



MEMORANDUM for RECORD

Millicent Hill
Aviation Accident Investigator
Eastern Region Aviation

Date: August 21, 2019
Person Contacted: Les Doud, Hartzell Propellers

The statement below was taken from email correspondence with Mr. Doud.

“It failed in the corner/shoulder between the turbine-end bearing journal and piston ring carrier portion which is a larger diameter. This was at a different location than the last turbine wheel separation on the Dixon, CA SR22T. Mike Burns (Continental Metallurgist) stated the failure appeared to be rotational bending fatigue; ratchet marks around the OD and a small overload area offset from the center of the shaft. He stated each ratchet mark indicated an origin of fatigue cracking.

The first thing I noticed even before we removed the shaft from the center housing was the visually evident scratches that appeared in a consistent and intentional pattern on the shaft (see attached photo by Ed). After removal of the shaft I found several corrosion pits (see attached photo by Ed), so it's possible these scratches were caused by mechanical removal of corrosion before turbo assembly during the overhaul process? If there were scratches and/or corrosion in the shoulder, those may have introduced stress risers that may have contributed to this failure? Additional metallurgical analysis would be needed to confirm this theory if needed?

Both turbos were manufactured as new in July 2004 by Kelly Aerospace. The date code on the failed shaft was October 2008. The right turbo shaft date code was July 2004 so it was likely the original? So it appears the turbo overhauls in 2016 reused the right shaft and replace the left shaft with one from a 2008 turbo? Regardless, it is evidence the turbine wheel assemblies were not replaced with a new assembly during the 2016 overhaul as our Manual specifies.

To restate Phillip's phone call, the engine run showed a loss of approximately 5 quarts of oil over a time period of approximately 2 mins at wide open throttle; oil was observed streaming out of the exhaust pipe. The engine was shut down at the first sign of decreasing oil pressure. The manifold pressure only reached approximately 28.9" at wide open throttle suggesting the absence of the left turbine wheel introduced an exhaust "leak" that prevented the right turbocharger from contributing any measurable boost to MP. The ID of left turbo bearings were visually worn to a large diameter

leaving a large gap between the ID and shaft and allowing a large amount of oil to escape.”