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FACTUAL NOTES, ENGINE TEARDOWN INVESTIGATION IN SUPPORT OF ACCIDENT INVESTIGATION OF SCHWEIZER GRUMMAN AG-CAT MODEL 164B N629EH PERFORMED FOR THE NTSB.

Customer: Thunder Valley AG Aviation

Application: Schweizer Grumman AG-CAT model 164B - N629EH

Location: Indiana USA

Event Date: 26 July 2022

Engine Model: PT6A-34

Engine Serial No.: 56841

NTSB Identification: CEN22LA349

TSB Identification: A22F0264

Red File No.: 22-150

RFA No.: 22SIE00246

Sales order: 234961

I ACCIDENT SYNOPSIS

On July 26, 2022, a Schweizer Aircraft Corporation G-164B airplane, was on its 5th flight of the day when shortly after takeoff, the airplane would not continue to climb. The pilot stated that he advanced the throttle, but the engine did not seem to respond. The airplane then impacted a corn field about 300 ft from the end of the grass airstrip. The airplane sustained substantial damage to the fuselage and wings.

A preliminary field inspection was carried out on 8 September 2022 at Myers Aviation located in Oshkosh, WI. The engine accessories (Fuel Control Unit, Fuel pump, Start control unit, Propellor governor & Overspeed governor) were removed and sent to P&WC for additional review. Reference Factual Notes 22ECN00153.

The engine was then shipped to P&WC for a disassembly investigation.

[REDACTED]	
[REDACTED]	
[REDACTED]	
[REDACTED]	

EXPORT CONTROL CLASSIFICATION		LOCATION		U.S. REGULATION	
				EAR	ITAR
		U.S.	P-ECCN	9E991	P-USML NSR
		OUTSIDE U.S.	ECCN	NSR	USML NSR
		CANADA	LOCAL REGULATION		
Date of marking	15 June 2023		EIPA (ECL)	DPA (CG)	
			NSR	No	

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II FACTUAL INFORMATION

1.0 INVESTIGATION PARTICIPANTS

The powerplant investigation was performed on the 13 June, 2023 at the Pratt & Whitney Canada (P&WC) Service Investigation Facility at Saint-Hubert, Quebec, Canada. The following individuals participated in the investigation as representatives of their respective organisations:

[REDACTED]

Regional Senior Investigator
Transportation Safety Board of Canada

[REDACTED]

Service Investigation
P&WC

2.0 LEFT HAND (LH) ENGINE HISTORY

Engine Model: PT6A-34, **Serial No.:** 56841

Logbook Available: **The engine logbooks were not available at the time of the investigation.*

Time Since New (TSN): Unk

Cycles Since New (CSN): Unk

Time Since Overhaul (TSO): Unk

Cycles Since Overhaul (CSO): Unk

3.0 LEFT HAND (LH) ENGINE EXAMINATION

All positional references are in relation to view from aft looking forward. Upstream and downstream references are in relation to gas path flow from the compressor inlet to exhaust.

3.1 External Condition

The engine was received in a wooden box. The engine externals were dirty, and evidence of impact damage was observed (Photo No. 1 & Photo No. 2) The compressor rotated freely through the started pad gearshaft splines. It was not possible to rotate the propeller shaft. The engine data plate confirmed the Serial No. 56841 (Photo No. 3).



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Photo No. 1



Photo No. 2



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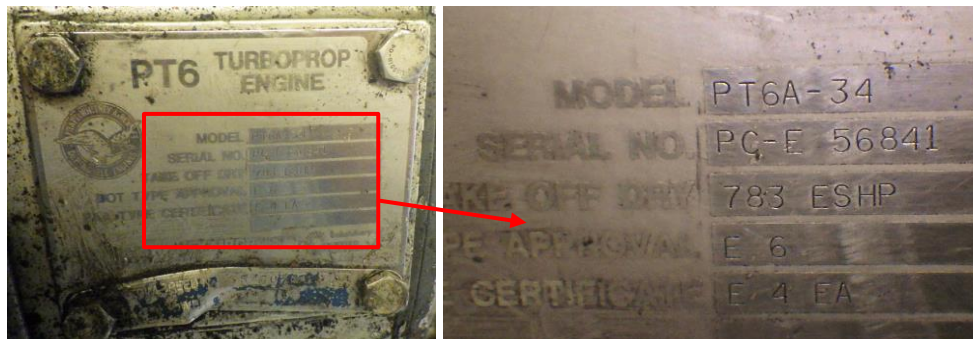


Photo No. 3

3.1.1 External Cases

Reduction Gearbox (RGB): The RGB was dirty, and it was not possible to rotate the propeller shaft (Photo No. 4).

Exhaust Duct: The exhaust duct was buckled at the top and bottom (yellow arrows, Photo No. 4 & Photo No. 5). The PT blades trailing edge side viewed through the exhaust case did not exhibit any visual damage.

Gas Generator Case (GGC): The GGC did not exhibit any visual damage. One fuel nozzle was not received with the engine.

