT6A Large



Cessna Grand Caravan EX



Piper M600



Air Tractor AT-602



Pilatus PC-12NG

BUSINESS AVIATION



JT15D



PW600



PW300



PurePower PW800



PW500



Citation XLS



Dassault Falcon 8X



Embraer Phenom 100EV

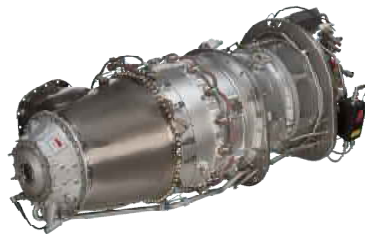


Gulfstream G500/G600

HELICOPTERS



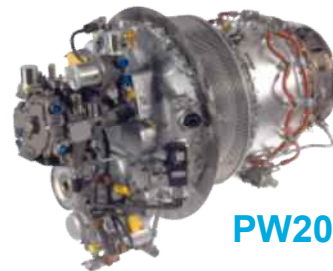
PT6T



PT6C



PT6B



PW200



PW210



Leonardo AW169



Airbus Helicopters H175



Sikorsky S-76D



Bell 429

REGIONAL AVIATION



PW100



PW150



Airbus Defence C295W



ATR 72-600



Bombardier Q400



XAC MA-60

AUXILIARY POWER UNIT



APS 500/1000/2000



APS 3200



PW900



APS 2300/2600



APS 5000



Bombardier Q400



Embraer E190

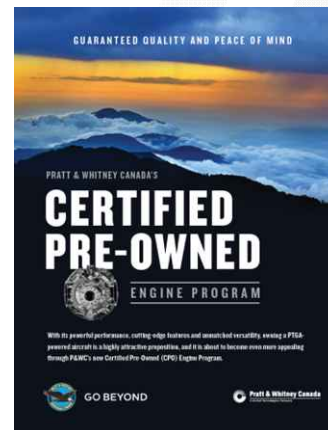
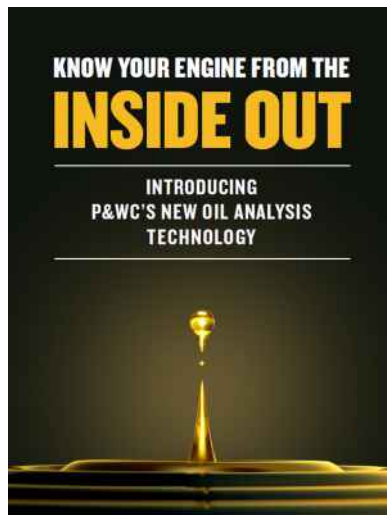


Boeing 787-8 Dreamliner



Airbus A320

TAILORED AND FLEXIBLE SOLUTIONS AND SERVICES



PRATT & WHITNEY CANADA CUSTOMER SERVICE CENTRE

PROVIDING ALL AFTERMARKET SERVICES FOR P&WC IN THE EMEA REGION

REPAIR AND OVERHAUL SUPPORT FOR ALL P&WC ENGINE MODELS

All repair and overhaul activities are performed by P&WC Network Shops

MTU in Ludwigsfelde, GER (EMEA) – PT6A, Fans, PW200

P&WC in Luton, UK (EMEA) – All Models

P&WC PWV (USA) – PT6A, Fans

P&WC Plant 5 (Canada) – All Models

P&WC SEA (Singapore) – PW100

P&WC Kenya (Nairobi) – PT6, PW100

SALES, RENTALS & EXCHANGES

We are fully equipped to handle all of your engine sales, rental and exchange needs including auxiliary power units (APUs).

SALES

We have a wide variety of engine and APU models – both new and used – available for sale.

EXCHANGES

An exchange via P&WC Leasing can be an cost-effective way to minimize aircraft downtime, eliminate repair and overhaul turnaround times, and meet end-of-aircraft-lease requirements without an overhaul.

We continuously optimize our pool of lease and rental engines to allow us to make many of these engines available for sale.

RENTALS

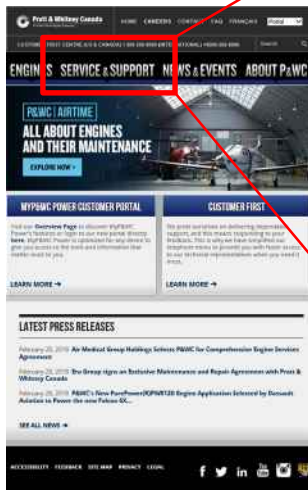
P&WC Leasing, Limited Partnership has the largest pool of rental and exchange engines available in the industry.

FLEET ENHANCEMENT PROGRAM

Our Fleet Enhancement Program allows you to exchange a core engine for a new one of the same model at a reduced price, on a flexible delivery schedule.

Our FEP program can help reduce operating and maintenance costs, while providing you with new life-limited components, a new factory warranty, engine-OEM support, and enhanced aircraft resale value.

P&WC SMART PROGRAMS



WWW.PWC.CA



HOME • SERVICE & SUPPORT

FLY P&WCSMART

P&WCSMART Maintenance Solutions deliver greater value to our operators.



PW100

Discover how P&WCSMART will benefit your operations and give you greater peace of mind. Sign up for our solutions to simplify management of your PW100 engine maintenance costs.



TURBOSHAFT

Explore our P&WCSMART Maintenance Solutions for turboshaft engines - including competitive solutions for the PT6B, PT6T, PT6C and PW200 engine families.



PT6A

Check out our P&WCSMART Maintenance Solutions tailored to the needs of operators flying PT6A engines - which make the leading turboprop in its class even better.

We want to hear from you.

Be part of the innovation - we are motivated by your feedback.

Tell us your needs - let us help you solve your operations challenges, such as logistics, budget planning and more. We are open to your perspectives and suggestions. [Contact us.](#)

A P&WCSMART Decision

[Print-friendly version](#)

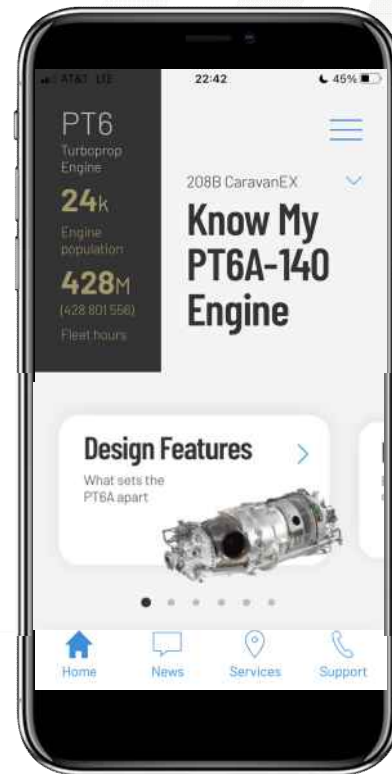
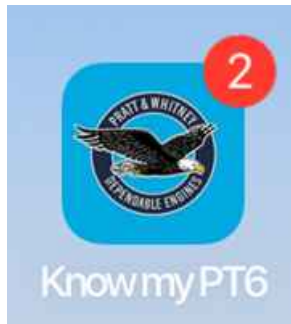
CUSTOMER FIRST CENTRE (US & Canada) 1 800-268-8000 (INTERNATIONAL) + 800-268-8000

P&WCSMART Maintenance Solutions deliver greater value to our Customers

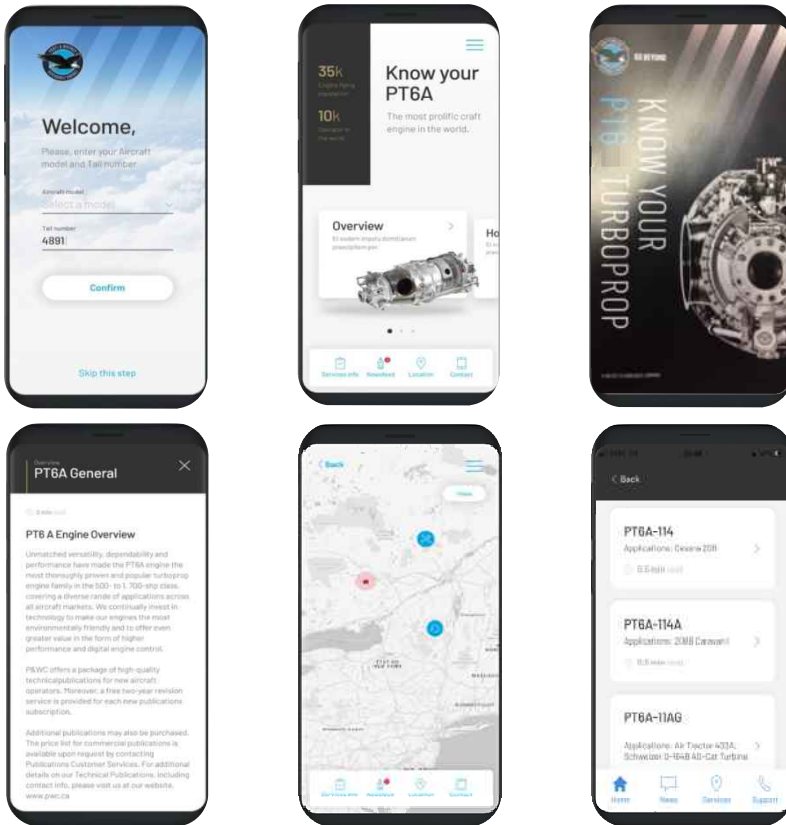
KNOW MY PT6 APP

Know My PT6 released – 17 July, 2019

Digital version of the “Know Your PT6” booklet
Customer First Centre immediate contact
Pilot friendly service notifications
Push feed P&WC relevant news
P&WC Airtime blog articles
Service information
Support information



