



GO BEYOND

Aviation Safety Campaign – June 2019



EXPORT CLASSIFICATION

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

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GO BEYOND



This Is Pratt & Whitney Canada

COMPANY OVERVIEW

A UNITED TECHNOLOGIES COMPANY

NOVEMBER 2018

UTC Businesses Push the Limits of Innovation



Pratt & Whitney

A United Technologies Company

Commercial Engines

Military Engines



Pratt & Whitney Canada

A United Technologies Company



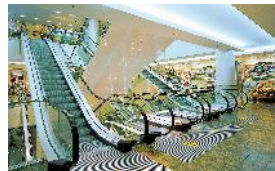
Collins Aerospace

A United Technologies Company



Otis

A United Technologies Company



United Technologies

Climate | Controls | Security

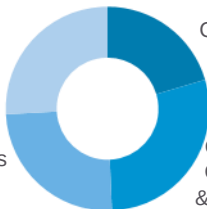


2017 net sales*

\$60.2B

Pratt & Whitney

United Technologies Aerospace Systems*



Otis

UTC Climate, Controls & Security

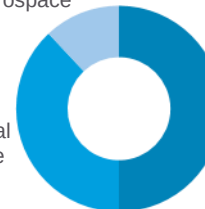
Aftermarket



Original Equipment Manufacturing

Military Aerospace & Space

Commercial Aerospace



Commercial & Industrial

*UTAS became Collins Aerospace in 2018

THIS IS PRATT & WHITNEY CANADA – 2018

Data from 2016 Annual Report * Adjusted net sales and adjusted operating profit are non-GAAP financial measures.

Market Reach

13,000+

OPERATORS

1,100+

AIRLINES

38,000+

AIRCRAFT
IN SERVICE

64,000+

ENGINES
IN SERVICE

200+

COUNTRIES AND
TERRITORIES

855M+

OPERATING
HOURS

Our Engines

Over 103,000 Engines Produced



General Aviation

500 – 1,900 SHP



PT6A Small



PT6A Medium



PT6A Large

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



PW600



JT15D



PW500



PW300



PurePower®
PW800

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

Fleet Reliability

PT6A ENGINE RELIABILITY

Terminology

Key Rates	BIFSD - Basic In Flight Shut Down BUR - Basic Unplanned Removal
Basic	Event can be directly linked to the engine design or manufacture
Non-Basic	Event cannot be linked to the engine design or manufacture (e.g. weather, pilot induced, etc.)
Standard to report statistics	
Single - 12 months rolling average	
Twin - 6 months rolling average	

PT6A ENGINE RELIABILITY

Basic IFSD Rates

Industry Benchmark	Current Rates	
0.010 = 10 events per 1,000,000 hrs.	PT6A Small	0.003
	PT6A Medium	0.003
	PT6A Large	0.003
	PT6A Family	0.003