Accessory Gearbox (AGB) and Inlet Case: The AGB was dirty and exhibited coating loss (Photo No. 6). The AGB was rotated through the Starter pad gearshaft splines. The airframe low pressure fuel pump was received with the engine. A view of the inlet case with the inlet screen removed is shown in Photo No. 7. Environmental debris was observed in the inlet.

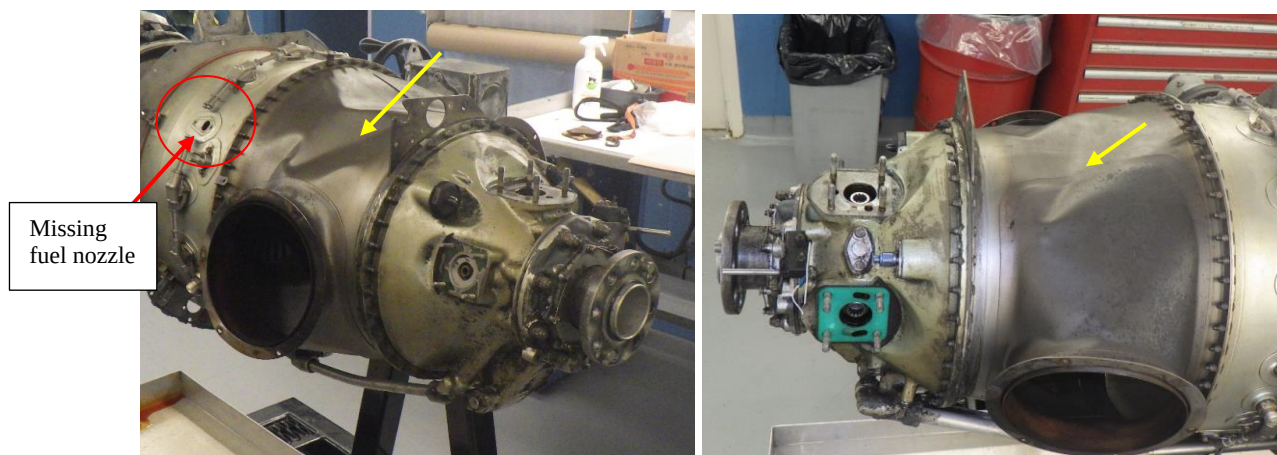


Photo No. 4



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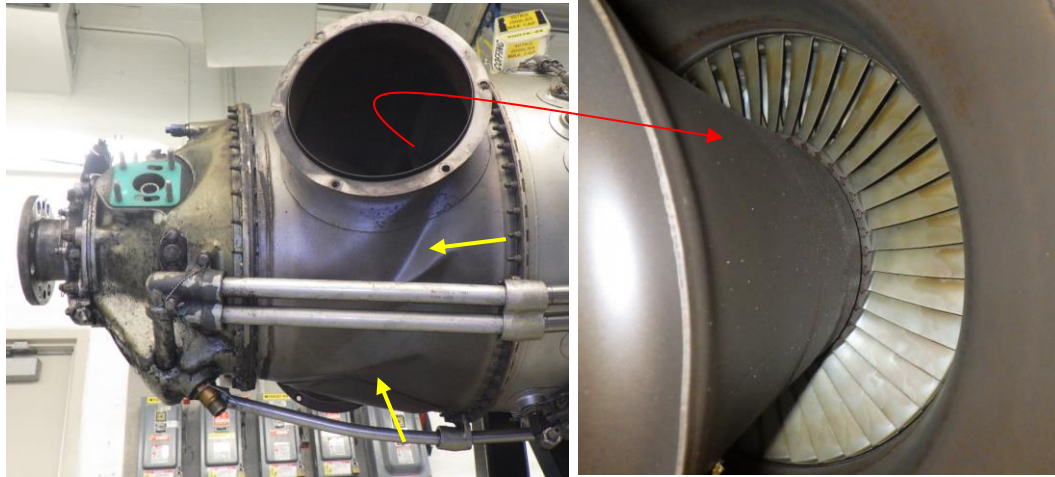


