

George found some metal in the oil filter and sentenced Ted's big IO-550-N to death, but Tom got the sentence commuted to time served.

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Engine Euthanasia Averted

"Ted, our records indicate that the annual inspection for your 1998 Cessna 182S Skylane comes due in December, and we need to start preparing for it now," posted Savvy's veteran account manager Tom Cooper A&P/IA in early September. "Have you decided what Service Center you want to use for this year's annual, or would you like Savvy to recommend some shops to you?"

"I'll be having my annual done at Knightly Aviation at KOMG," replied Ted. "The director of maintenance is George Knightly and I've scheduled the week between Christmas and New Years with him. George did my first annual when I purchased the plane three years ago."

"Excellent," said Tom. "Would you like me to handle all communications with Knightly Aviation on your behalf, or would you prefer to communicate with the shop yourself?"

"I think I'd like to handle the communications myself on this one," Ted said.

"Works for me," said Tom. "When have you scheduled the inspection to begin?"

"On or about December 28th," said Ted.

"Okay, I'll be back in touch then," Tom promised.

I will definitely need your help

"Good afternoon, Ted," Tom posted on December 28th. "Your annual was scheduled to start today, so I'm checking in to see if it did and to let you know that I am here if you need anything."

"Yes, the annual has begun and I will definitely need your help," said Ted. "George at Knightly Aviation just called to tell me that he has found metal in the oil filter and it is magnetic. He took some pictures (attached)."



"George suggested he stop work on the annual as he felt the engine would need to be sent out for a teardown," Ted continued. "That's above my pay grade (and my budget), so I told George that he should expect to hear directly from you."

"No problem," said Tom. "I'm happy to take over and work directly with George."

"I flew the plane about a week ago and everything seemed fine," Ted said. "I had no indication of any problems (thank goodness)."

No guidance from Continental

Tom reviewed Ted's maintenance records—Savvy keeps scanned copies online for all its SavvyMx managed maintenance clients—and noted that Ted's Skylane had been converted to use a 310 horsepower Continental IO-550-N engine. That complicated the situation a bit, because Continental provides no specific guidance about what to do when metal is found in the oil filter.

Tom had dealt with situations like this before and knew exactly what to do. He added George Knightly to Ted's ticket and reached out to him.

"George, this is Tom Cooper A&P/IA from Savvy Aviation. Ted sent me some photos you took showing what appears to be metal pieces from the oil filter, and indicated that you said they are magnetic. As you know, Continental provides no guidance about what to do in a situation like this, but Lycoming provides very specific guidance in its [Mandatory Service Bulletin 480F](#), and in our opinion Lycoming's guidance offers a reasonable decision framework even for Continental engines."

"Service Bulletin 480F is fairly complicated, but the bottom line is that Lycoming says that no action is required if fewer than 10 pieces of metal are found in the oil filter," Tom explained. "For more than 10 pieces but less than ¼ teaspoon of metal, Lycoming says to pull the prop governor and inspect the gasket screen to see if any metal got past the filter and contaminated the engine. If no metal is found in the prop governor gasket screen, the next step is to remove the top spark plugs and borescope the cylinders."

Tom followed up with a phone call to George.

"Ted, I had a great talk with George," Tom reported. "He's as old as I am (big grin). I think things should be fine."

"Thanks, Tom!" said Ted.

The next day, George posted to the ticket: "Tom, I washed the oil filter element and found some more debris, seemed to be rust and particles. I pulled the propeller governor and did not find anything in the gasket screen. I am going to remove the drain plug from the oil sump so I can use a magnet and borescope to see if there's any metal accumulated in the sump, and also try to get a look at the suction screen on the oil pickup tube. I also may pull the alternator to inspect the drive gear and coupling. I'll keep you posted."

Things get strained

"George, thanks for the update," Tom said. "Great news that the prop governor gasket screen is clean, as this means no metal got past the oil filter. However, I would ask that you NOT remove the alternator unless we see good reason to believe that it's the source of the metal. I suggest that we send the recovered metal to Aviation Laboratories in Houston for analysis, which will likely tell us where the metal is coming from, rather than pulling parts off the engine. What do you think?"

"Tom, I wanted to get a better look at the internals," George said. "I have seen these gears get damaged from improper installation. The alternator was replaced recently, so I thought it was worth a look. I pulled the alternator, but found nothing significant, just a little surface corrosion."

Tom was not happy that George took it upon himself to pull the alternator "on speculation" and without Ted's approval.

"I pulled the drain plugs out of the sump and put in a magnet," George continued. "Every time the magnet was pulled out, I found magnetic chunks and flakes sticking to it. This tells me that whatever is wearing is dropping pieces down into the sump and possibly being pulled up by the oil pump, which is not a good scenario. We can send the filter element along with the other metal we've recovered to the lab, but it will take a couple of weeks to get an answer. I am waiting for a call back from my engine shop."