** Rates calculated with 6 months rolling average. Data as of March 2019*

PT6A Design Demonstrates Excellent Reliability

PT6A ENGINE RELIABILITY

BUR Rates

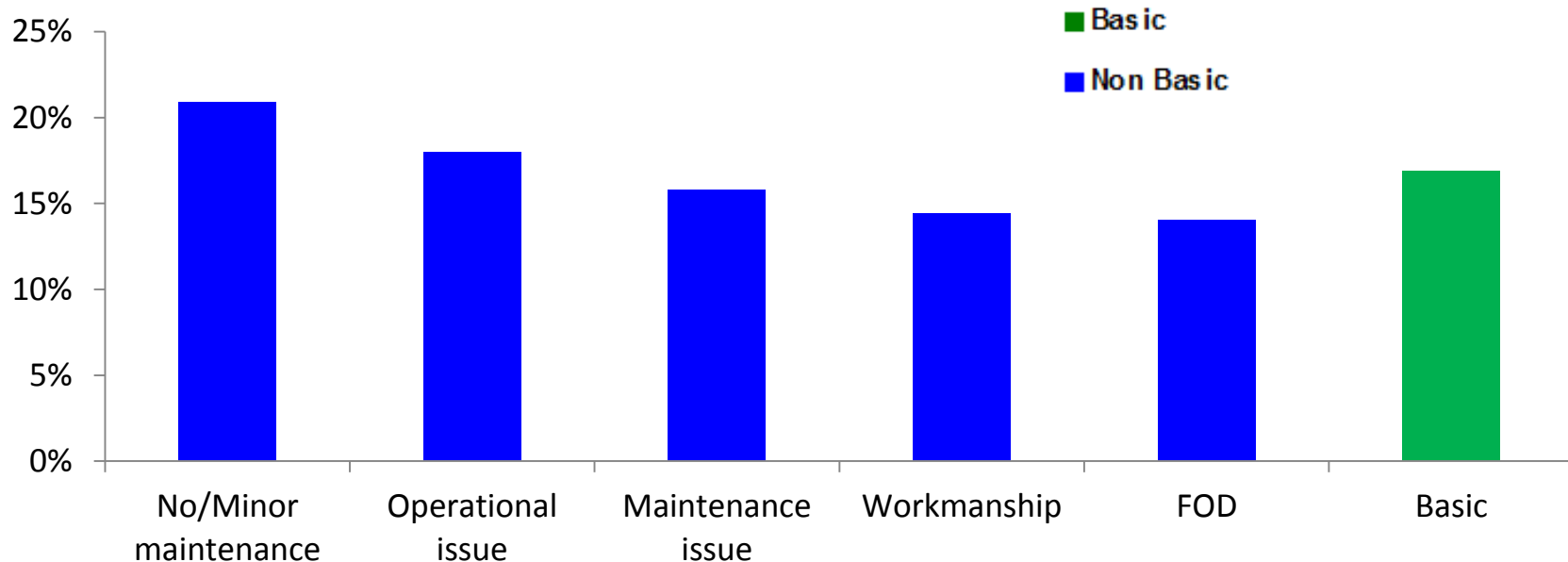
Industry Benchmark	Current Rates	
0.100 = 100 events per 1,000,000 hrs.	PT6A Small	0.025
	PT6A Medium	0.043
	PT6A Large	0.041
	PT6A Family	0.034

** Rates calculated with 6 months rolling average. Data as of March 2019*

PT6A Design Demonstrates Excellent Reliability

PT6A ENGINE RELIABILITY

Main Drivers



Note: Data 2013 to Dec 2017

Maintenance & Operations Are Key

PW100 ENGINE RELIABILITY

PW100 Worldwide Fleet	
Fleet Cumulative (Flying Hours)**	179,251,000
Fleet Cumulative (Cycles)**	189,647,600
Current Population**	7,779
Fleet Leader**	63,337
BIF Rate in 1 per FH*	1 per 260,600
BIF Rate in 1000 FH*	0.004
BUR Rate in 1 per FH*	1 per 59,800
BUR Rate in 1000 FH*	0.017

*Rates are based on 6 months rolling average as of 31 Mar 2019

**Fleet Hours as of 2 May 2019

PW100 ENGINE RELIABILITY

	SMALL	MEDIUM	LARGE
Fleet Cumulative (Flying Hrs.)*	70,090,200	63,047,500	46,113,200
Fleet Cumulative (Cycles)*	75,557,200	67,713,000	47,957,728
Current Population*	1,767	2,348	3,664
Fleet Leader*	63,337	59,095	49,553
BIF Rate in 1 per FH**	1 per 396,800	1 per 346,700	1 per 206,600
BIF Rate in 1000 FH**	0.003	0.003	0.005
BUR Rate in 1 per FH**	1 per 79,400	1 per 65,000	1 per 53,100
BUR Rate in 1000 FH**	0.013	0.015	0.019