Photo No. 5

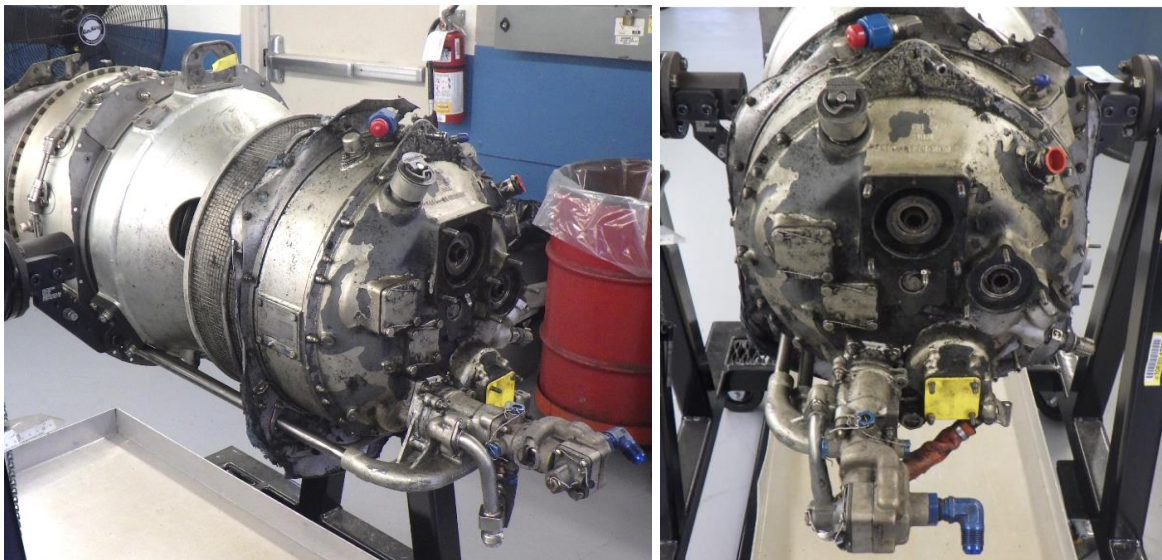


Photo No. 6



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Photo No. 7

3.1.2 Power Control Linkage and Reversing Linkage

The Power Control Linkage and Reversing Linkage were not received with the engine.

3.1.3 Pneumatic Lines

Compressor Discharge Air (P3) and P3 Filter: The P3 line and P3 air filter were not received with the engine.

Power Turbine Control (Py): The Py line was not received with the engine.

3.1.4 Chip Detector and Filters

Chip Detector: The RGB chip detector was clean (Photo No. 8).

Oil Filter: The oil filter was not received with the engine.

Fuel Filter: The fuel filter was not received with the engine.



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Photo No. 8

3.2 Disassembly Observations

3.2.1 Compressor Turbine (CT) Section

The CT disc did not show any primary distress (Photo No. 9). The CT blades did not show any signs of primary distress (Photo No. 10). The CT shroud segment showed localised rubbing (Photo No. 11). The CT vane ring showed a normal engine running condition.

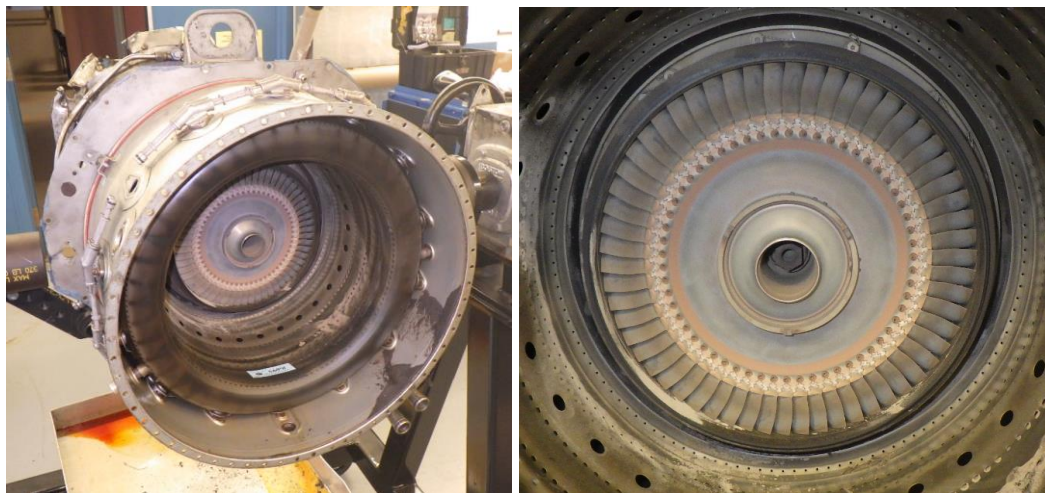


Photo No. 9



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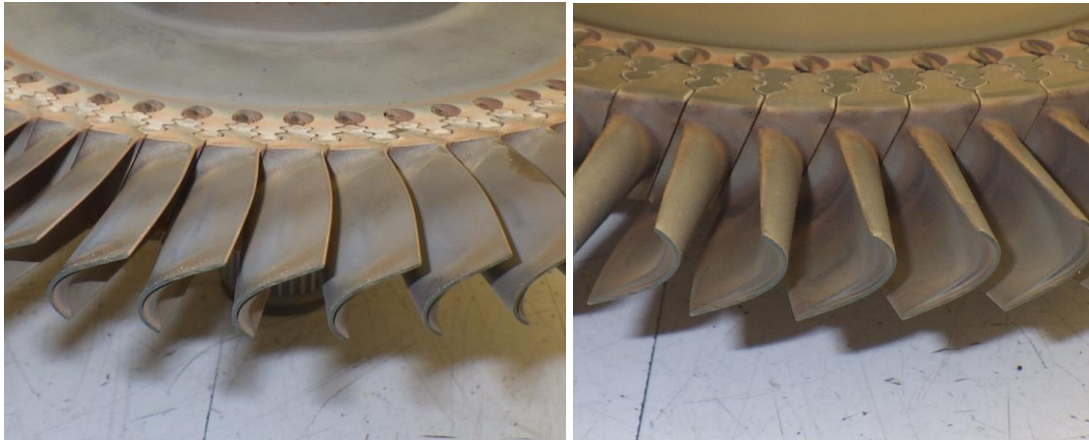


