

Gang,

We have returned three 0-320 Lycoming cylinders to the factory under their two year warranty. These cylinders were removed from our customer Ed Vinsion's HC Cheetah that we overhauled two years ago. The three cylinders #2, #3, #4 we returned had excessive exhaust valve guide wear in accordance with Lycoming Service Bulletin 388B, and its supplements. These cylinders have only 179.3 hours total time since new. Wear rates of guides are #1 = .0025", #2 = .0060", #3 = .0065", #4 = .0090". Out of the four cylinders only #1 is wearing at an acceptable rate. Note: Lycoming allows .0030" wear in the valve guide anytime during the first 300 hours of cylinder operation, and then allows .0010" wear for each 100 hours of operation. #4 cylinders .0090" wear would then be allowed with a cylinder with 900 hours on it, not on cylinders with only 179.3 hours of operation. Inspection of the cylinders for flashing on the cylinder cooling fins showed cylinder #1 to be fairly free of flashing, and the other three cylinders that have excessive exhaust valve guide wear to have substantial flashing. Ed's aircraft is equipped with an EDM 700 EGT/CHT, and he reports high CHT's on the cylinders with the excessively worn guides. BTW this was the second time we complied with Lycoming Service Bulletin 388B, and its supplements on Ed's aircraft. The first time was at 103.25 SMOH about a year ago, and at that time he had the following exhaust guide wear, #1 = .0025", #2 = .0034", #3 = .0048", #4 = .0069". As a result of these early inspection results we decided to let Ed fly for another year, and then take action to correct the problem before we, and Ed were outside of Lycomings two year parts & labor warranty.

As it turns out we have another customer currently in house for warranty work as a result of excessive valve guide wear. Rob Scott & Bill Kleb two NASA Rocket Scientists (I love calling them that) from New Port News WV have three cylinders with excessive exhaust guide wear. We overhauled Rob & Bills Cheetah over 3 years ago, and they have almost 700 hours SMOH. Like Ed Vinsion we did a early 388B inspection on their engine, and found excessive guide wear on three of their cylinders. In their case we found #2 cylinder to have nominal wear, and found excessive wear on the other three cylinders. Once again the cylinder with the least amount of guide wear had the smallest amount of flashing. Bill & Rob are AYAers, and time to time Gangsters. Bill Kleb took a good look at the flashing, but also pointed out the mold line misalignment, and explained to me the possible implications of it. In Rocket Scientists terms the mold line misalignment forms "forward facing, and reward facing steps". Bill explained that on a forward facing step the air flow that is running parallel to the surface of the cooling fin detaches from the surface well before hitting the step in order to flow over the step. On the rear ward facing step the air flow is detached from the down stream surface, and forms a rotation of air much like the rotation of air on the leeward side of a mountain range. Bill was kind of shocked with the possible implication of this. The separation of the air on the forward, and rear facing step is like losing the surface area in the separated area which he explained could be 3 to 7 times the height of the step. Bill also explained to me that the that the rotating air on the reward facing step could become super heated since heat released in that area just keeps circulating round, and round, getting hotter, and hotter. Bill is interested in this subject, and said perhaps he would do some computer modeling of these air flows around the steps to start with. Later flashing could be added to the modeling, along with the effects of the adjacent cooling fin. Very interesting stuff. Bill & Robs cylinders are out of Lycoming warranty, but they are under our 5 year pro rated warranty. Bill

Kleb spent a day filing off all of his flashing with our new assortment of files we purchased just for that purpose, noting we already had over 100 files in house. Bill & Rob do not have an EGT or CHT gage to speak of, but time will tell if the filing helped reduce guide wear.

I would expect to hear from Lycoming shortly in regards to Ed Vinsions warranty cylinders, it will be interesting to hear what they have to say. As I reported at Baraboo where I was contacted by Lycoming customer service rep Mike Caldra, and Lycoming chief engineer Dan Fletchair they have inspected over 40 cylinders in house, and found no flashing on any of them. We have 20 new cylinders installed on fresh engines in our shop right now, and all of them have extensive flashing, and mold line misalignment. Some of these aircraft have been in our care for a lengthy period of time under going the Precision Engine restoration treatment so these cylinders were purchased over a long time frame. It is very hard to believe Lycoming found no flashing, perhaps they are blind. I was grilled heavily by Mike Caldra about Ed Vinsons cylinders we are returning under warranty. Caldra kept asking me if the valves and guides had failed, I told him yes since they were wearing at over 6 times the allowable rate in accordance with Lycoming service information. Caldra asked me if I was inspecting the inside diameter of the guides with a plug gage in accordance with Lycoming instructions. I told him I was not, we inspect them with a small hole dial bore gage in accordance Lycomings instructions. A plug gage is a Go No Go gage used by the factory to see if a hole is sized correctly, one size has to fit into the hole, and the other size must not fit into the hole. A Go No Go plug gage is of no value when checking a valve guide for wear since all the wear usually takes place on the vertical axes as a result of side loading from the rocker arm. Worn valve guides have an egg shaped inside diameter, the unworn horizontal inside diameter of the guide will not allow the No Go side of the plug gage to be inserted despite having wear on the vertical axes. This whole conversation left me with a head ach, and the feeling that they do not want anyone to do 388B prior to the cylinders, and engine being outside of the Lycoming warranty period. None of our customers has had an operational problem with their engines, they run great, make good power, have good compression, and do not burn oil. Our customers do flunk 338 quite often though. The way I look at it its better to flunk 388B, and have the overhaul shop or Lycoming pay for it then too fly it outside of the warranty period, and get stuck with a repair bill or end up in the trees.

Bottom line, comply with 388B for your finical well being, and flight safety, and lets see what Lycoming has to say about the flashing, and mold line misalignment.

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