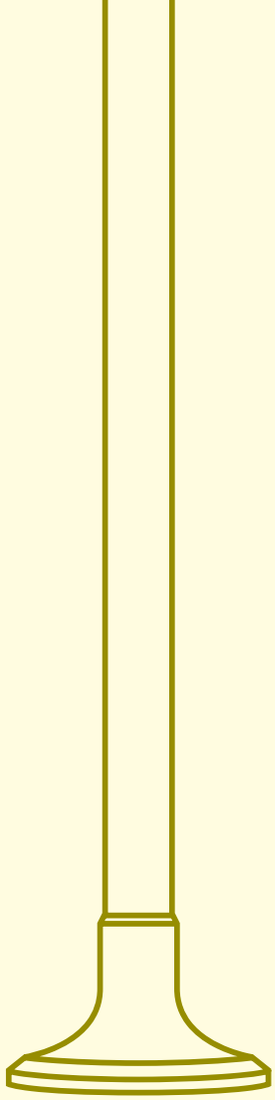


Sticky Situations

Causes and Cures for Stuck Valves

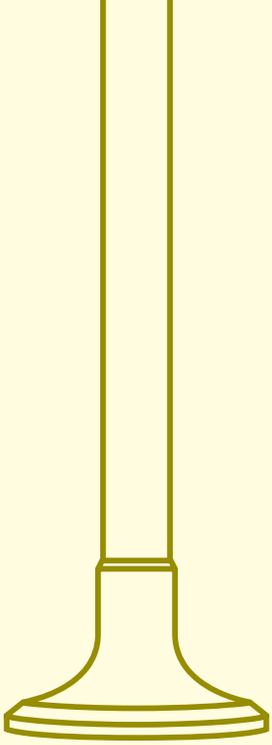
By William Pollard

Causes of sticking valves, and what to watch for.

Sticking valves are a relatively common problem on aircraft piston engines. Lycoming Service Bulletin 388 addresses the need to regularly check clearance and provides a procedure to clean carbon accumulations to prevent problems.

Valve sticking is almost exclusively limited to the exhaust valves. Most issues with intake valves are usually associated with improper fit or machining during repairs or loose seats usually becoming apparent soon after the cylinder is put into service.

Most engines will give an important warning that valve stem clearance has been lost to carbon deposits, allowing for maintenance that can avoid the problem. The following will explain most of the causes and what to watch for.



Prevention

Many contributors factors can lead to the deposits that cause stuck exhaust valves. One very important thing operators can do is change their oil often at the regular intervals specified in the operators manual, thus removing suspended solids before they can accumulate in the guides.

Engines that use screen filters will benefit from changing to a full flow filter to remove more particulates from the oil.

Keeping cylinder temperatures in normal operating range with proper attention to air flow and baffle sealing will help by lowering guide and valve temperatures.

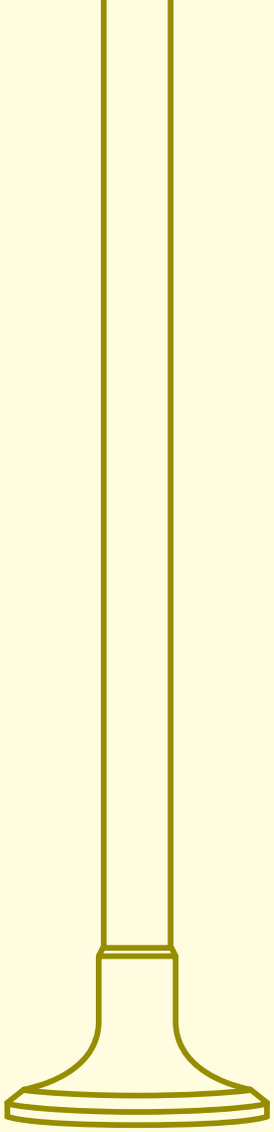
Proper air filtration can also help by keeping ingested solids to a minimum.

Causes

Longer than recommended oil change intervals, high lead content of fuel in engines certified for lower octane fuels and insufficient air filtration can lead to high amounts of suspended solids that can eventually lead to stuck valves from accumulated deposits.

Deposits can accumulate within the valve guide during operation as heat evaporates engine oil allowing the suspended solids to remain behind. If these deposits accumulate at a rate that is slower than they can be worn away then they usually do not become an issue.

When engine oil is heavy with deposits and high operational temperatures are encountered these deposits can accumulate at a faster rate, slowly robbing the valve of clearance. High cylinder temperatures, especially with unapproved or inferior engine oils, can cause oil coke to be the source of deposits as well.



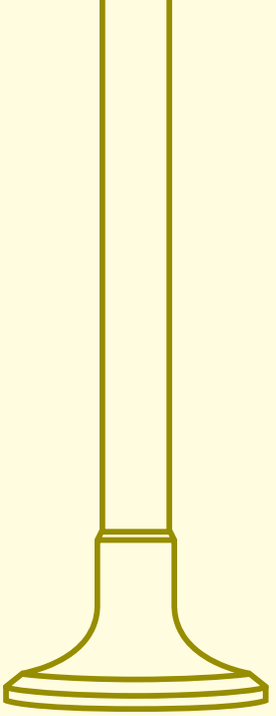
Warning signs

While at operating temperature, clearances are higher than at room temperature, allowing extra space for deposits to accumulate. Once the engine cools and the clearances shrink, the deposits can start to cause a problem.

At startup an early warning of trouble will be a hard miss and roughness that clears as the engine warms up, usually in a matter of seconds rather than minutes. This leads many operators to believe the engine is just cold natured, has a fouled plug or is getting up in time—but the reality is that the engine is giving notice that a major problem is looming.

Given that a stuck valve can cause a forced landing and serious engine damage, these symptoms should not be ignored. Valve clearances should be checked as soon as possible.

Valves tend to ride one side of the guide rather than having the carbon act like an encompassing bushing. This results in galling by metal-to-metal contact as deposits force the valve against the opposite side of the guide. This galling is what eventually causes the hard sticking that can occur in flight, long after startup.



Valve corrosion

Another common cause of valve sticking is the corrosion that can occur in high humidity areas as the engine sits unused for long periods of time. Corrosion can occur between the valve stem and guide binding the valve in place. Turning the propeller through can expose the problem, but cylinder service will be the only way to properly fix it.

Nitralloy guides are particularly predisposed to this problem since they are magnetic and will readily rust in a high-moisture environment. Engines that still use these guides should not be allowed to sit for long periods without use, especially without some type of climate control such as a closed hangar.

Repair

Stuck valves will not go away by themselves. Continued operation of the engine will only increase the risk of damage. Damage could rear its ugly head in the form of bent pushrods, damaged camshaft lobes, damaged camshaft followers or damaged rocker arm supports.

Pay attention to the warning signs and if you suspect you have a stuck valve, take your Cessna to a qualified mechanic to get it inspected and if necessary, fixed.

William Pollard has been the quality assurance manager at Airmark Overhaul for 22 years. Send questions or comments to editor@cessnaflyer.org.

RESOURCES

Airmark Overhaul, Inc.
airmarkoverhaul.com