Photo No. 10

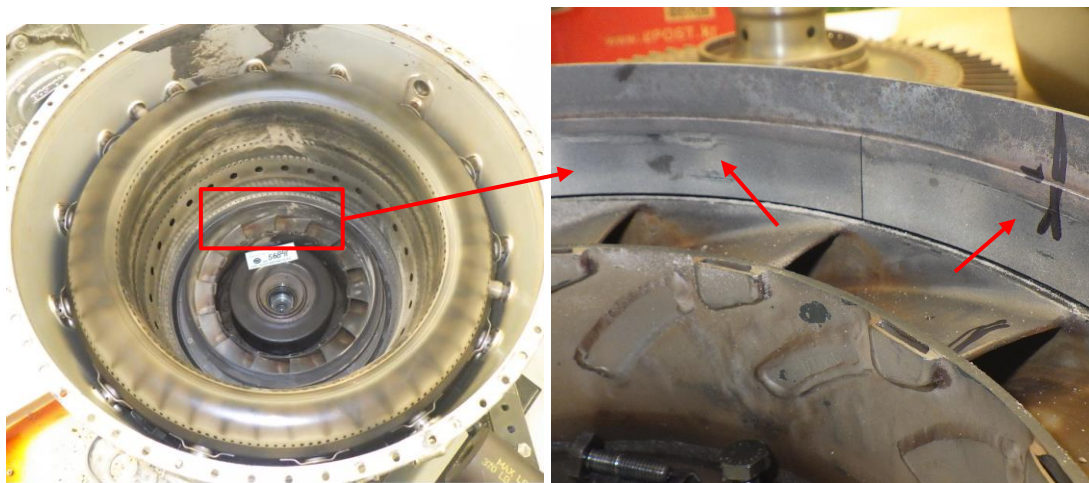


Photo No. 11



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3.2.2 Combustion Section

The small exit duct, large exit duct and combustor liner showed a normal in-service condition (Photo No. 12 & Photo No. 13).

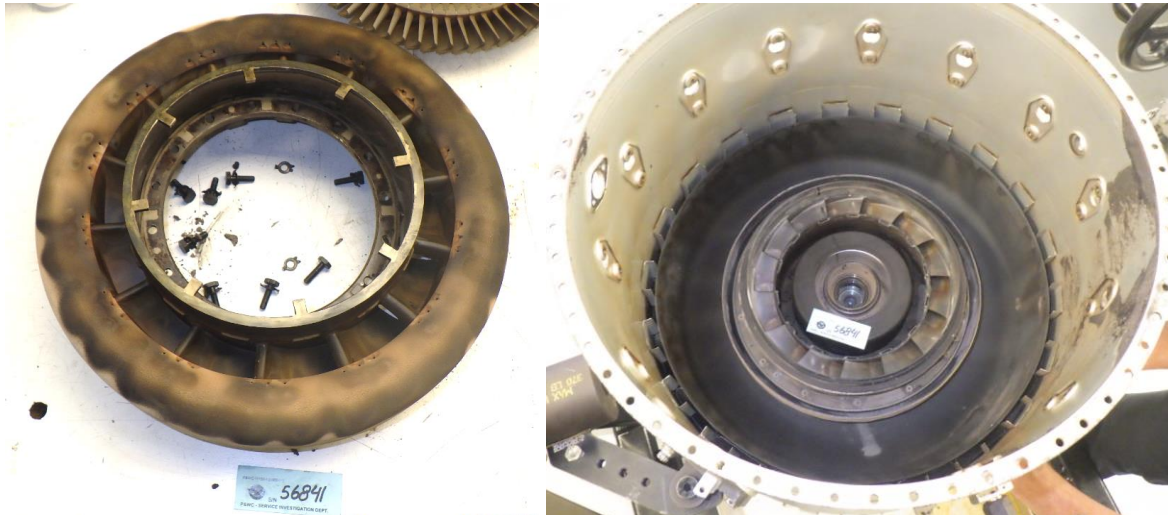


Photo No. 12



Photo No. 13



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3.2.3 Power Turbine (PT) Section

The inter turbine temperature (ITT) probes did not show any visual damage. The PT vane airfoils were covered with whitish deposits and debris. The power turbine disc and PT blade platform are exhibited circumferential rubbing wear from contact with the PT baffle. (Photo No. 14 to Photo No. 16). The PT blade tip and PT shroud exhibited rubbing wear.