“KNOW YOUR PT6A” APP

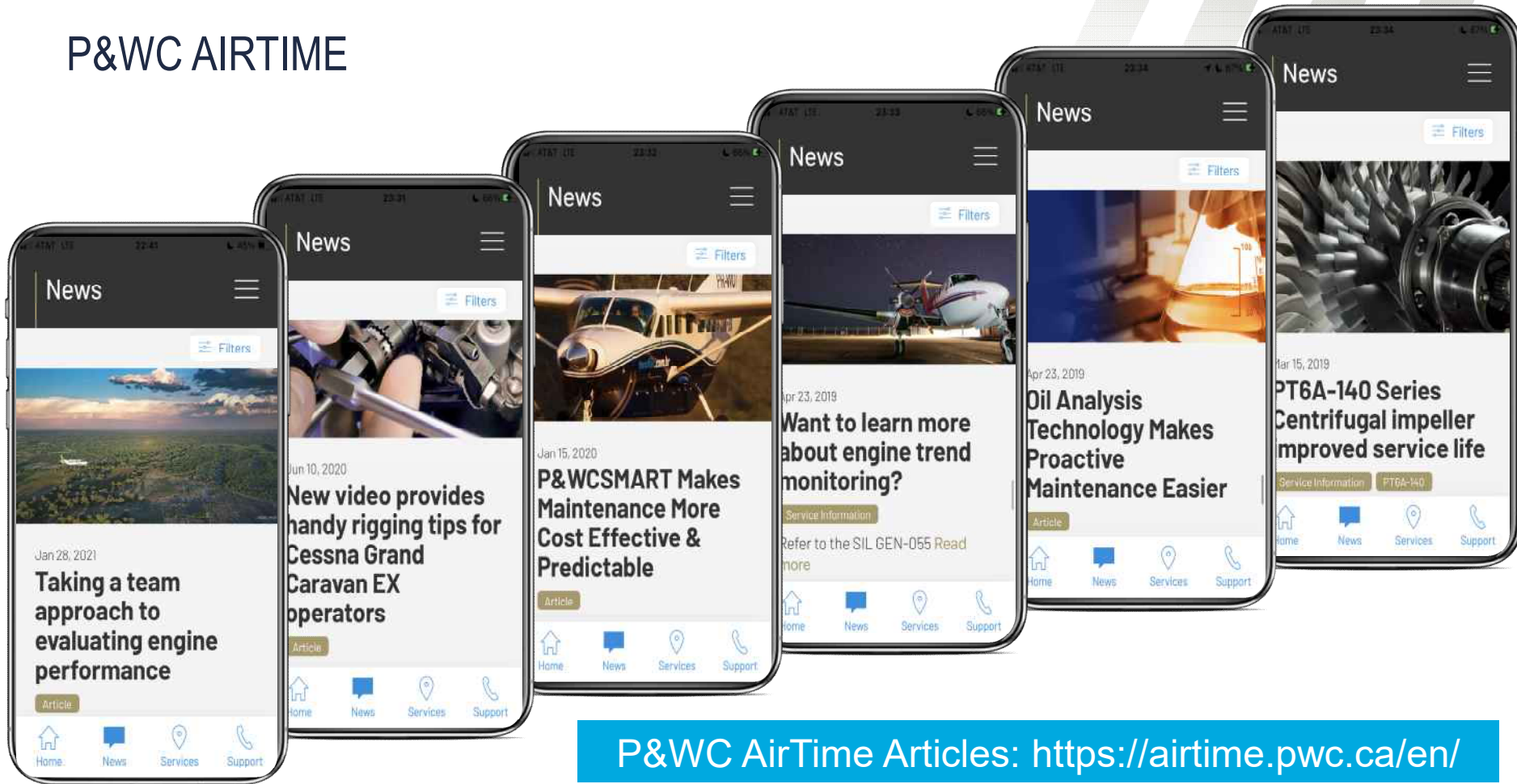


A simple, easy-to-navigate tool for owners, pilots and operators of PT6A engines to obtain relevant information on operation and maintenance of engine.

Key Features:

- Access useful information 24/7 whether online or offline
- No user ID/Password is required so practical and convenient
- User can select single or multiple aircraft models and manufactures
- Push news feed including service information and selected airtime articles
- Includes information on design features, engine control, operations, maintenance and contact information for customer services

P&WC AIRTIME



P&WC AirTime Articles: <https://airtime.pwc.ca/en/>

OIL ANALYSIS TECHNOLOGY (OILAT)



What is it?

- The most predictive oil analysis monitoring solution for the engine
- Monitors the health of the oil wetted engine components including; bearings, gears, carbon seals and all other oil wetted components

Why?

- Move from reactionary to prediction / prevention

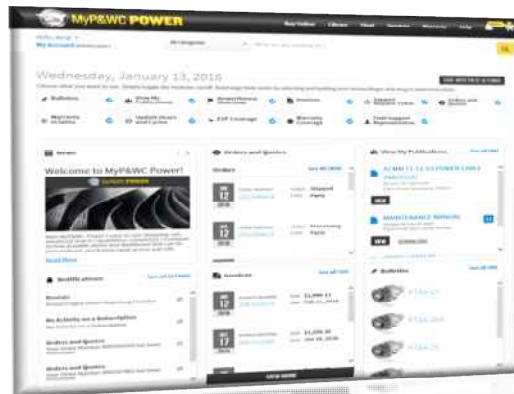
How?

- Oil samples from the oil tank

A POWERFUL NEW CUSTOMER PORTAL



Customizable Dashboard



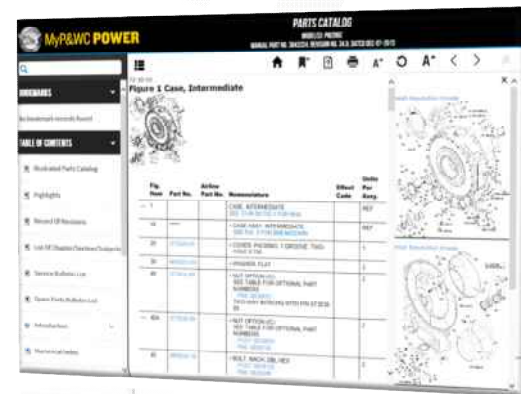
On-line Rental Requests
Streamlined Warranty Management

Online Purchasing (Parts & Pubs)



Optimized for Any Device
Maintenance Program Management

Advanced Technical Publications



Simplified Account Management
On-line Support Requests

PT6A ENGINE MAINTENANCE TECHNICAL PUBLICATIONS

New Aircraft owners receive 2 years free access to:

Engine Maintenance Manual (EMM)

Illustrated Parts Catalogue (IPC)

Service Bulletins (SBs)

Service Information Letters (SILs)

Spare Parts Bulletins (SPBs)

Temporary Revisions (TRs)

1. Complete Tech Pubs Registration form / Technical Data Agreement
2. Register on “My P&WC Power”

<http://www.pwc.ca/en/service-support/technical-publication>**S**

FREE TRAINING ENTITLEMENT



The following customers are entitled to tuition-free instructor led Line and Base maintenance (L3) training on regularly scheduled applicable courses at any P&WC-FlightSafety Learning Center

Owner-Operators of new P&WC engines

2 courses per A/C, tracked by Engine S/N

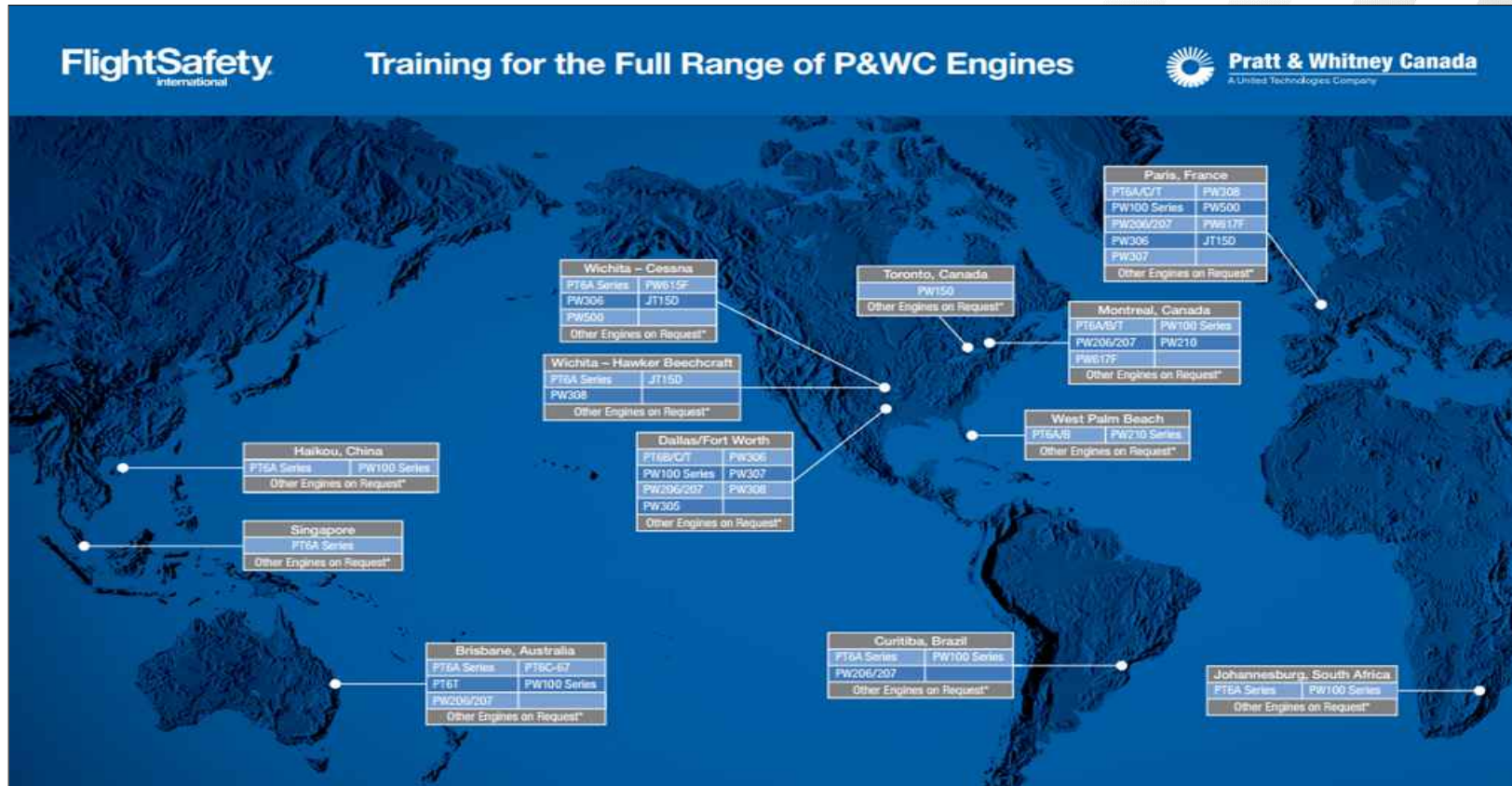
Valid 5 yrs from aircraft delivery

Not transferrable

Additional courses available at market rates

For Learning Centers and Course Calendar consult
www.flightsafety.com ► [Pratt & Whitney Canada](#)

FLIGHTSAFETY TRAINING LOCATIONS



TRAINING

Additional details on the training provided by FlightSafety International can be found in Service Information Letter **SIL GEN-110**.

<http://www.pwc.ca/en/service-support/customer-training>

http://www.flightsafety.com/fs_prattwhitneycanada.php

PTG PROMOTIONS ▶
REPAIR & OVERHAUL ▶
SALES, RENTALS & EXCHANGES ▶
PARTS SALES & MAINTENANCE ▶
MAINTENANCE PROGRAMS ▶
WARRANTY PROGRAMS ▶
CUSTOMER TRAINING ▼
2011 FlightSafety International Training

HOME SERVICE & SUPPORT
CUSTOMER TRAINING

Customer Training

Some companies supply a manual with their product. Pratt & Whitney Canada, together with our global training provider, FlightSafety International, provide a first class school. Our mission is to offer training and confer the knowledge.

