



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region
November 16, 2017

TURBOCHARGER EXAM REPORT

WPR17LA137

This document contains 15 embedded photos.

A. ACCIDENT

Location: Dixon, CA

Date: June 30, 2017

Aircraft: Cirrus Design Corporation SR-22, Registration Number: N744TC, Serial #: 3640

NTSB IIC: Howard Plagens

B. EXAMINATION PARTICIPANTS:

Howard Plagens
Senior Air Safety Investigator
National Transportation Safety Board
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C. SUMMARY

Examination of the turbochargers was conducted on November 16, 2017, at the facilities of Hartzell Engine Technologies, Montgomery, Alabama.

D. DETAILS OF THE INVESTIGATION

1.0 Turbocharger Examination

Both turbos were manufactured by Kelly Aerospace. The right turbo had been overhauled by Approved Turbo Components Inc. in July 2016 at an engine time of hours.

Left turbo	PN	466304-0003	SN	LIL00112
Right turbo	PN	466304-9003	SN	IBL 00293
Controller	PN	470688-0005	SN	MIN00110
Wastegate	PN	470842-0004	SN	NEN00150



Figure 1 Turbochargers



Figure 2 Compressor Sides of Turbos



Figure 3 Turbine Side of Turbos

LEFT TURBOCHARGER

The left turbocharger compressor and turbine blades rotated freely by hand. The compressor blades were not discolored, and the housing was darker than the right turbocharger. The internal lubrication passages were present with no indication of concern. The CHRA assembly (nose only) exhibited moderate coking. The piston rings on the turbine wheel were present and in good condition, and the journal bearings' radial holes were clear.

The turbine bearing displayed signs of scoring on the outer diameter and contact (the oil chamfers hole was missing). The turbine housing displayed signs of excessive exhaust deposits. It was determined that the turbocharger was in a functional condition.



Figure 4 Left Turbocharger Housing Exducer



Figure 5 Left CHRA Assembly Nose Coking

RIGHT TURBOCHARGER

The right turbocharger compressor vanes wobbled on the shaft and were not discolored. There were compressor wheel rub marks on the compressor housing. The compressor blades were heavily bent opposite the direction of rotation and damaged.



Figure 6 Right Turbo Compressor Blades

The CHRA assembly exhibited moderate coking (nose only).



Figure 7 Right Turbocharger CHRA Nose Assembly

The right turbocharger turbine wheel was not located, and the housing was white. There was little to no rub or contact damage noted on the turbine wheel housing. A wheel of the specified dimensions would not be able to exit the unit without interference with the housing. The piston ring was still in place in the center housing seal bore. The turbine wheel head separated from the turbine shaft at the outboard edge of the piston ring groove. The shaft fractured circumferentially at a piston ring groove as indicated by the white arrow in the picture below. The fracture surface was smeared when viewed through a microscope so that type of fracture could not be determined. The turbine wheel assembly had a manufacture date code of 1106 (November 2006). Time on this component is not recorded so time in service could not be determined.



Figure 8 Right Center Housing Bore with White Arrow Pointing at Fractured Piston Ring Groove



Figure 9 Turbine Shaft Fractured End



Figure 10 Side View of Turbine Shaft



Figure 11 Close-up of Fractured End

There was one slight witness mark on the turbine housing.



Figure 12 Turbine Housing with Witness Mark

The turbine wheel piston rings were present and worn. The journal bearings had to be pressed out of the housing. The radial holes in the thrust collar had pieces of backplate located in the path. There were scratches and scoring on the end plates along with evidence of rubbing on the backplate seal bore.



Figure 13 Thrust Collar and Backplate

There was scoring on the inboard thrust bearing; all pads were wiped.



Figure 14 One Side of Thrust Bearing



Figure 15 Opposite Side of Thrust Bearing

The back plate had a broken seal on the bore hub; the seal bore inner diameter for the spacer was broken. The center bearing housing had evidence of residual oil, and the oil squirt holes were clear.