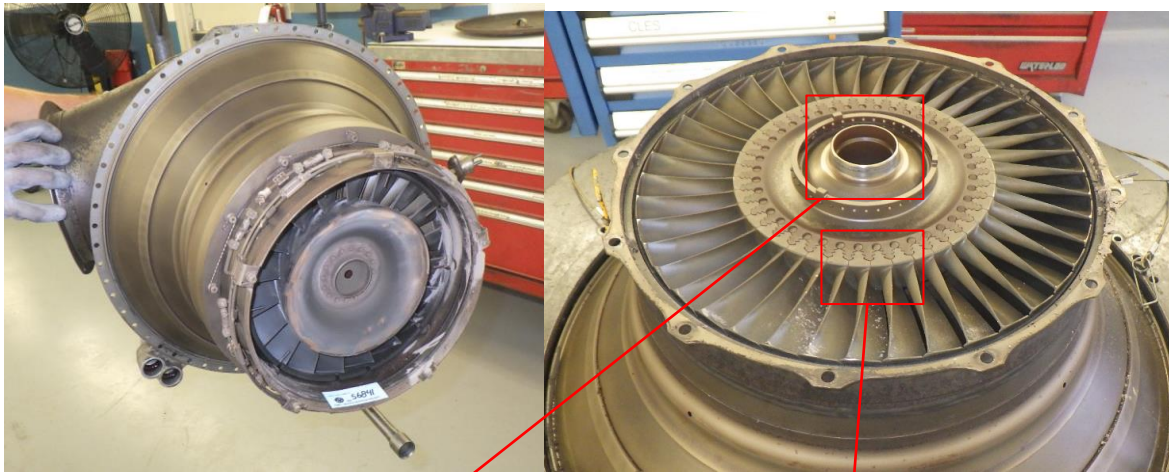


Photo No. 14

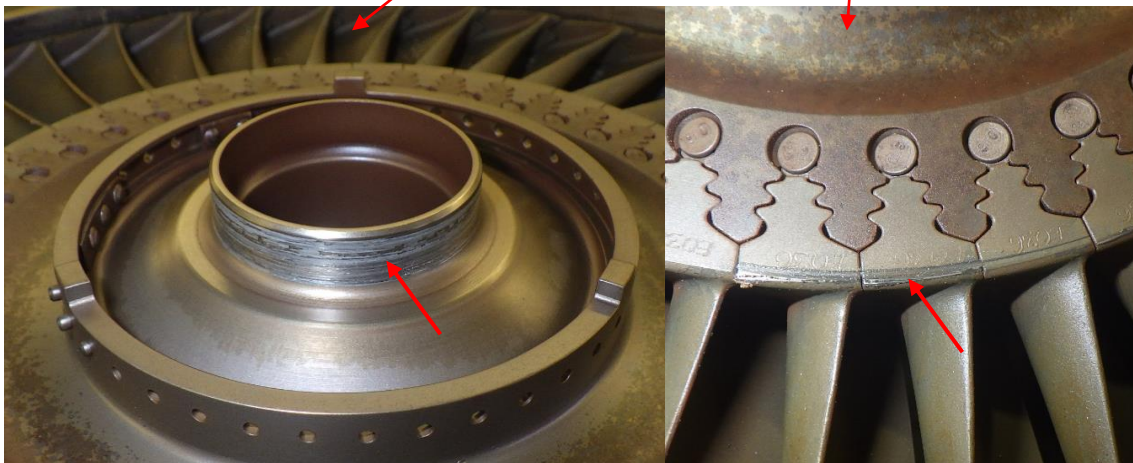


Photo No. 15



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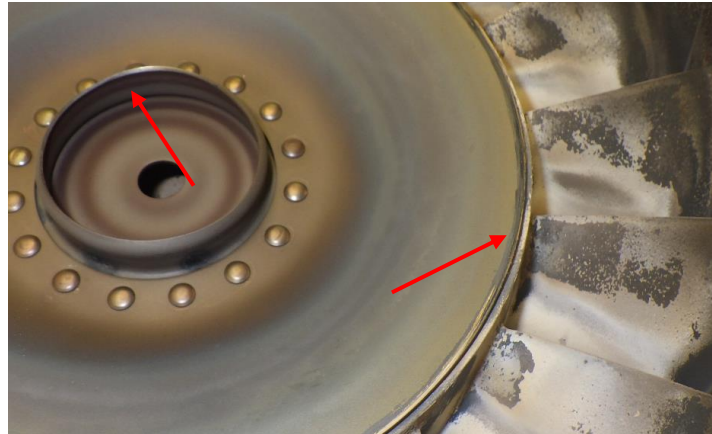