CONTACTS
For FSI site and contact information, please contact FlightSafety International
www.flightsafety.com
9555 Ryan Avenue
Dorval, Quebec H9P 1A2
CANADA
514-631-2084 or
1-800-573-4025

RIGGING VIDEOS FOR PT6A



Clarifies subtleties of rigging PT6 Engines

Focuses on details that customers appreciate

Rigging PT6A engines for King Air B200:

Part 1: <https://youtu.be/zPjGof4CcRc>

Part 2: <https://youtu.be/sdC8ZQTWPWs>

Part 3: <https://youtu.be/0VKkGcOGSYo>

Rigging PT6A engines for King Air B350:

Part 1: <https://youtu.be/erfuWzXaMTA>

Part 2: <https://youtu.be/slyVbHZ2lv0>

Part 3: <https://youtu.be/Plt4pW9NUVc>

Rigging PT6A engines for Caravan

PT6A-114A - <https://youtu.be/H7c2NiFCNH0>

PT6A-140 - <https://youtu.be/0pApXlmLiMw>

“They say a picture’s worth a thousand words, in which case a video is like an entire book. These videos take what’s written in our engine manuals and bring it to life. You can see the instructions being applied in practise”

Rob Winchcomb, Owner Pilot and Manager, Customer Service at Pratt & Whitney

FIELD OPERATIONS



Experience where you need it



Always available

Local point of contact
± 100 FSR Strategically
located
5 Regional Mng
1 OEM Regional Mng

Strategically located close to our customers. Empowered to take decisions.

CUSTOMER FIRST CENTER



Worldwide Support 24/7/365

Front Line
Specialists

Technical
Specialists

Logistics
Specialists

Contact Us

USA & Canada

1 800 268-8000

International (where available):

(IAC) + 8000-268-8000

Email: Cfirst@pwc.ca

CONNECT WITH US!



PT6A



APPROVED SERVICE BULLETINS

PT6A Instructions for Continuous Airworthiness (ICA)

Engine Models	List of Synthetic Oils	Rotor Component Service Life (LCF)	Fuel and Additives	Operating Time Between Overhaul
PT6A-114/A	1001	1002	1244	1703
PT6A-140	Chap. 72-00 Engine General	Airworthiness Limitations	Chap. 72-00 Engine General	Chap. 05-20
PT6A-67D	14001	14002	14004	14003

} EMM

P&WC KEY BUSINESS SEGMENTS

Business



Cessna
Sovereign



Dassault
F7X

Military



Beechcraft T-6A



Pilatus PC-21

Civil helicopters



AgustaWestland AW139



Eurocopter EC135

Regional



ATR 72



Bombardier Q400

General Aviation



Beechcraft
King Air 350



Cessna
Caravan EX

Aftermarket



Customer First Centre



MRO

PT6A POWER AND FLEET GROWTH

NEW CATEGORY: SINGLE ENGINE TURBOPROP IFR



Cessna Grand Caravan EX



Epic LT



Pacific Aerospace P-750
YSTOL



Daher-Socata TBM900



Pilatus PC-12NG



Piper Meridian

PT6A POWER AND FLEET GROWTH

Ag and Utility – Powering Efficiency



Pacific Aerospace 750XL



Air Tractor 802



Cessna Grand Caravan EX



Quest Kodiak



Thrush 510P



Viking Twin Otter

PT6A POWER AND FLEET GROWTH

Piston & Turbine STC Conversion Upgrades



Blackhawk XP140



Blackhawk XP135



Basler BT-67



Rocket Malibu JetPro



Wipaire Turbo Beaver



Viking Twin Otter

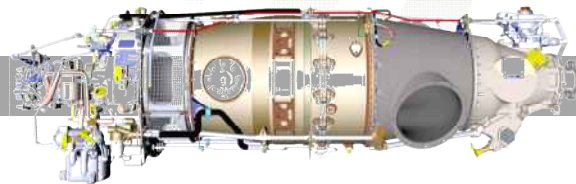
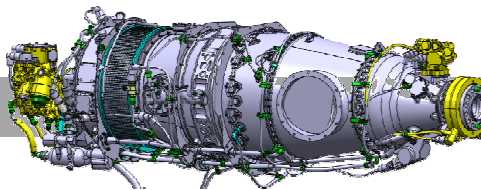
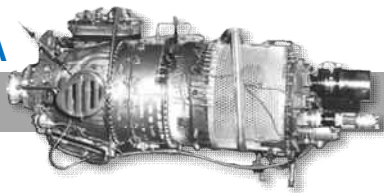
PT6 TURBOPROP HISTORY TIMELINE

First complete PT6 engine tested, January 1960

PT6E engine family introduction: PT6E-67XP

The latest PT6A engine: PT6A-65SC

PT6A



1963

P&WC shipped the first PT6 production engine, the PT6A-6.

1970

P&WC's PT6T Twin Pac entered into service.

1973

The second-stage power turbine was introduced on the PT6A-41.

1984

First-stage Integral Bladed Rotor (IBR) technology was introduced.

1993

Single-crystal blade technology was first introduced on the PT6A-67A.

2010

The Computerized Visual Inspection System (CVIS) was introduced to the manufacturing process for PT6 engines.

2012

The PT6A-140 enters into service, powering the Cessna Grand Caravan EX.

2013



2014

400 Million Hours

2015

PT6A-140AG Certification

2019

PT6E-67XP receives certification from TCCA and enters into service, powering the Pilatus PC-12NGX

2022

The PT6A-65SC enters into service, powering the Cessna SkyCourier.

PT6 E-SERIES INSTALLATION

PC-12 NGX



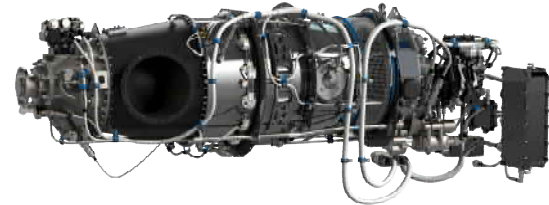
TBM 960



PT6E-67XP



PT6E-66XT

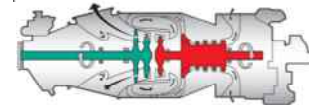
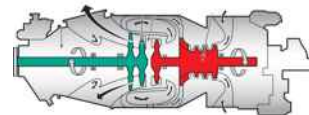
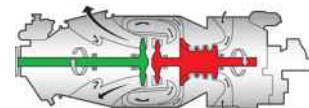


PT6A-65SC



PT6A PRODUCT FAMILY

PT6	Thermodynamic Power Class* (ESHP***)	Mechanical Power Class* (SHP)	Propeller Speed (Max. RPM)	Height** (Inches)	Width** (Inches)	Length** (Inches)	Weight (Lbs)
'Small' (A-11 to A-140)	600 to 1075	500 to 900	1,900 to 2,200	21 to 25	21.5	61.5 to 64	330 to 380
'Medium' (A-41 to A-62)	1,000 to 1,400	850 to 1,050	1,700 to 2,000	22	19.5	66 to 72	410 to 485
'Large' (A-64 to A-68)	1,400 to 1,900	700 to 1,700	1,700 to 2,000	22	19.5	69 to 75.5	450 to 590

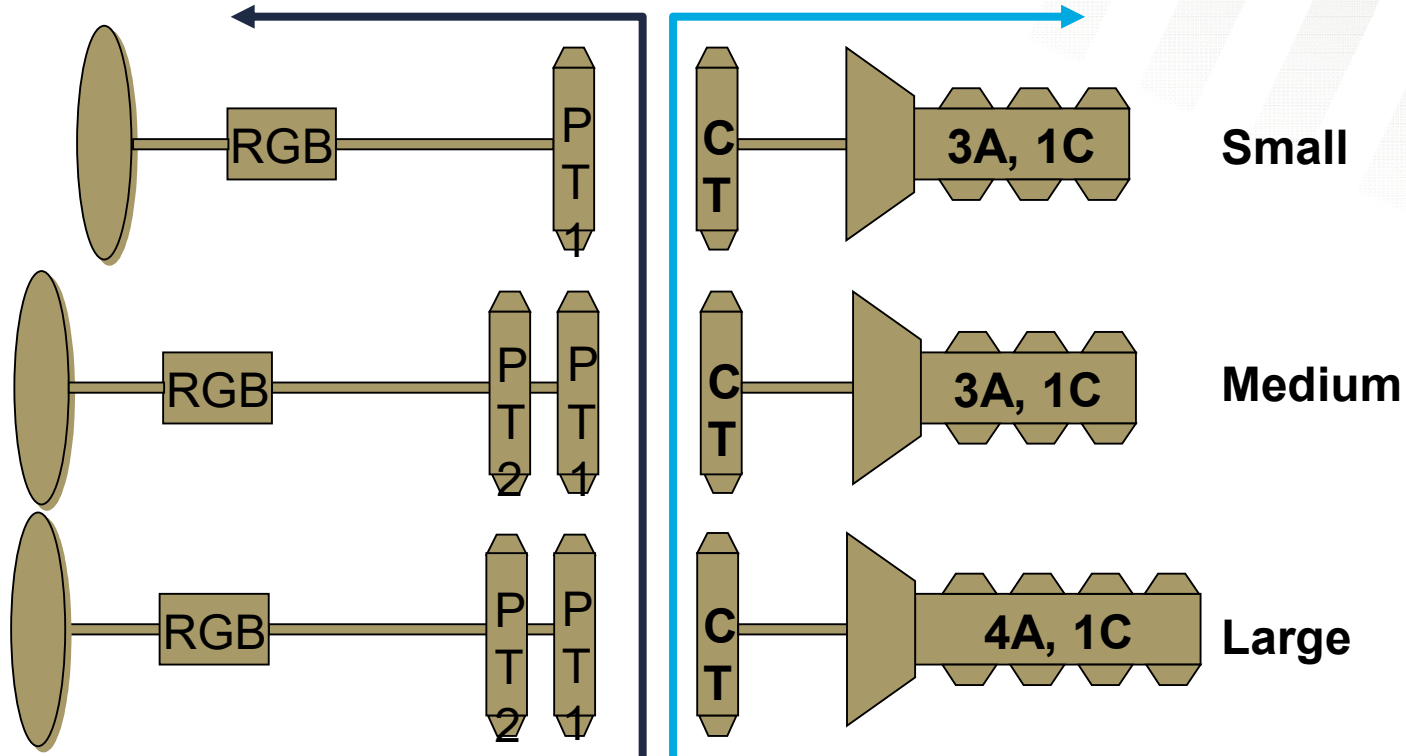


* Powers are approximate values at take-off. Available at sea level, standard day, static conditions, uninstalled.