"Bottom line," George concluded, "I would not put my family or myself in this airplane with the engine in its current condition."

Tom was now getting really unhappy with George. We really hate it when mechanics try to use scare tactics like this on our clients.

Confused

"Tom, I'm really confused," Ted posted privately so George could not see it. "We have metal in the filter and the sump, but not in the prop governor gasket screen, so we know the engine isn't contaminated. Isn't the next step to quantify the amount of metal and get it analyzed? Why is George waiting for a call from an engine shop?"

"Ted, I don't know why George pulled the alternator off," Tom replied. "At this point, I'm afraid that he is going off on a wild goose chase rather than following an established protocol for metal in the engine along the lines of Lycoming Service Bulletin 480F. I strongly recommend that you call George and INSIST that he follow the protocol we've laid out for him. You need to direct him to STOP ALL WORK until the metal has been sent to the lab and we receive a report back."

"Okay, I've communicated with George and have verified that he has ordered a chip kit from Aviation Laboratories," Ted said. "He also sent an oil sample to Blackstone Labs. He has borescoped the cylinders and said they all look fine. George told me that the rest of the annual inspection is complete, and there are no significant issues apart from the metal in the engine."

About a week later, the reports came back from AvLab and Blackstone. The AvLab report said:

"THE CHIPS SENT MOSTLY CONSIST OF CARBON/GRIT. THE LARGE METALLIC PIECES SENT CONSIST OF ALUMINUM FLAKES/CURLS MATCHING AMS #4280, RANGING IN SIZE FROM 370 x 1359 TO 752 X 448 MICRONS."

George's snarky response to this: "I sent them a big chunk of steel and they said all they found was aluminum. That is why I don't use AvLab."

"I'd trust their scanning electron microscope over George's eyeball," Tom thought to himself, but resisted the urge to say anything.

The Blackstone oil report said:

"Not much has changed since the last sample. Metals are down slightly compared to October."

Savvy team consensus

"I shared all these findings with the rest of the Savvy team," Tom posted, "and the team's consensus recommendation was to run the engine on the ground for an hour or so and cut open the oil filter. If the filter comes up clean after the ground run, then we recommend flying the aircraft for an hour or two and cut open the oil filter again. If it's still clean, fly 10 hours and re-inspect the oil filter. If it's still clean, then fly your normal oil-change interval and re-inspect."

"Ted, you have to do whatever lets you sleep well at night," Tom added. "If you asked Continental Motors what to do, I'd expect them to say 'tear it down' because their main concern is covering their behind. You should consider everyone's opinion before making your decision."

"Tom, I like the approach you're recommending," Ted said. "I would think the hour on the ground would not be a problem. If the filter is clear, then I guess the next challenge will be convincing George to sign off the annual as airworthy so I could spend an hour circling the airport."

"I spoke with my engine shop yesterday," George posted. "He is of the opinion that we have one or more lifters wearing. I suggest we pull all the lifters, replace any bad ones, put the good ones back, and hope we don't have a damaged camshaft. Let me know how you would like to proceed."

"Aluminum lifters?" Tom thought to himself, but resisted the urge.

"George, thank you for your report," Tom posted. "We are reviewing it with Ted and he should be giving you direction shortly."

"Ted, after reviewing George's post, Savvy's recommendation remains to do a one-hour ground run and cut open the oil filter," said Tom. "The AvLab and Blackstone results do not warrant pulling lifters in our opinion. If a lifter is spalled, we would expect to find iron whiskers in the oil filter. The cam lobes are significantly harder than the lifter faces. Again, I would urge you to do what gives you the most confidence in your engine. Let me know how you would like to move forward."

"Thanks, Tom," said Ted. "Any chance we could do a three-way phone call with George to discuss this?"

"Certainly," said Tom.

"I'll phone you at 3:30 pm and we can try to get George on the line," said Ted.

"Roger that," said Tom.

The three-way call took place. George agreed to the one-hour ground run.

Some good news

"Tom, I just heard from George," Ted posted. "He did the one-hour ground run, and there's no metal in the filter! I'm hoping to do an hour in the air over the airport on Saturday and have him check the filter again on Monday. If that goes as planned, we'll know more early next week."

"Excellent news," said Tom. "Fingers crossed for Saturday."

A few days later...

"I took the plane up on Saturday and circled the airport for an hour," Ted posted. "Everything seemed normal, engine was strong, nothing unusual with CHT/EGT temps, etc. Next step is for George to cut the filter and inspect. I'm attaching the invoice for the annual, which I've paid."

"I've reviewed the shop's invoice," said Tom, "and it looks to be fair for the work performed. Hopefully, the filter will reveal nothing."

A few more days pass...

"Hey Tom, good news," Ted posted. "The filter was clear after my hour over the field. I'm assuming the next step is 10 hours of normal flying and then another oil change/filter inspection?"