Photo No. 16

Rubbing wear on PT baffle from contact with PT disc and blades

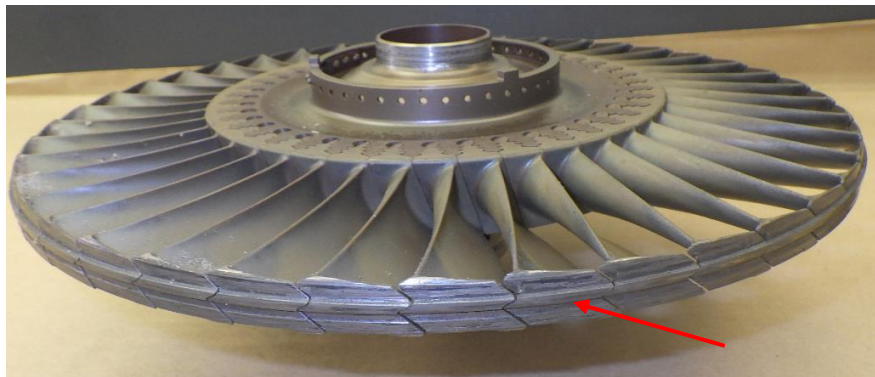


Photo No. 17

PT blade shrouded tip rubbing wear



Photo No. 18

PT shroud rubbing wear



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The No. 3 bearing knife edge seal was seized into the PT shaft housing and once removed allowed free rotation of the PT shaft. The No. 3 and 4 bearings rotated freely and did not show any signs of primary distress. (Photo No. 19).



Photo No. 19

3.2.4 Compressor Section

The 1st stage compressor rotor airfoils were dirty as shown in Photo No. 20.. The compressor was disassembled and there was no primary distress in any of the compressor stages (Photo No. 21 & Photo No. 22). The No.1 bearing and No.2 bearing rotated freely with no sign of primary distress (Photo No. 23).



Photo No. 20



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Photo No. 21
1st, 2nd & 3rd stage compressor rotors

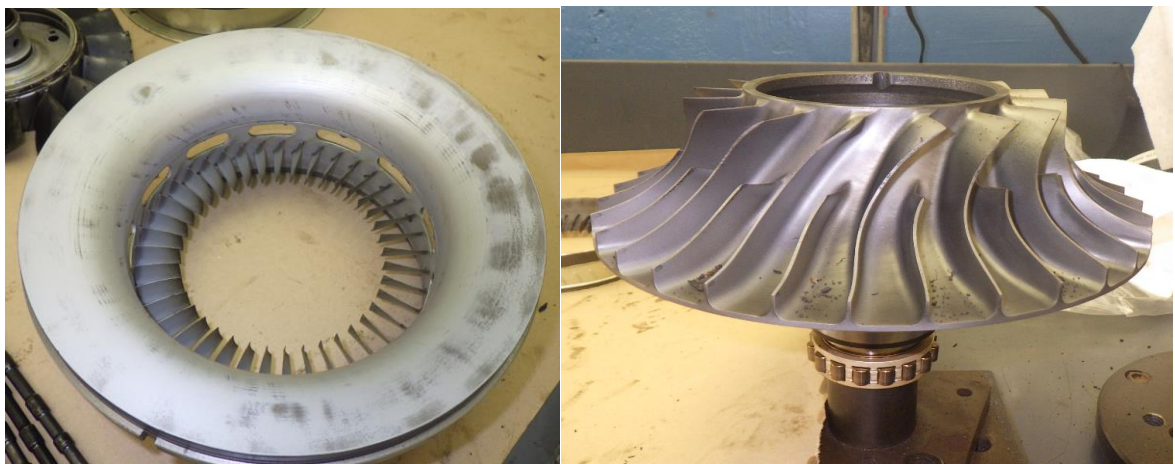


Photo No. 22
Centrifugal impeller



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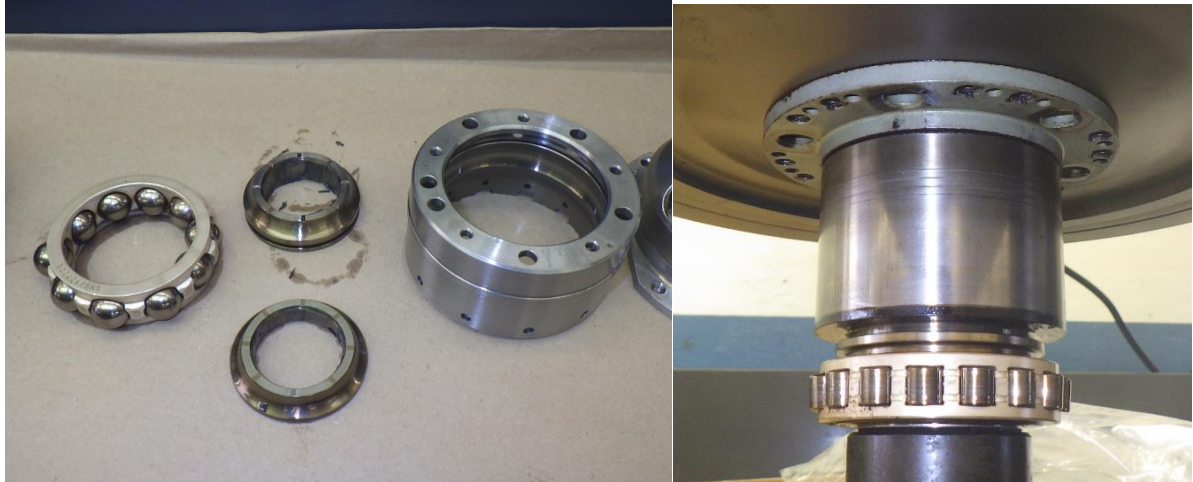


Photo No. 23
No.1 bearing and No. 2 bearings

3.2.5 Reduction Gearbox (RGB)

The RGB was partially disassembled to access the 1st and 2nd stage reduction gearsets. Both the 1st stage and 2nd stage planetary gearsets rotated freely without any signs of distress (Photo No. 24 & Photo No. 25).