** Dimensions are approximate values.

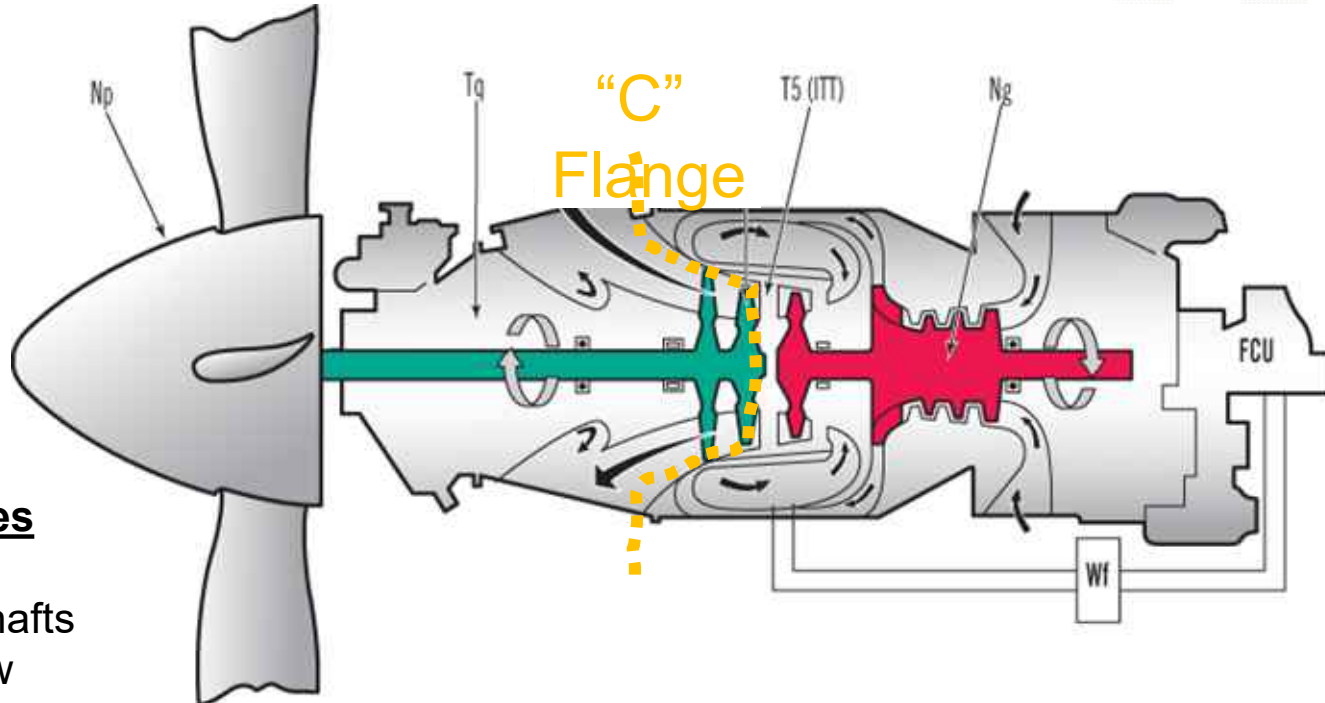
*** Equivalent Shaft Horsepower: includes estimated equivalent contribution of exhaust thrust.

PT6A PRODUCT FAMILY



PT6 ENGINE OVERVIEW

Modules



Key Features

- Free turbine
- Opposing shafts
- Reverse flow

PT6 ENGINE OVERVIEW

Free Turbine Advantages



Less starting torque required

Simpler Fuel Controls

No clutch required for helicopter installations

Off-the-Shelf Propellers

Less Drag in case of In-Flight Shutdown (Prop Feathered)

Quiet (ability to slow prop during ground operations)

PT6 ENGINE OVERVIEW

Opposing Shaft Advantages



Opposing Shaft Advantages

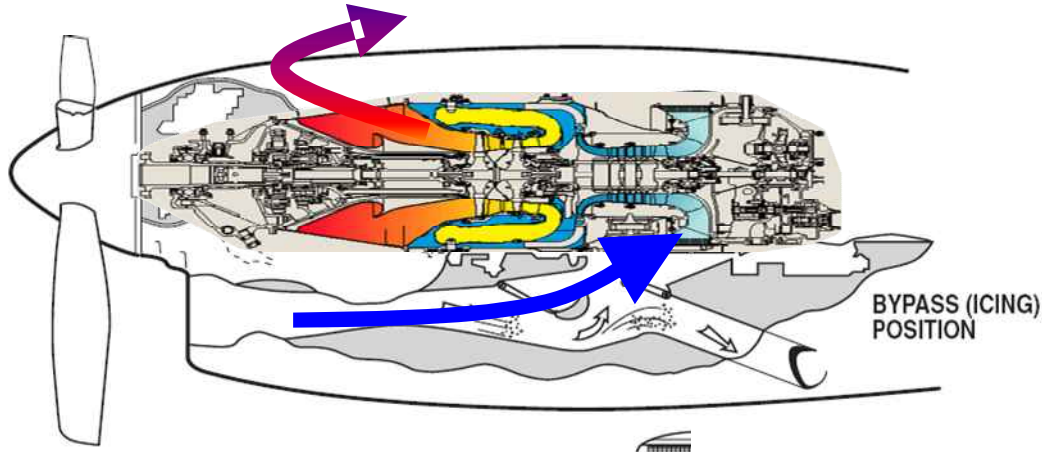
Simpler Design

Ease of Maintenance

Inherent FOD protection

PT6 ENGINE OVERVIEW

Reverse Flow



FOD and Ice Protection
Quiet – Reduces Ambient Noise
Easy On-Wing Maintenance (Access to Hot Section)

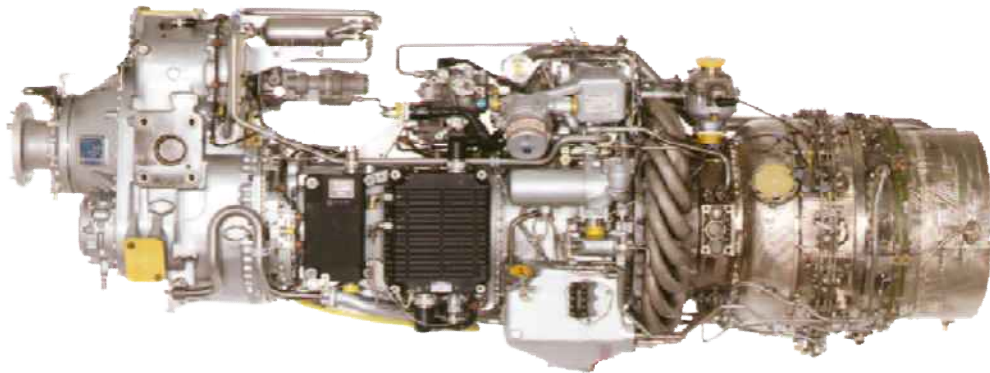


GO BEYOND

ENGINE OVERVIEW

PW100 Turboprop

- 1800-5071 SHP
- The most popular and thoroughly proven Powerplant in its class



PW100 SERIES

Growth

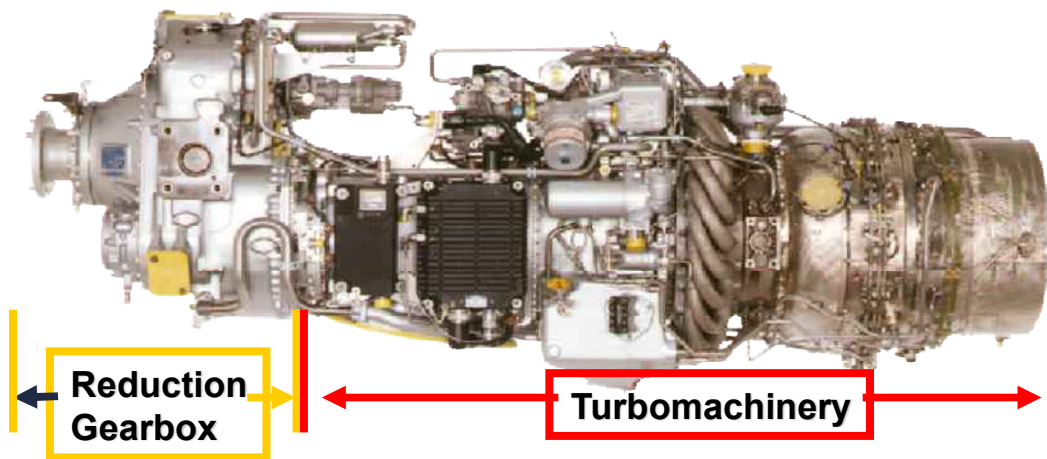


PW100 GENEALOGY

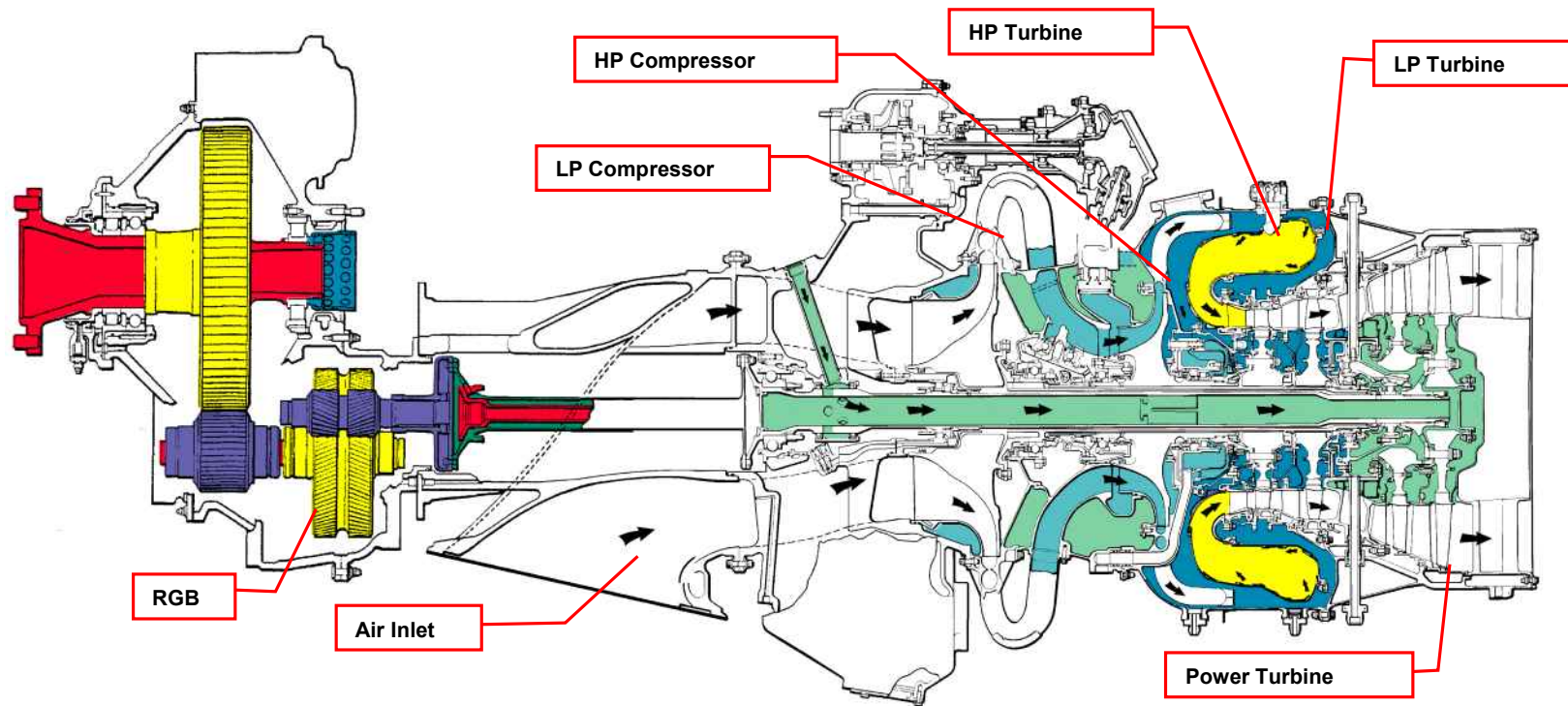
The RGB and turbo-machine modules are independent

