

National Transportation Safety Board

Office of Aviation Safety

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CEN24LA011

ENGINE FOLLOW-UP EXAMINATION

March 7, 2024

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A. ACCIDENT

Location: Red Oak, Iowa
Date: October 15, 2023
Time: 0951 Local
Airplane: N6JA - Cirrus SR-22T

B. ENGINE FOLLOW-UP EXAMINATION

IIC	Andrew Finne NTSB Aurora, Colorado
Party Member	Brandon Mayer Cirrus Aircraft Duluth, Minnesota
Party Member	J Ferrell Continental Aerospace Technologies Mobile, Alabama

C. SUMMARY

The examination was conducted with Cirrus and Continental at Beegles Aircraft Recovery in Greeley, Colorado on March 7, 2024. The examination consisted of both a visual and teardown inspection of the Continental TSIO-550K engine. The examination revealed a failed exhaust valve on the #4 Cylinder along with a failing exhaust valve on the #6 Cylinder. Both Cylinder and associated components were retained for further examination.

D. DETAILS OF THE EXAMINATION

1.0 Engine Examination

The Cirrus SR-22T was equipped with a 315 horsepower turbocharged Continental TSIO-550K engine.

Visual examination of the engine prior to teardown showed no issues or abnormalities. All engine control cables, fluid lines, and instrumentation cables were found secured with no abnormalities present. The engine was clean with no oil observed on the exterior of the engine. The cowling was secured with no damage or abnormal fluid deposits observed.



Figure 1. Engine prior to examination teardown

Oil dipstick was removed and the oil level observed to be within the normal operating range with relatively clean oil.

The lower spark plugs were removed and observed to be all normally worn, except the spark plugs of Cylinder #4 and #6, as compared with the Champion Spark Plug Card. The spark plugs from Cylinder #4 and #6 had debris and oil fouling.



Figure 2. Spark Plugs

The engine was rotated by hand with the propeller and the engine continuity to the accessory section was observed. Normal valve movement was observed on all cylinders. A thumb compression test was performed on all cylinders using the lower spark plug hole with the #4 Cylinder having no observable compression.

The #4 Cylinder was borescoped and the exhaust valve was found to be missing part of the valve face. Due to the observed damage, the other cylinders were borescope to gather a baseline for the condition of the valves.



Figure 3. #4 Cylinder Exhaust Valve.

An additional exhaust valve. #6 Cylinder, was found to have heat damage, when compared to the AOPA Anatomy of a Valve failure poster Figure # 6.



Figure 4. #6 Cylinder Exhaust Valve Face

The exhaust tube for the #4 Cylinder was removed and the outlet side of the valve examined to locate the missing valve face. However, no fragments of the face were discovered in the cylinder exhaust valve outlet or exhaust tube. Due to being unable to locate the missing valve face and engine monitor data showing a drop off in Turbine Inlet Temperature, the turbocharger was removed and borescoped. Multiple broken turbine blades were observed as well as witness marks along the exhaust inlet interior walls that were consistent with a dense hard object passing through the exhaust system.



Figure 5. Broken Turbocharger Turbine Blade

Based on the findings of the thumb compression test and borescope, the #4 and #6 Cylinders and associated components were removed by a salvage facility A&P mechanic at a later date. The assemblies were then retained and shipped to the NTSB Materials Laboratory for further examination.

Submitted by:

Andrew Finne
Air Safety Investigator