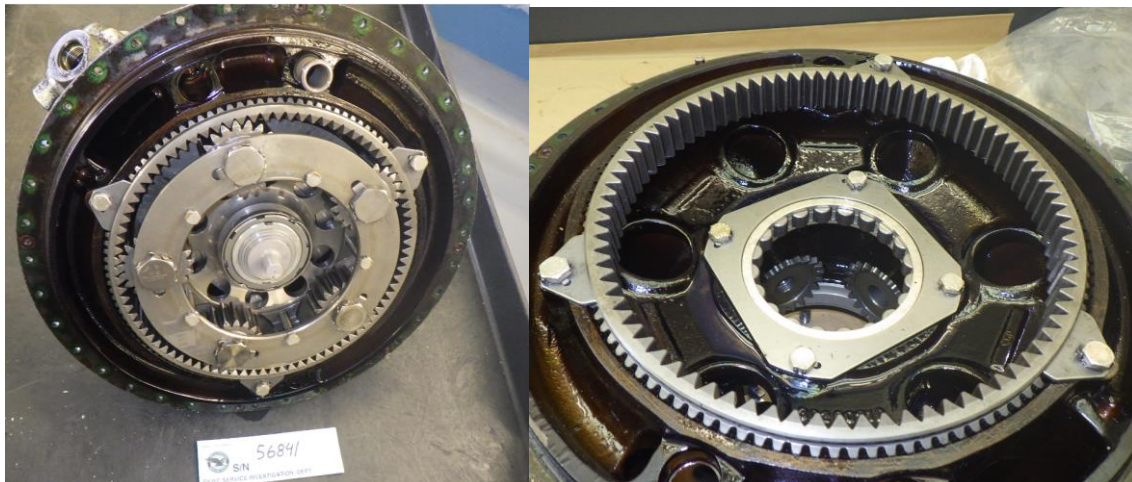


Photo No. 24



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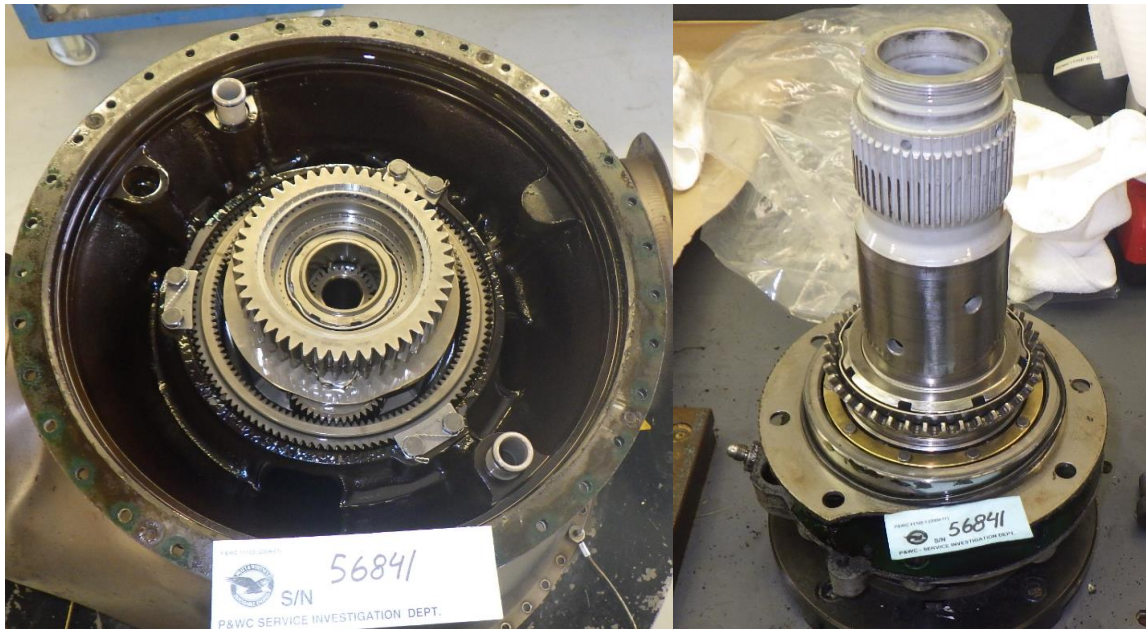


Photo No. 25

3.2.6 Accessory Gearbox (AGB)

The AGB internal gears did not show any primary distress (Photo No. 26). The internal surface of the AGB showed coating peeling (Photo No. 27). The oil pressure pump, the external oil scavenge pump (RBG, 3 & 4 bearing), the No. 2 bearing oil scavenge pump and the AGB scavenge pump all rotated freely and disassembly did not reveal any sing of primary distress (Photo No. 28 to Photo No. 31).