Modules can be interchanged in the field with no testing required

AutoFeather Unit (AFU) “Characterization Plug” installed on Turbomachine
to remain with RGB module



PW100 DESIGN



ENGINE MAINTENANCE

Option 1

On-Condition Maintenance Program (OCP)

No hard-time Hot Section Inspection (H.S.I.) interval

No hard-time Overhaul

H.S.I. or Overhaul interval based on:

Engine Condition Trend Monitoring (ECTM) results

Borescope inspections

Option 2

Hard-time scheduled tasks

Hot Section Inspection at 4000 hours

Overhaul at 8000 hours

ON-CONDITION MAINTENANCE

Referred to as “continuous maintenance”

Benefits from no fixed time refurbishment intervals

Maintenance intervals based on:

- Borescope inspections

- Performance trend monitoring

- Scheduled on-wing inspections

Allows maximum flexibility for reduced cost of operation

Operators work towards maximizing on-wing time

LCF limitation is the driver for engine removal

On Condition $\neq$ “Run to Failure”

ON-CONDITION MAINTENANCE

More than 50% of worldwide PW100 powered aircraft are operated “On-Condition”

Maximum flexibility for reduced cost of operation:

Optimum reliability

Better economics

ENGINE DIAGNOSTIC TOOL

SPOTLIGHT

You are logged in as Flavio Gomes

Home

Select or Change your Engine Type:

PW100

Start a New Session

Recent Sessions

View All Open Sessions

Find a Session

Spotlight Links

- [Spotlight Quick Start Tutorial](#)
- [Performance Tips Tutorial](#)

Pratt & Whitney Canada Links

For Pratt & Whitney Canada SpotLight assistance, please contact:

P&WC Call Centre

E-MAIL:

Pratt & Whitney Canada

PW100

Select



GO BEYOND



GO BEYOND

MAINTENANCE FOCUS

PT6A ENGINE LINE MAINTENANCE

KEY MAINTENANCE ACTIONS



Oil Level Check

Oil Filter Inspections

Fuel Nozzle Inspections & Functional Testing

Borescope Inspections

Ground Performance Checks

Engine Washing

AVIATION ACCIDENTS / INCIDENTS

S.I.L. NO GEN-135

Return to Service of affected P&WC Products and the effect on Engine Warranty and Service Policies status

Reporting Events

Operators are requested to report the details of an accident or incident, regardless of the extent of damage incurred.

The attached sample form (Appendix A) is intended to assist operators in reporting all necessary information to P&WC, including:

- Engine serial numbers, running times and accumulated cycles
- A detailed description of the accident/incident (including pilot's report, if available)
- Photographs of the P&WC Products and airframe showing all external damage sustained
- A copy of the investigating regulatory authorities' report, if available.

SERVICE INFORMATION LETTER

WARNING - PROPRIETARY RIGHTS NOTICE

This document is the property of Pratt & Whitney Canada Corp. ("P&WC"). You may not possess, use, copy or disclose this document or any information in it, for any purpose, including without limitation to design, manufacture, or repair parts, or obtain FAA or other government approval to do so, without P&WC's express written permission. Neither receipt nor possession of this document alone, from any source, constitutes such permission. Possession, use, copying or disclosure by anyone without P&WC's express written permission is not authorized and may result in criminal or civil liability.

Subject: Aviation Accidents / Incidents - Return to Service of affected P&WC Products and the effect on Engine Warranty and Service Policies status

Applicability: All P&WC engines

This Service Information Letter (SIL) supersedes SIL GEN-030

Pratt & Whitney Canada ("P&WC") wishes to advise owners, operators and maintainers of P&WC engines or engine parts (P&WC Products) of the policies regarding those products involved in aviation accidents or incidents and the possible associated limitations on both serviceability and the applicable P&WC Warranty for New Engines and Service Policies (Warranty).

P&WC strongly recommends that operators report any accident or incident involving P&WC Products in a timely manner, regardless of whether applicable maintenance criteria exists in the published instructions for Continued Airworthiness ("ICA") or not. This will enable the evaluation and investigation of these events, as well as the determination and provision of any additional or customized maintenance recommendations that may be required to restore serviceability and restate Warranty.

For the purposes of this SIL, an accident or incident encompasses (but may not be limited to) any event wherein the P&WC Product is subjected to abnormal loads or conditions such as excessive "G" forces, sudden stoppage, abnormal temperatures, or exposure to chemical agents or thermal shock. This would include events such as aircraft contact with the ground outside of the intended landing site, engine separation from the airframe, burst, external fire or any other situation in which the aircraft

This Service Information Letter is valid until superseded or canceled by revision.

Export Control Classification			
Contains no Technical Data			(X) if Applicable
Not Subject to the EAR pursuant to 15 CFR 754.7(a)(1) or Not Subject to the ITAR pursuant to 22 CFR 120.11 (NSR)			(X)
Jurisdiction and Classification based on Physical Location of the Item:	Location	Regulations	
	Outside U.S.*	EAR	ITAR
	U.S.		
	Canada	CDPA (15.1)	CDPA (15.1)

ISSUED: 02/21/2017

Page 1 of 8

PT6A - Aircraft environment vs engine maintenance



Engine Air Inlet Filter (Aircraft component)

Issue: Compressor erosion, engine surge/stall

Cause: Air inlet filter maintenance / Filter Installation

Follow Aircraft OEM recommendations



PT6A Periodic Inspection – Compressor blades

EMM Chap : 72.00 Engine – Periodic Inspection Table 601

2.	Engine Internals				
	A.	First-stage Compressor Rotor		Do a visual inspection with a mirror or a borescope (Ref. Para. 9.D).	MINOR
			NOTE: If any FOD has caused the engine to become prone to engine surges or causes unusual compressor whining, the large bent airfoil will make the whining sound (Ref. Fig. 602). Remove the engine immediately.		
	B.	Compressor Turbine Disk Assembly		Overhaul. Remove assembly and ship to an approved overhaul facility.	Refer to SB1003, SB1303 and SB1403
	C.	Hot Section	(1)	Examine with borescope (Ref. Para. 9).	In conjunction with periodic fuel nozzle leak and function tests (Ref. Para. 3.B (12))
			(2)	For Post-SB1590 engines NOT incorporating SB1627 or SB1628:	
				(1) Analyse engine condition trend monitoring system data on a weekly basis. (Ref. 72-00-00, FAULT ISOLATION, Engine Condition Trend Monitoring System). No baseline HSI is required.	

PT6A Operation Harsh environment Compressor Rotor Erosion

Inspection compressor as follow;

- ***Borescope inspection through inlet screen holes***
(5mm borescope or smaller only) or;
- ***Remove inlet screen and inspect with a mirror and a flash light***



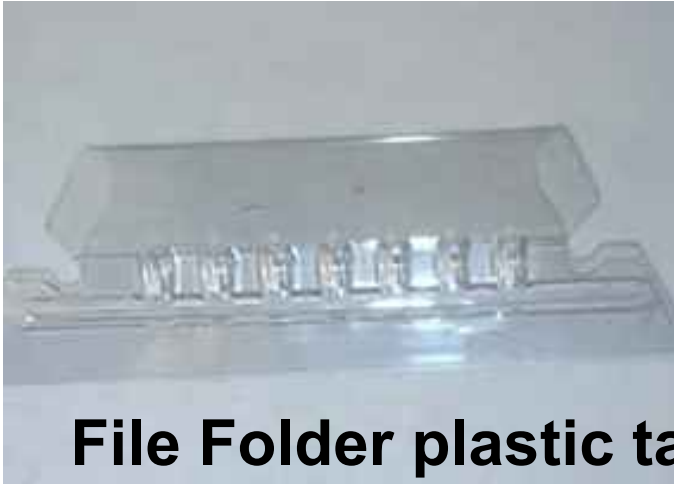
PT6A Operation Harsh environment

Compressor Rotor Erosion

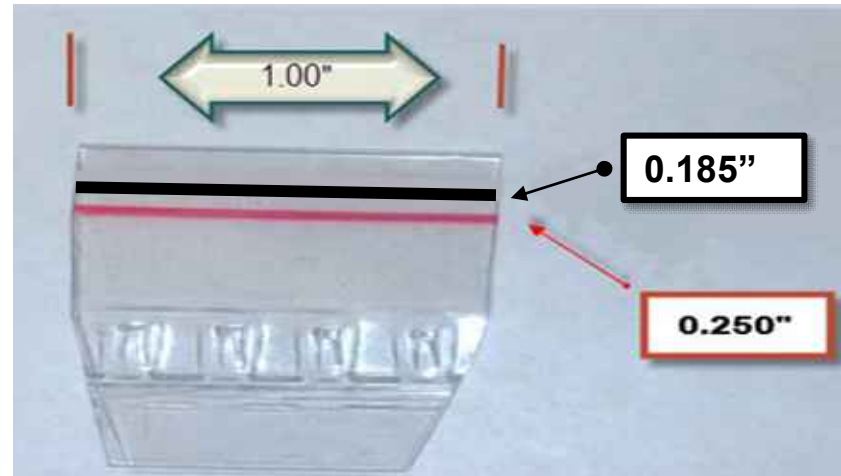
Make your own tool - Use a clear File Folder plastic tab

1. Cut plastic tab (1" width)
2. Mark two lines with an ink pen

Black line = 0.185" and Red line = 0.250"



File Folder plastic tab



PT6A Operation Harsh environment

Compressor Rotor Erosion



Erosion measurement

Slide Tab over the leading
edge of compressor blade

Provides a clear and accurate
measurement:

75% progression (.185")

Max. limit (0.250")

PT6A Operation Harsh environment Compressor Rotor Erosion



HOT STARTS - BEST PRACTICES

Use GPU when possible

Ensure Battery voltage / health

Achieve 12% Ng **MIN** before fuel on

Quick Turns - Make sure to motor down below 130C ITT

Start with Inertial Separator OFF, Bleed OFF, A/C OFF, etc.

Anything that loads the compressor drives up ITT

Watch RATE of change of ITT, if too fast, cut fuel and investigate



Hot Start Area C requires replacement of all CT/PT Blades (\$\$\$)

ELECTRONICAL DISCHARGE DAMAGE (EDD)



Starter Generator Gear



AGB input Driveshaft

Issue:

If the STARTER / GENERATOR is replaced to rectify a starting / electrical generation issue, there is a possibility that a electrical discharge may have occurred though the drive shaft.