*Rates are based on 6 months rolling average as of 31 Mar 2019

**Fleet Hours as of 02 May 2019

PW 100 Large Series: PW 119B/C, PW 127 All

PW 100 Medium Series: PW118 A/B, PW123B/C/D/E, PW124B, PW125B, PW 126/A

PW 100 Small Series: PW118, PW120/A, PW121/A

Humanitarian Support

•HUMANITARIAN AVIATION UNIQUE CHALLENGES AND NEEDS

•P&WC LISTENING TO THE HUMANITARIAN COMMUNITY

•Remote Locations Operations



•Harsh Environment Conditions



•Operating Cost Predictability



•> 75% of fixed-wing aircraft operating in humanitarian mission P&WC powered

- P&WC-WFP COLLABORATION
- COOPERATION FOR SAFE HUMANITARIAN MISSION SUCCESS

- Safety Promotion Emergency
•& Training Readiness support

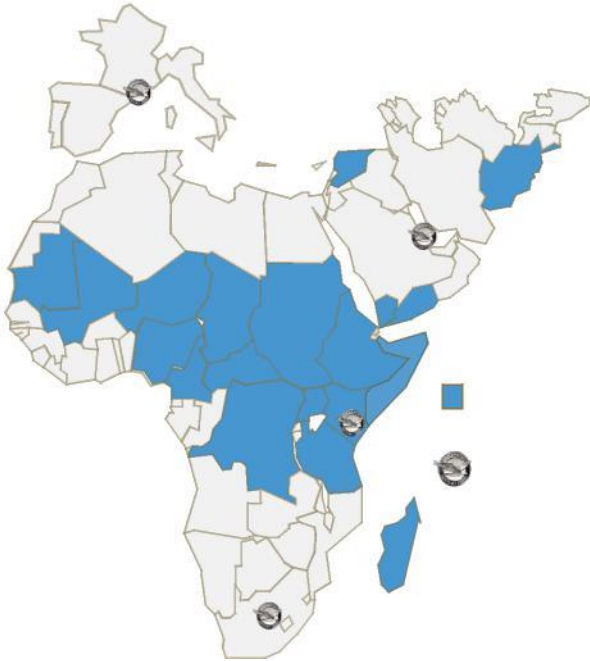
- Operators Support /
Tailored Solutions



- WFP / P&WC extensive collaboration in support of humanitarian effort and operators

