



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

January 18, 2018

CYLINDER EXAMINATION

WPR17LA175

A. ACCIDENT EXAM

Location: Superior Air Parts
Date: January 18, 2018
Aircraft: N/A,
NTSB IIC: Tom Little

B. EXAMINATION PARTICIPANTS:

Craig Hatch
Air Safety Investigator
National Transportation Safety Board
[REDACTED]
Denver, CO 80239

Bill Ross
Vice President, Product Support
Superior Air Parts
[REDACTED]
Coppell, TX

C. SUMMARY

The cylinder was shipped to Superior Air Parts for examination. It was discovered during the initial exam of the airplane, that the cylinder had a stuck (open) exhaust valve. Before the exam started, we reviewed the case file, including photos of the cylinder and components. The cylinder had about 324 hours on it since installed back in February 2017. A visual inspection of the cylinder found that the exhaust valve is “stuck” open, with minor damage to cylinder; which consisted of damage to the head’s cooling fin and a bent exhaust stud.

D. DETAILS OF THE INVESTIGATION

1.1 Exam with photos



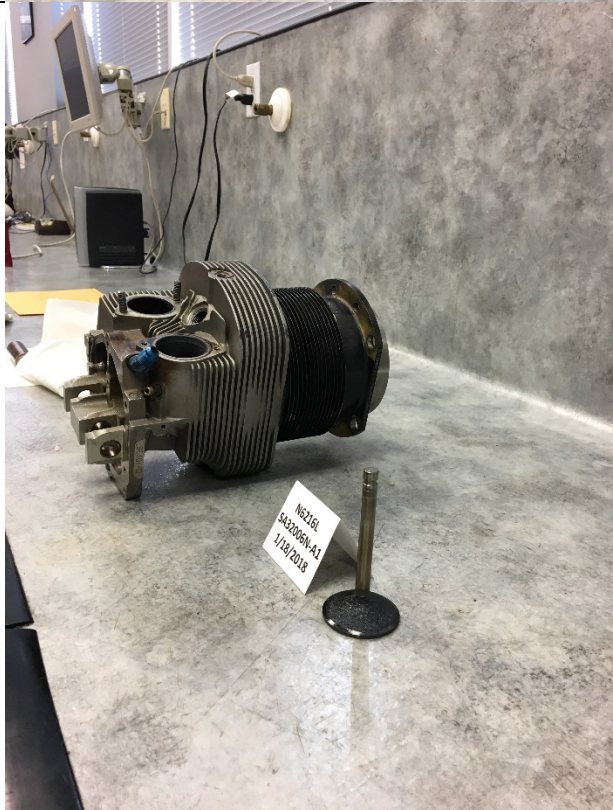
Cylinder after removal from shipping container; The piston was also part of the shipment. The cylinder was absent the push rods and rocker arms.

The intake and exhaust valve were in their respective positions.



Top piston; heavy combustion deposits are present, also the lack of any signatures that indicate the exhaust valve struck the top of the piston is noted.

The rings appeared normal, and the piston sides were absent any “scuffing” marks.



The intake valve was removed from the cylinder. Heavy combustion deposits are noted on the back side of the valve.



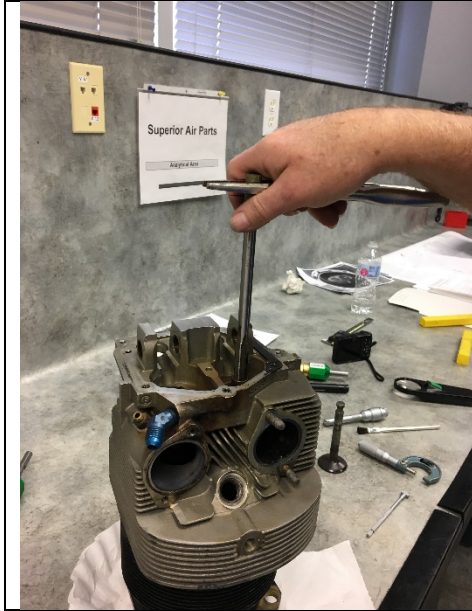
The exhaust valve was stuck in the open position. A “light” tap to the bottom of the valve was applied, in order to close the valve, and remove the valve keepers. A light tap was then required to remove the valve from the cylinder.

A Rockwell hardness test was performed on the valve: The valve was within specifications.



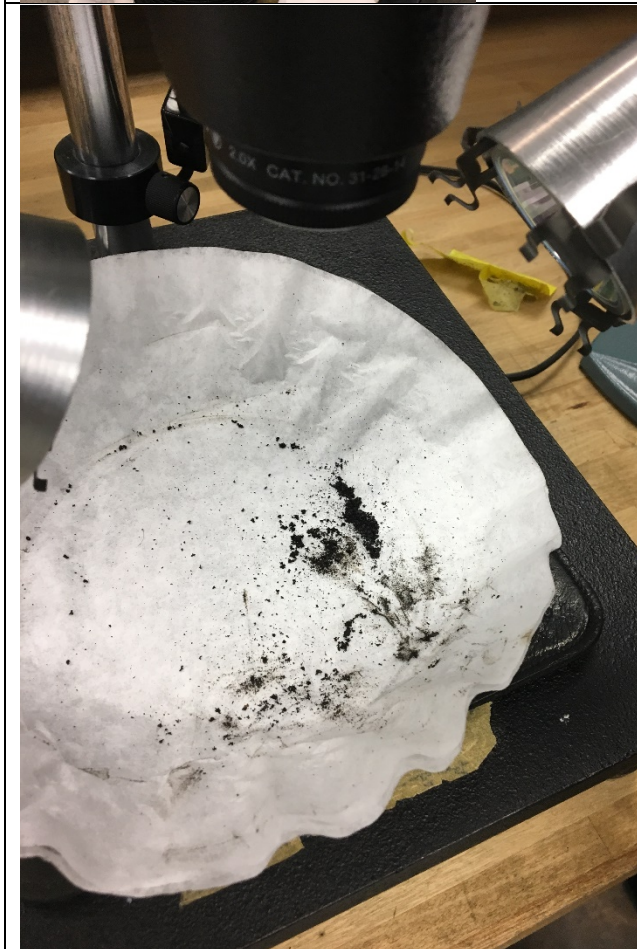
A Go No-Go gauge was applied to the cylinder valve guides. The intake valve guide passed the test. Neither end of the Go No-Go gauge was able to enter the exhaust guide.

A visual look in the exhaust valve guide, revealed what appeared to be material buildup on the inside the guide sidewalls.



The exhaust valve guide was reamed (Lycoming SB) to remove material from inside the guide.

A visual look inside the guide after reaming, noted that metal material from the sides of the guide were not removed during the process.



Material removed from the guide was collected. A visual look (including under a microscope) at the material was done. The collected material was consistent with combustion deposits; the absence of guide material was noted.

 A close-up photograph of a yellow reamer tool. The tool is angled diagonally across the frame. Handwritten in black marker on the yellow surface are the numbers '0.4975' followed by the word 'Reamer'. The background is dark and out of focus.	Reamer for the exhaust guide.

Results: No pre-accident deficiencies were found with the cylinder. The stuck valve was consistent with combustion deposit buildup in the exhaust valve guide.

Miscellaneous:

A review of photos, in the case file, noted that the push rod(s) were not bent. Since the exhaust valve was stuck, a bend push rod, maybe expected.

	Exemplar rockers. Also a review of the case file noted that there did not appear to be a oil hole in the rocker arm. The exemplar rocker arms: note the oil hole in both the intake and exhaust rocker arms. *Rocker arm and push rods were not supplied for the cylinder exam.