Electrical Arcing

ELECTRONICAL DISCHARGE DAMAGE (EDD)



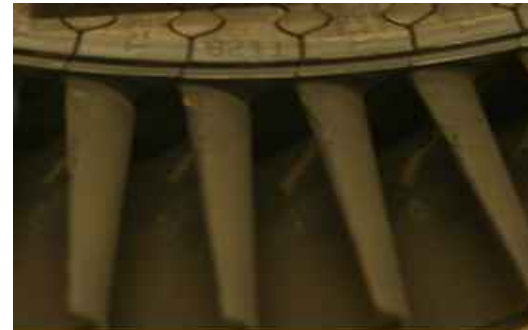
No. 1 Bearing



No. 1 Bearing Ball



No. 1 Bearing Thrust Race



CT Blade Rub

Electronical Discharge Damage (EDD)

Pay attention to starter-generator maintenance

Use authorized repair facilities

Engine repair costs >>>> starter overhaul costs

Ref. SIL GEN-PT6A-024

Engine Maintenance Manual (CH 72-00-00)

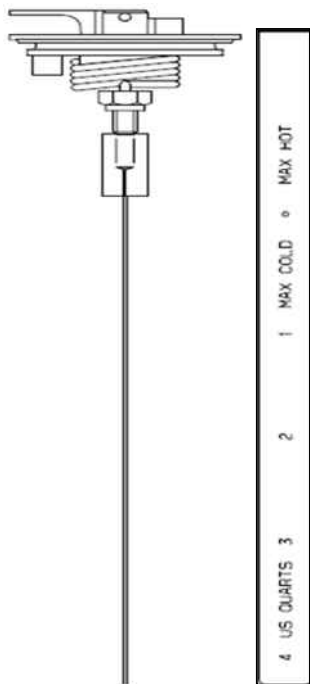
Oil Filter Patch check (CH 79-20-02)

Review results within next 25 flight hours of S/G removal

Repeat Oil Filter Patch check every 100 hours for the next 700 flight hours of S/G removal

If bearing material is found within the patch check, remove engine/gas generator module.

OIL LEVEL CHECK



Within 30 minutes after engine shutdown to avoid overfilling of oil tank, and high oil consumption

- Ideal interval is 15 to 20 minutes
- If more than 30 minutes and oil is needed, **start the engine and run at ground-idle for 5 minutes, and recheck oil level**
- Normal oil level is between MAX HOT and 1 US quart below MAX HOT

Filling to Max level may result in high consumption rate, with the oil exiting through the AGB breather

On some engines, this may also occur at 1 or 2 US quarts below Max level

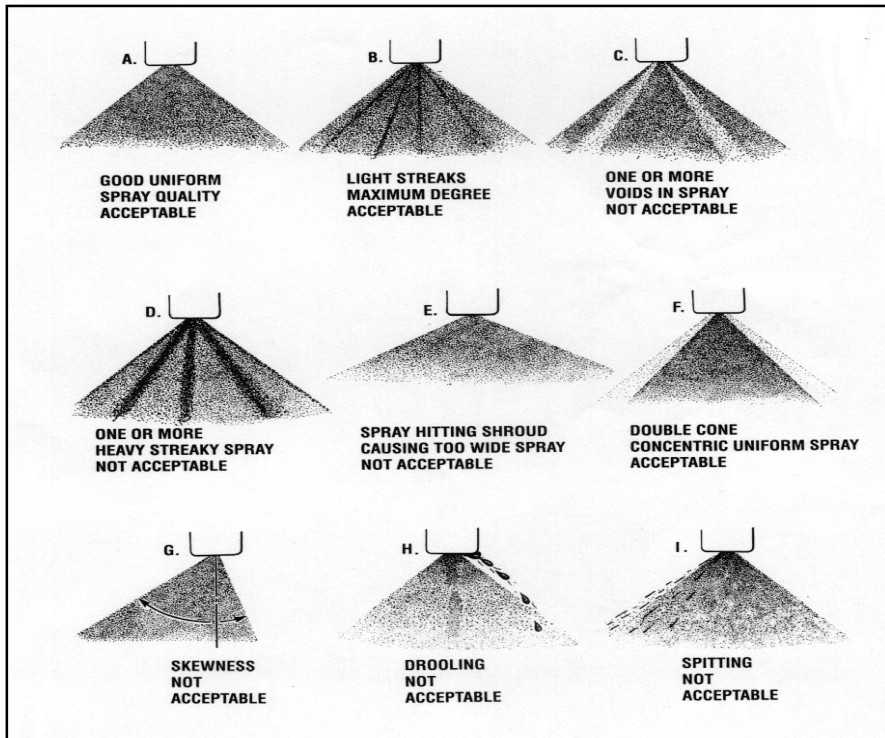
- In such cases, service the oil to the level that results in acceptable consumption, down to 3 quarts below the maximum, if necessary.

Best practice: Propeller Governor in FEATHER for 15 seconds

No draining and replacement needed

No Oil Spectrum Analysis required

FUEL NOZZLE MAINTENANCE

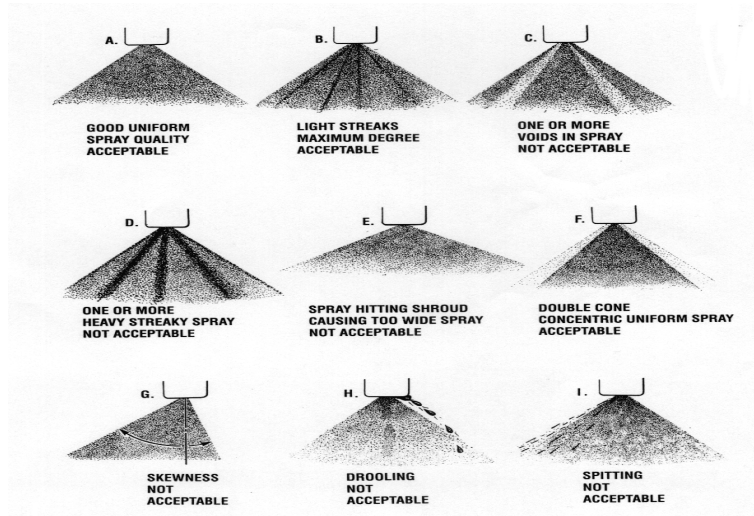


Why do fuel nozzle maintenance?

- Fuel Quality
- Engine Operation



Fuel Nozzle maintenance



Heavy Streaking



Drooling

Inspection Interval:

200 hours for new operators, can be escalated to 400 hours based on experience

Flow Check:

Looking for consistent spray patterns

Inspection / Cleaning:

Ensure no residual carbon in tips, check for cracks, etc.

Fuel Nozzle maintenance



Optimising the fuel nozzle refurbishment interval

Do not double the interval, increase in steps based on experience

Record findings from fuel nozzle inspections

- Number each nozzle

- How many tips replaced?

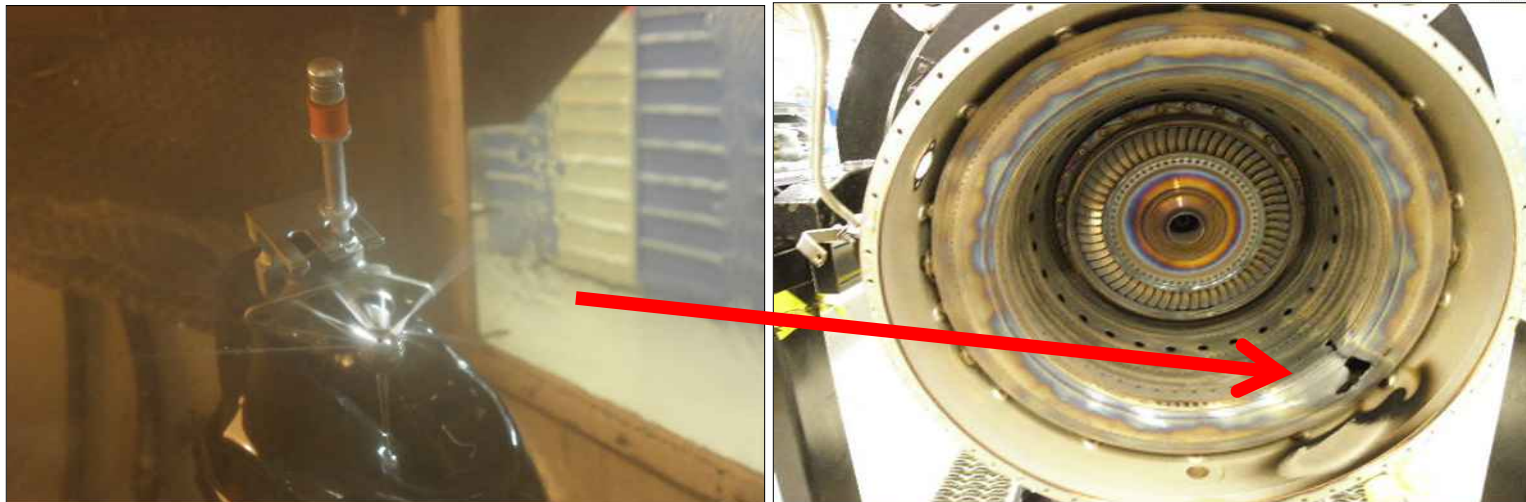
- Maintain a trend

Borescope hot section during nozzle maintenance, correlate findings to nozzle location



Adjust interval (↑ or ↓) according to fuel nozzle tip replacement rate and hot section condition

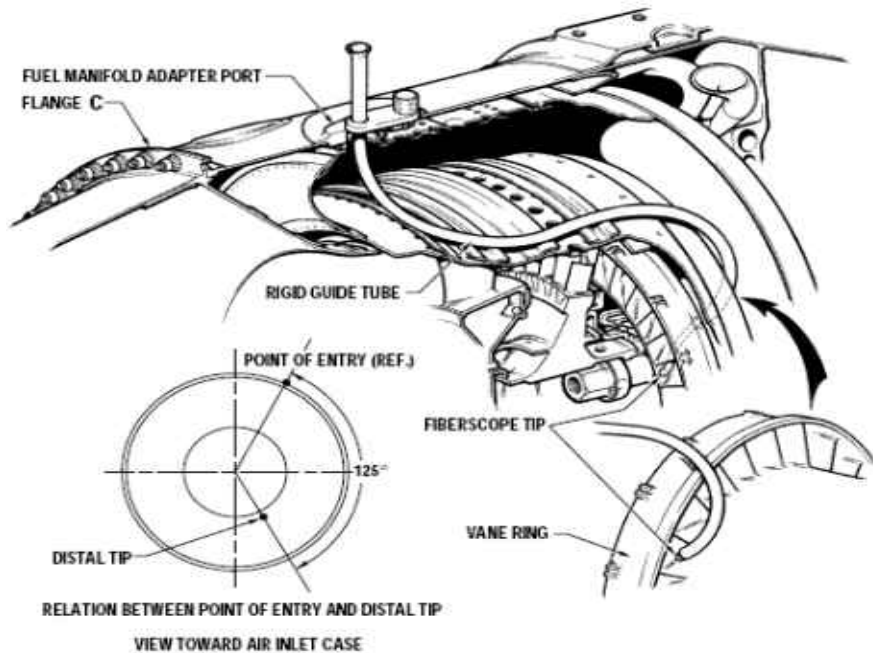
POSSIBLE RESULTS OF IMPROPER FUEL NOZZLE MAINTENANCE



Recommendations:

1. Request fuel nozzle spray check prior to cleaning and review the result.
2. Request quantity of fuel nozzle tip replaced & spray category from provider.