•INCREASING PRESENCE IN AFRICA

•GROWING NETWORK OF SERVICE CENTERS AND FIELD SERVICES



- New mobile repair (MRT) bases launched

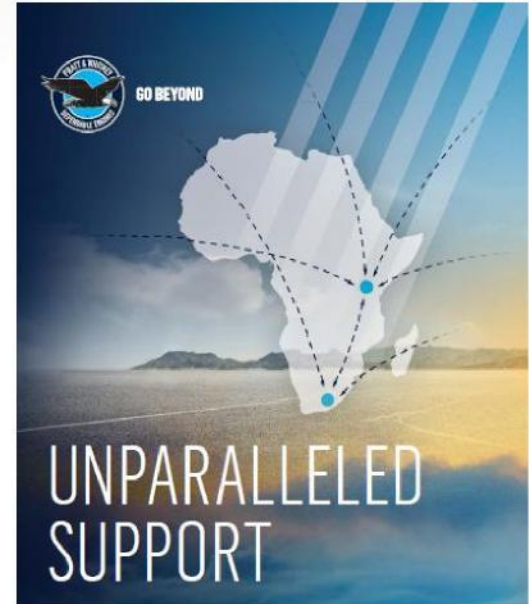
- 100+ operator visits

recently

New local training programs

- Enhanced in-region asset availability

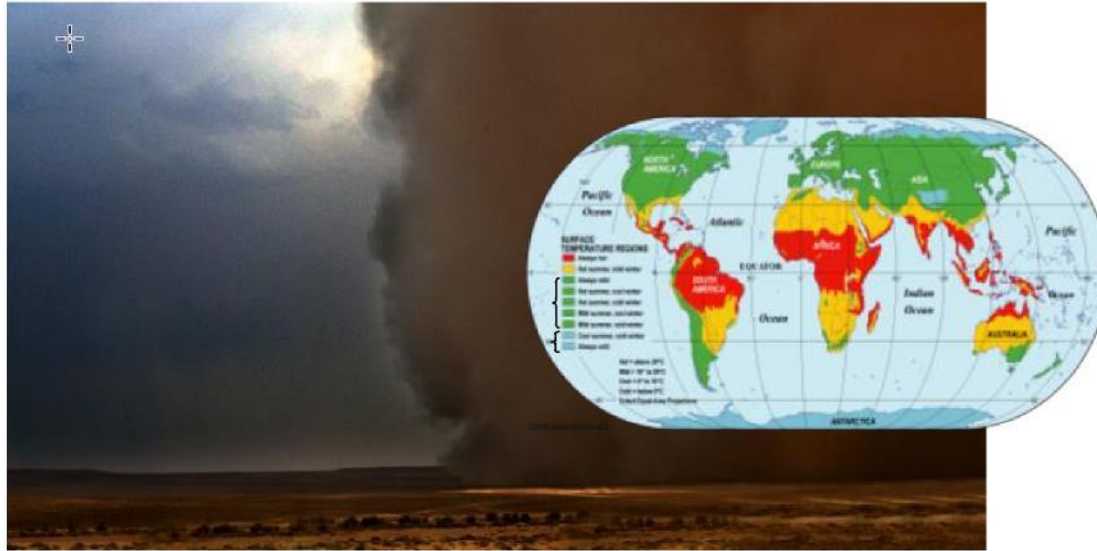
- (engines and parts)



•Increasing local presence to support aircraft availability & provide local solutions

HARSH ENVIRONMENT SUPPORT

TAILORED SUPPORT FOR OPERATOR IN DIFFICULT ENVIRONMENTS



Enhanced PW150A (Q400)
harsh environment package*

Up to 30%
extra credit over current program

Significant increase
in eligible parts

•Enhanced commercial support for operators in harsh environments

•*Ref: SIL PW150-05

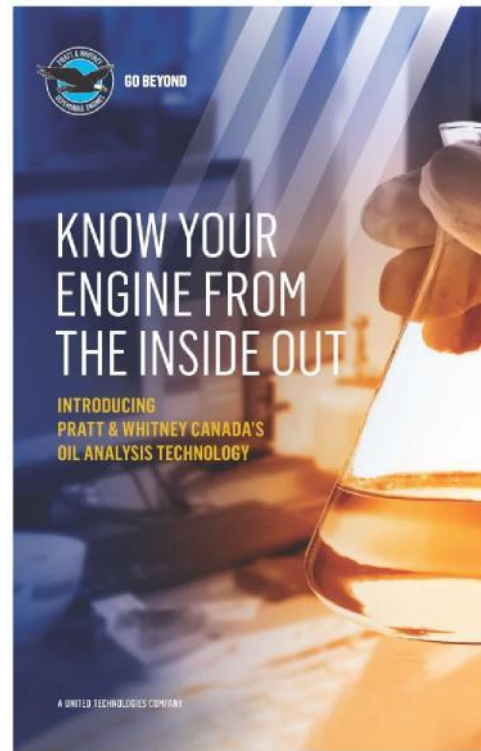
•GLOBAL HUMANITARIAN AVIATION CONFERENCE | OCTOBER 2018 5

- DIGITAL ENGINE SOLUTIONS
- MAKING ENGINES MORE INTELLIGENT AND MAINTENANCE MORE PREDICTIVE



•P&WC Digital Engine Services

•Digital solutions with options tailored for humanitarian aviation



P&WC DPHM



The image shows a computer monitor displaying a software interface for engine diagnostics. The screen shows multiple channels of data, including a top section with green and blue bar charts and several lower sections with red line graphs. To the right of the monitor is a blue diagnostic unit labeled 'FAST' with 'Pratt & Whitney Canada' and 'Engine Solutions' branding. In the foreground, a person's hands are visible typing on a black keyboard. The background is a plain white surface.