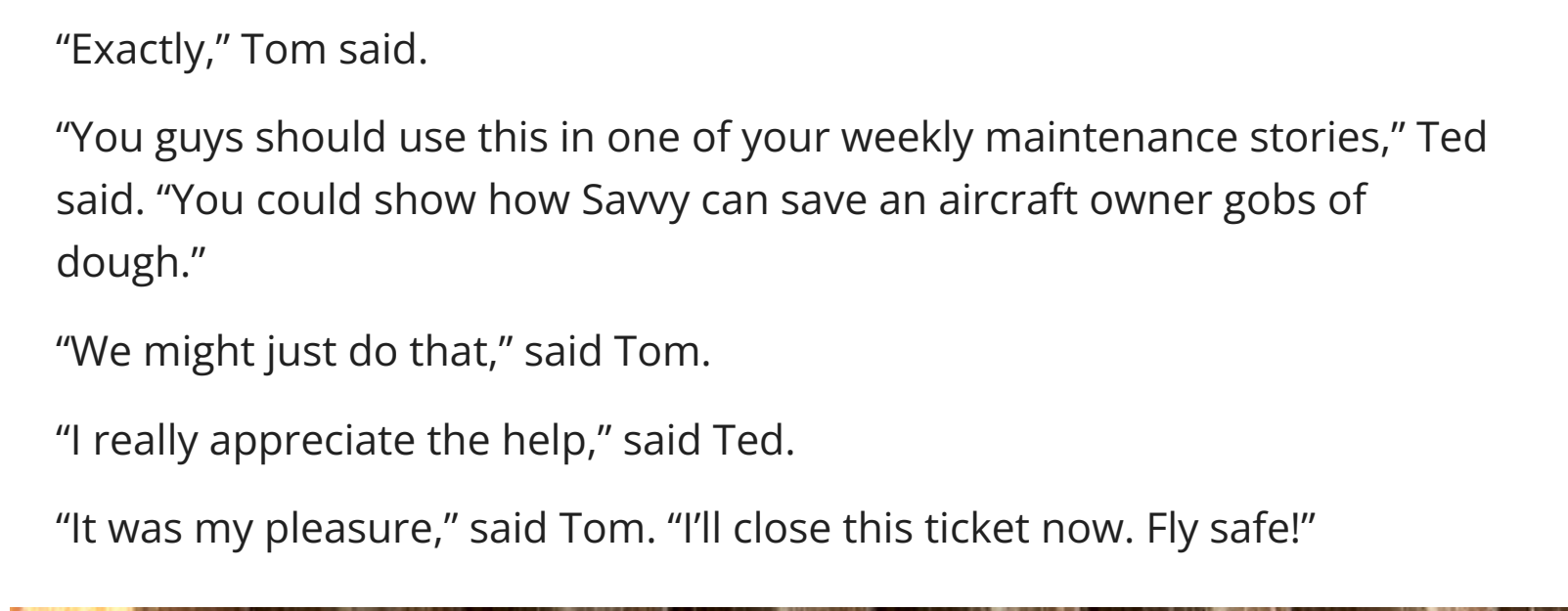
"Exactly," Tom said.

"You guys should use this in one of your weekly maintenance stories," Ted said. "You could show how Savvy can save an aircraft owner gobs of dough."

"We might just do that," said Tom.

"I really appreciate the help," said Ted.

"It was my pleasure," said Tom. "I'll close this ticket now. Fly safe!"



Epilogue

"Tom, I wanted to let you know that the 10 hour review of the oil filter came up negative for any metal," Ted posted, reopening the closed ticket. "I'll now extend the next check to 25 hours, but this is just fantastic news. Thank you so much. Without Savvy's help, I would have just spent a whole bunch of money unnecessarily."

"I'm delighted," said Tom. "Thanks so much for letting me know."



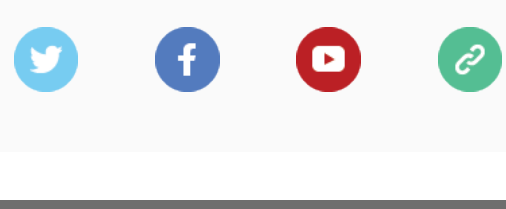
We just **hate to see engines euthanized unnecessarily**. It's amazing how often we encounter A&Ps who are spring-loaded to the teardown position the moment they see a few metal flakes in the oil filter. When this happens to one of our SavvyMx clients, we try our level best to convince the mechanic to adopt a more measured and thoughtful approach. As Ted's case illustrates, we usually succeed (although sometimes it takes a bit of a struggle).

We wound up **saving Ted around \$40,000 on this annual**, and he wanted us to tell you about it. So we did. We changed the names to protect the innocent (and the not-so-innocent) but the rest is verbatim how it went down.

Ted's annual subscription to SavvyMx managed maintenance cost him \$750 per year. Do you suppose he got his money's worth?

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