Photo No. 26



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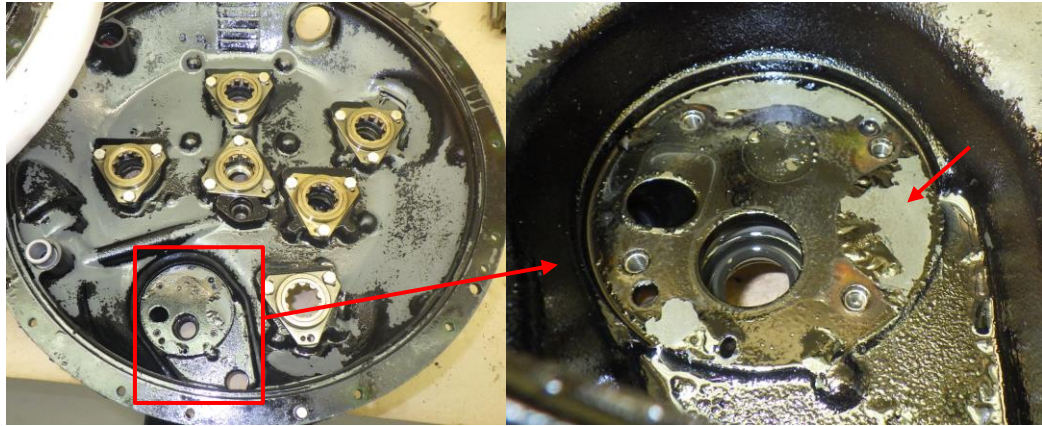


Photo No. 27



Photo No. 28
Oil Pressure Pump

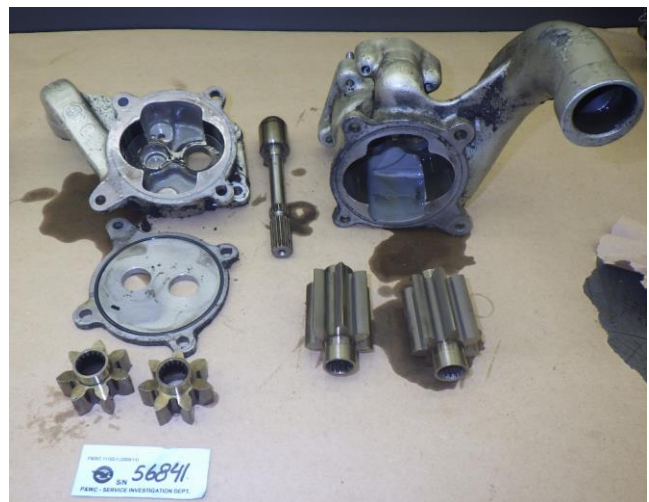


Photo No. 29
External oil scavenge pump



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Photo No. 30
No. 2 bearing oil scavenge pump



Photo No. 31
AGB oil scavenge pump

3.3 Controls and Accessories

3.3.1 Ignition System

Ignition Plugs: The ignitor plugs exhibited a normal engine condition (Photo No. 32).

Ignition Leads: The ignition leads were not received with the engine.

Ignition Exciter: The exciter box was not received with the engine.



Photo No. 32

3.3.2 Fuel System

Fuel Oil Heat Exchanger (FOHE): The FOHE was not received with the engine.

Fuel Pump: The Fuel pump not received with the engine.

Fuel Control Unit (FCU): The FCU was not received with the engine.

Start Control Unit: The start control unit was not received with the engine.

Fuel Nozzles: The fuel nozzles did not show any sings of primary distress (Photo No. 33).



Photo No. 33

3.3.3 Air System

Compressor Bleed Valve (BOV): The BOV was observed to be in the fully opened position. The BOV was removed, and the piston was free to move through its entire range. The BOV was leak tested and disassembled and there were no indications of malfunction (Photo No. 34).



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Photo No. 34

3.3.4 Oil System

Propeller Governor (CSU): The CSU was not received with the engine.

Overspeed Governor (OSG): The OSG was not received with the engine.



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III ADDITIONAL ACTIVITIES / FURTHER ANALYSIS

No other engine activities are planned at this time.
A final report of the engine examination will be provided by P&WC.

IV SUMMARY

There were no indications of any pre-impact mechanical anomalies to any of the engine components reviewed that would have precluded normal engine operation.

V CLOSING

These factual notes are based on engine examination conducted on 13 June 2023 and may be altered or corrected in the final investigation report on the basis of further information.

Pratt & Whitney Canada Corp.



Service Investigation Department
22 June 2023