DPHM | DIAGNOSTICS, PROGNOSTICS
& HEALTH MANAGEMENT

**YOUR ENGINES ARE TALKING
YOU COULD BE
LISTENING**

 **Pratt & Whitney Canada**
A United Technologies Company

P&WC Diagnostic History

A rich history in diagnostics

Over 7,000 aircraft mounted / engine diagnostic systems delivered

Over 50+ Supplemental Type Certificates (STC's), OEM SB & Baseline installation

P&WC validated data quality and analytics / trusted global P&WC 24/7/365 Support

OEM



STC



Engine Condition Trend Monitoring (ECTM) - Why ?

Peace of Mind

Monitor available margin

Detect issues before they affect operation

Aircraft availability

Remote aircraft troubleshooting

Maximize line maintenance practices

Maintenance intervention planning

Cost of Ownership

Qualification for on-condition HSI

Catch problem before they turn into costly repairs

Facilitate warranty claims

Increase aircraft resale value

Option B'' TBO extension

Regulatory requirement



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

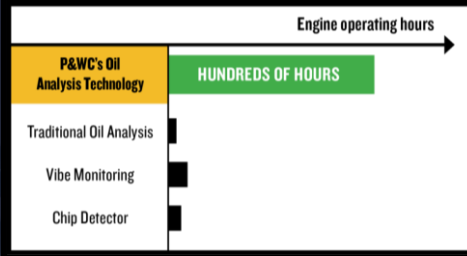
How?

- Oil samples from the oil tank

P&WC's Oil Analysis technology at a glance

SENSITIVITY: KNOW EARLIER

Time to plan for an event



SPECIFICITY: WHERE IS IT HAPPENING?

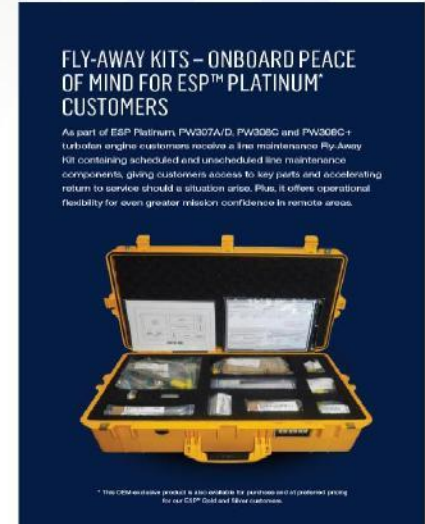
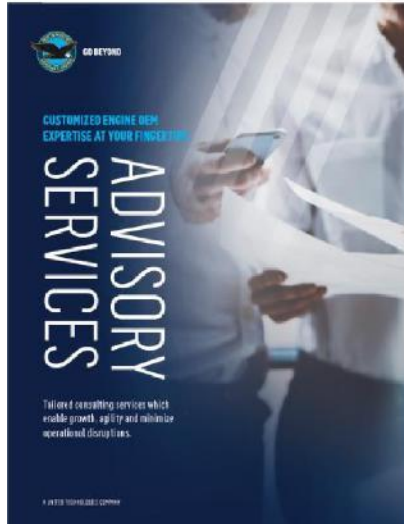
DETECTION CAPABILITY:	Traditional Oil Analysis	P&WC's Oil Analysis Technology
Chemical elements concentration	✓	✓
Alloy concentration	—	✓
Particles characteristics	—	✓
Interaction behavior	—	✓
Isolate & identify specific parts	—	✓

POTENTIAL BENEFITS FOR OPERATORS

- Lower maintenance costs
- Predictable maintenance budget planning
- Reduce delays and cancellations
- Increase aircraft resale value