BORESCOPE INSPECTION



Purpose

Allow for inspection of critical hot section components such as the CT vane, CT blades and combustion chamber.

Also useful for inspections of the 1st stage compressor rotor and 2nd stage power turbine blades.

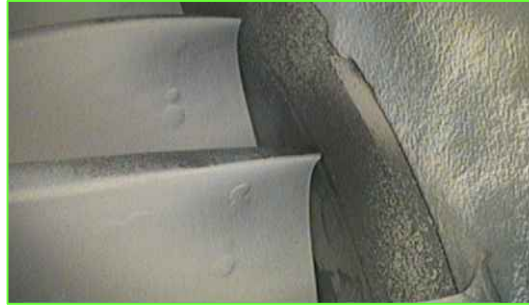
Interval

To be accomplished in conjunction with the scheduled fuel nozzle cleaning / testing.

Borescope Inspection



Engine noise
Compressor 1st stage rotor – Whistling



Compressor Turbine Blades
Light rubbing – Casting Marks



Compressor Turbine Blades
Leading edge– Carbon erosion



Combustion Chamber – Carbon
formation



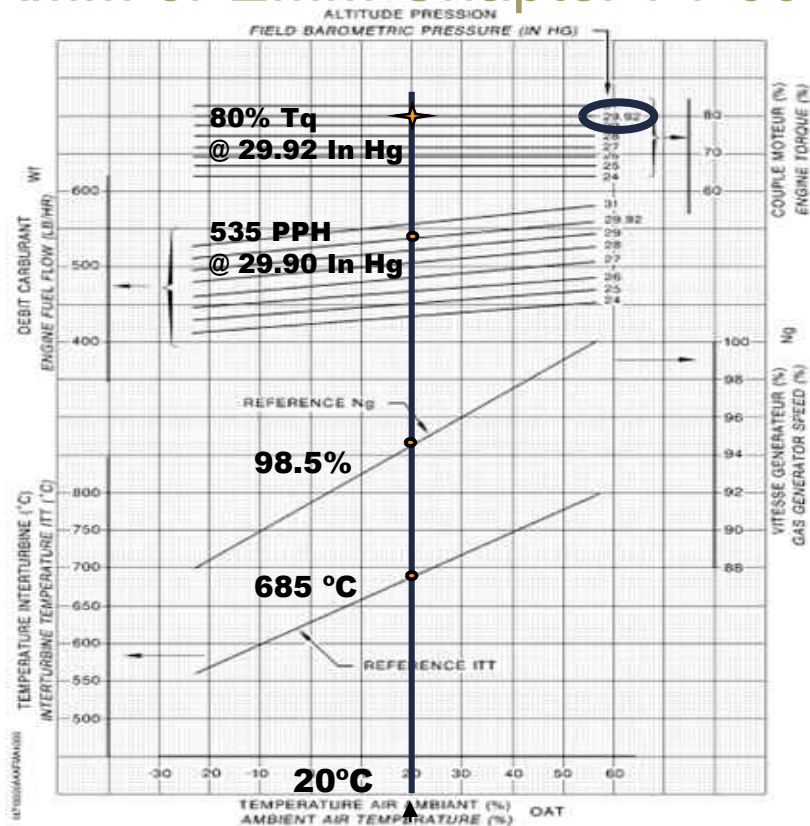
Impeller exducer – distal borescope
probe mark



Compressor Turbine Blades
Leading edge– Carbon erosion

Engine Performance Check

AMM or EMM Chapter 71-00-00 Figure 513



Ground performance check
Record the OAT (°C)
Record Field Barometric Pressure
Close Air Bleeds
Start the engine per POH
Run at ground idle speed for 5 min
Set propeller control lever to "Max RPM"
Set Power lever to Target Torque of the day
Stabilize for 5 minutes

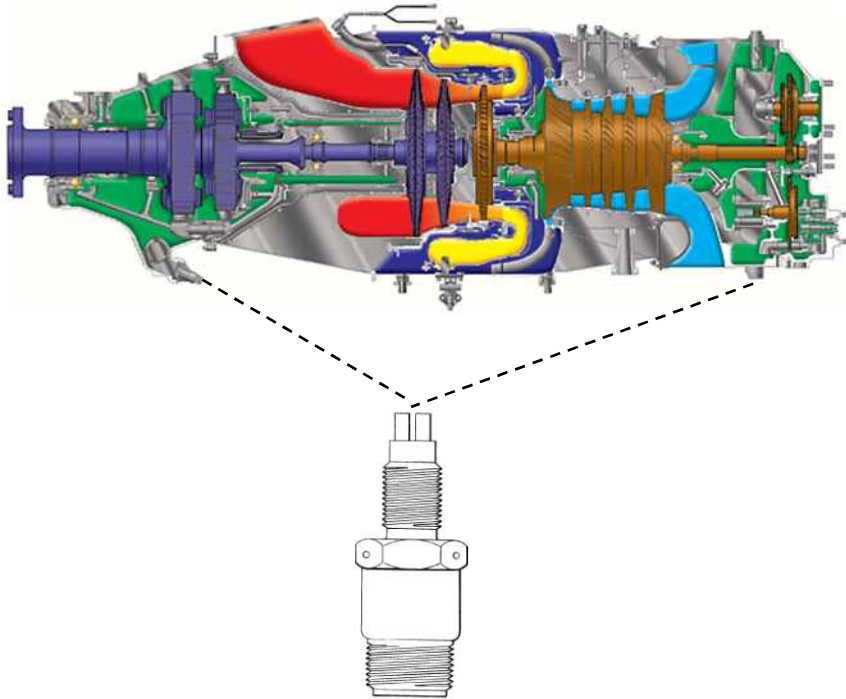
Keep records of engine performance;

- Gas Generator Speed (% Ng)
- Fuel Flow (Wf - lb/hr.)
- Inter Turbine Temperature (T5 -°C)

Maintain and monitor results

PT6A ENGINE MAINTENANCE

Chip Detector Inspection



Check for magnetic debris and perform continuity check every 100 hrs with extension to relevant airframe zone inspection based on experience, not to exceed 200 hrs.

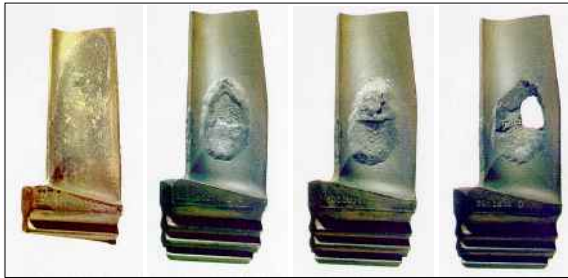
For airframe indication systems, the circuitry must be checked every 100 hrs with extension to 400 hrs maximum based on inspection results

PT6A ENGINE MAINTENANCE

Engine Corrosion – Two Types



Inlet Case Corrosion



Turbine Blade Sulphidation

Normal operation introduces salt, sulphur other environmental contaminants.

Insufficient engine wash allows corrosion/sulphidation to occur.

Compressor:

- Wet salt deposits lead to corrosion / pitting
- Typical components affected:

Compressor Inlet Case

Compressor Rotors, Stators

Turbine:

- Sulphidation requires:
Salt, sulphur (fuel), temperature

PT6A ENGINE MAINTENANCE

ENGINE WASHING

Corrosion

Cause by wet salt deposits

- Compressor Inlet Case
- Compressor Rotors, Stators
- Reduction Gearbox Rear Housing



Sulphidation

Caused by sodium in salt reacting with sulphur from fuel at high temperature

- Turbine Blades



PT6A ENGINE MAINTENANCE

ENGINE WASHING

Desalination rinse schedule is based on environment and **experience**

Operators in salt laden/polluted environment should perform daily rinse

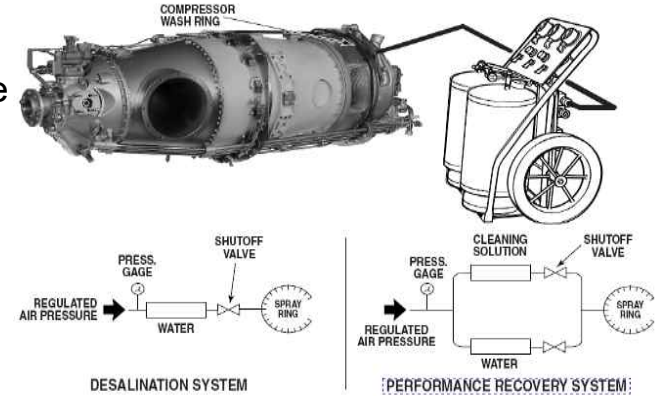
After last flight of the day

Minimum water quality: drinkable water

ALWAYS compressor rinse THEN turbine rinse

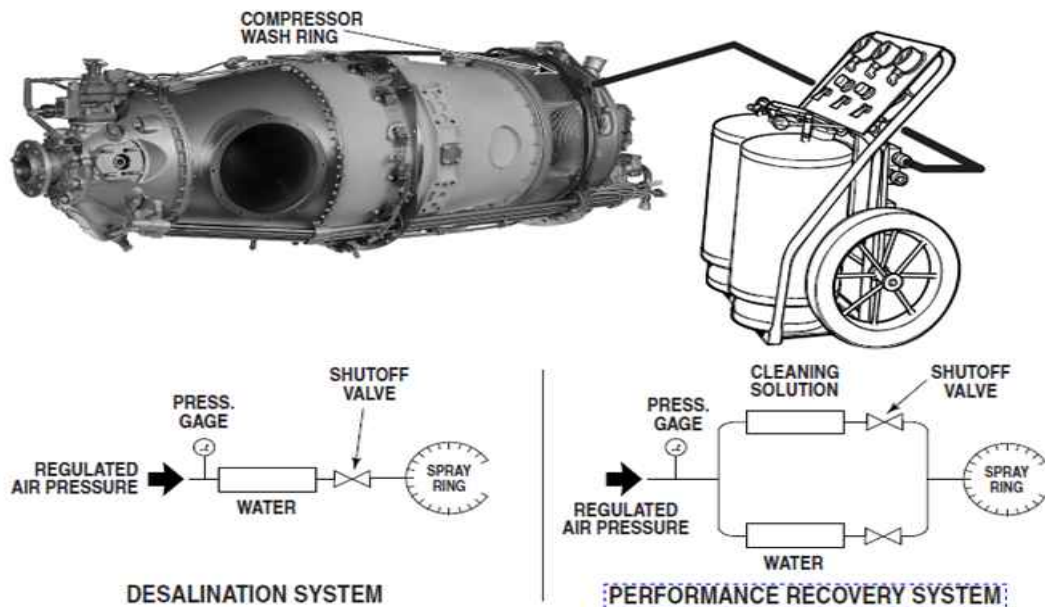
ALWAYS remove exhaust duct drain plug

Performance Recovery Wash to be performed only required based on a noticeable reduction in performance

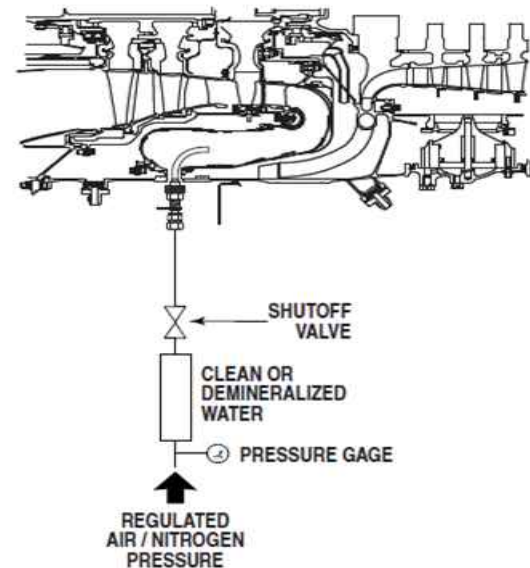


PT6A ENGINE MAINTENANCE

ENGINE WASHING

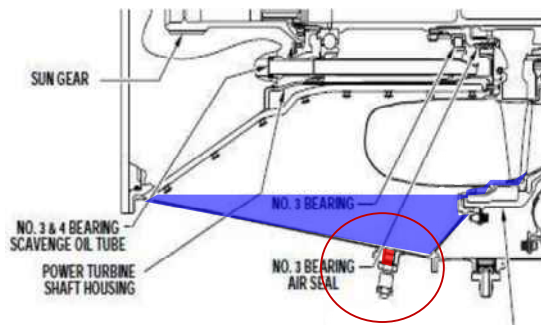


Step 1: Compressor



Step 2: Turbine

REAR RGB HOUSING CORROSION



Engine wash fluid not being drained out of the Exhaust case



Local corrosion at 6 O'clock

Issue

Rear RGB Housing reported with corrosion at 6 O'clock position

Cause

Engine wash fluid may not be properly drained when performing engine wash and comes in contact with the housing

- Engines found with exhaust drain blocked with carbon

Field Actions

Service Information Letter – Re-Issued in April 2016 (Ref SIL PT6A-206R2)

REAR RGB HOUSING CORROSION



Rear RGB Housing Case



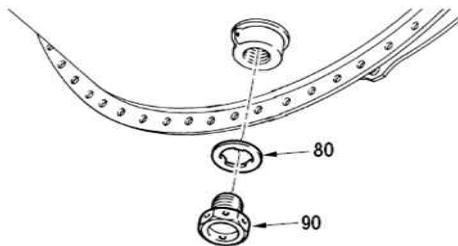
View from inside of the Exhaust Case Drain with Carbon debris

Field Actions

Service Information Letter – Re-Issued in March 2010 (Ref SIL PT6A-144R2)

Re-instate the importance of applying recommended EMM engine wash procedure to drain water fluid out of the exhaust case

- Place a container under exhaust duct drain port to collect fluid and remove cap (or Drain Line - Ref. Airframe Manual)
- Make sure that wash fluid came out of the exhaust duct drain and to remove any obstruction from the drain fitting.



PT6A Engine Maintenance

Engine Preservation

When do we preserve engines? (EMM Extract)

Preservation of engines in service depends on the period of inactivity and whether or not the engine may be rotated during the inactive period.

An engine is considered inactive when it has not been operated either on the ground, or in flight for a minimum of ten minutes after the oil temperature has stabilized.

Should be recorded in the engine log book and on tags fastened to the engine

Engines inactive 8 to 28 days

- Do 0 to 7 days procedures.
- Place desiccant bags and humidity indicator on wooden racks in engine exhaust duct only
- Seal off all engine openings. Make sure exhaust cover has suitable window to monitor humidity indicators
- Check relative humidity every two weeks if engine is stored outside, and every 28 days if engine is stored inside.
- Relative humidity should be maintained at 40%.
 - If humidity indicator turns pink, replace desiccant bags and indicator

PT6A Engine Maintenance

Engine Preservation



Example of workscope for unpreserved engine:

- Inspect gears for evidence of corrosion. If corrosion is present => overhaul type inspection.
- Accessories bench check
- Inspect engine oil filter and replace with new
- Check engine oil total acid number (TAN)
- Replace engine oil
- Run the engine at 80% TO power for ten minutes.
- Remove and inspect RGB chip detector, oil strainer, and main oil filter.
- **Additional information, refer to SIL GEN-093**

PT6A Engine Maintenance

Engine Cycles

Full Cycle Definition (SB ***02)

Start – idle – takeoff – **flight** – landing – idle – shutdown

Operato

$$\frac{\text{Accumulated Total Cycles}}{\text{Number of STARTS}} = \left[\frac{\text{No. of Starts}}{\text{Number of STARTS}} + \left(\frac{\text{No. of Flights} - \text{No. of Starts}}{\text{Abbreviated Cycle Factor}} \right) \right] \times \text{Flight Count Factor}$$

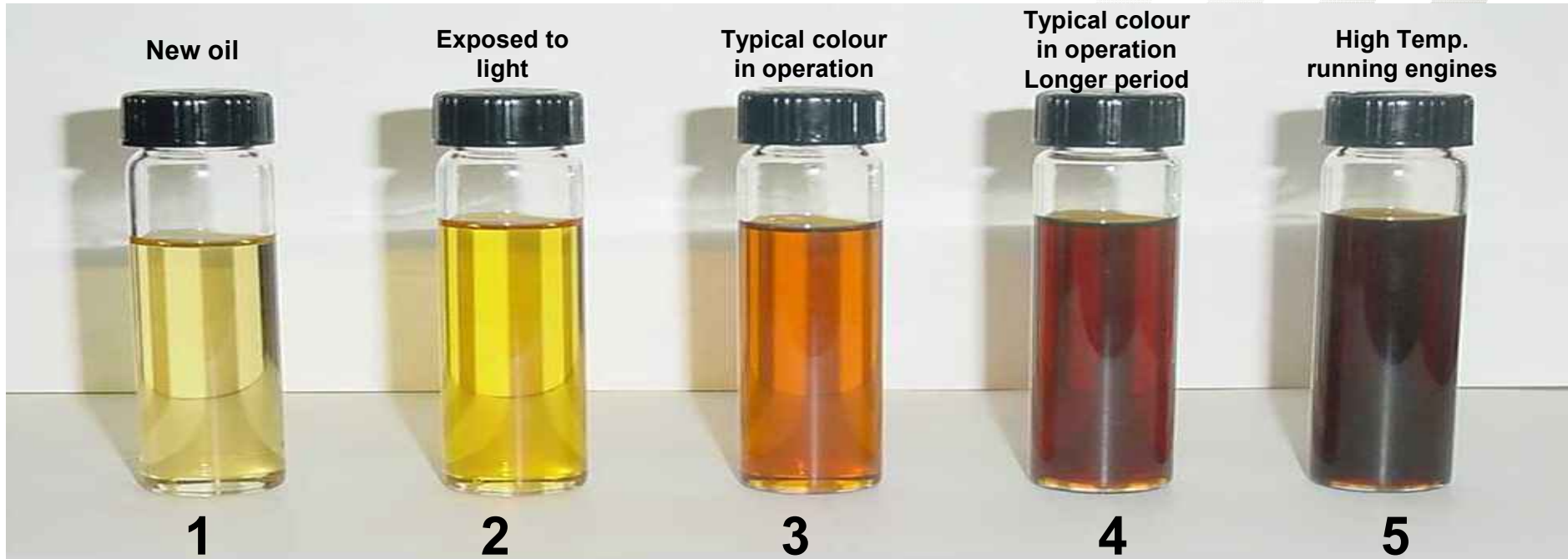
Number of **STARTS**
Number of **FLIGHTS**

PMA PARTS (PARTS MANUFACTURER APPROVAL)

P&WC do not recommend use of PMA parts

P&WC warranty can be denied.

Oil System – Oil discoloration



***Oil discoloration not detrimental to engine operation
Not a cause for engine removal***

Oil System

Third Generation Oil – What's new?



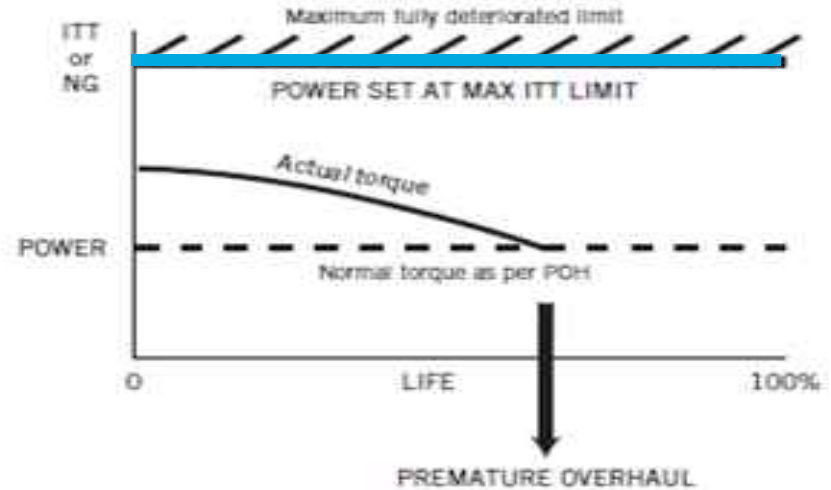
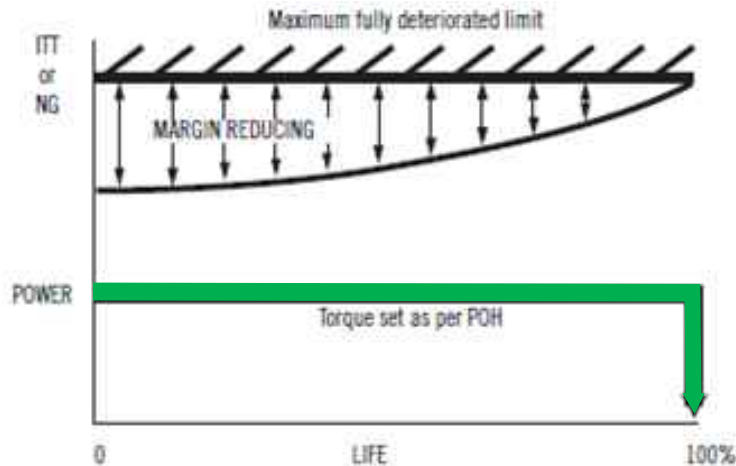
Approved for All PT6A Engines since Feb/16

10-15% less expensive than non HTS oil

Easily available; 200 distribution points in USA & Canada and 41 distribution points in Europe

HTS is compatible with all Approved Standard Type II (5 Centistokes) MIL-PRF-23699

WHY TORQUE NOT TEMP?



Do you set your power to torque per POH?

TOP 5 COST SAVERS

1. Always fly per POH recommendations. Fly torque not redline.
2. Trend Monitoring (or Ground Performance Checks)
3. Routine Fuel Nozzle Checks (with boroscope)
4. Compressor / Turbine Rinse
5. Utilize P&WC or Designated Overhaul Facilities



GO BEYOND