FROM REACTING TO ANTICIPATING
TOWARD A 100% PLANNED MAINTENANCE
ENVIRONMENT

- ENGINE SERVICE SOLUTIONS
- GROWING NUMBER OF TAILORED SERVICES



•Engine services with options tailored for humanitarian aviation

Maintenance Support

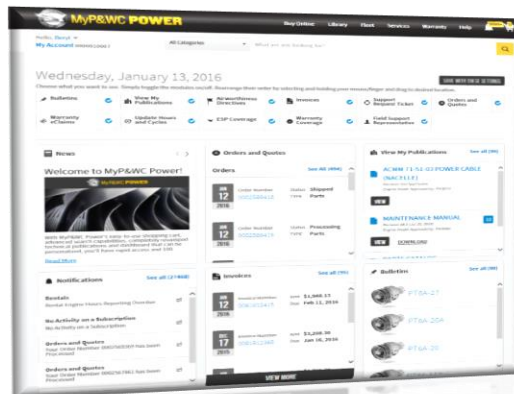
Seamless Service Online and Offline



A Powerful New Customer Portal

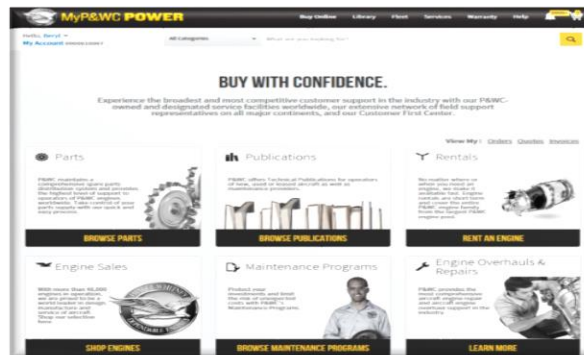


Customizable Dashboard



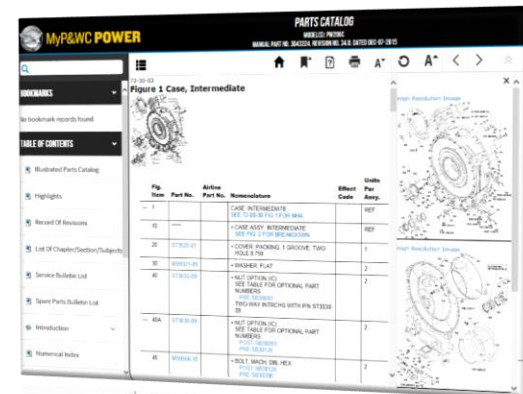
On-line Rental Requests
Streamlined Warranty Management

Online Purchasing (Parts & Pubs)



Optimized for Any Device
Maintenance Program Management

Advanced Technical Publications



Simplified Account Management
On-line Support Requests

CUSTOMER FIRST CENTRES



Longueuil Team



Singapore Team

VISION

Proactive approach to our customers needs with tailored technical support.

MISSION

Keep our customers flying with a 24/7/365 technical support that covers fleet monitoring to AOG event management.

24-hour 7 days a week event management, technical and commercial support

In Canada and United States
Tel: 1-800-268-8000

International Access Code
+ 8000-268-8000
Tel: (450) 647-8000

email: CFirst@pwc.ca

Top 5 PT6A Operating Recommendations

1. Always operate to the POH. Fly to Torque and not Temperature
2. Engine Condition Trend Monitoring (ECTM)
3. Routine Fuel Nozzle checks, including Hot Section Borescope
4. Engine washing; External, Compressor and Turbine
5. P&WC Designated facilities, P&WC approved Parts & Repairs

AVOID SURPRISES

Workshop Overview

Aviation Safety Workshop Elements

- Engine Overview
- Reliability Statistics
- Technical Updates
- Maintenance Best Practice
- Digital Engine and Service Solutions

Together, we **GO BEYOND.**

We believe that powered flight has, and will continue to, transform the world. So we work with an explorer's heart and perfectionist's grit to design, build, and service the world's most advanced and unrelenting aircraft engines.

To turn flight's possibilities into realities for our customers.

