SAFETY SPOT

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Winter Blues

First, the almost obligatory error correction! In the December *Safety Spot* I discussed two stroke fuel systems, "pay attention at the back"; Eagle eyed Rotax expert Nigel Beale pointed out that the smallest orifice in the system is not the main jet, but the idle jet, which, he assures me is "much smaller than a main jet". If you think about it, this jet getting blocked could be even more disastrous … There you are just turning final … Throttle to idle, engine stops … Think quickly. You get the point I'm sure, thanks Nigel.

For those of us who spend hours studying the weather, examining charts of isobars, temperature gradients, dew points, tephigram's (what!) and solar angles, it will come as no surprise at all that winter is upon us. Less nautical types will have known this for ages as they use other signs, for example, coloured lights over people's houses, e-mail's with strange comments like "season's greetings" and people, who really should know better, dressing up in red costumes and pretending to have long white beards; I was never fooled.

As I write, there is a deepening low pressure in the Atlantic Ocean and a strong South Westerly, looks as if it is working itself up for a gale. Last week's frosts have given way to balmy spring like temperatures; one of the two resident swans that live on the LAA HQ lake has just done a brilliant 180 degree turn and landed, perfectly of course. I'm watching him paddle into the lee of the building to weather the approaching storm; it may be a few days before he spreads his wings as the forecast is appalling. The weather, as I read the B.B.C. forecast is set to be unseasonably warm, but very windy with, no doubt, plenty of rain.

As aviators we are well used to the changing weather, as somebody once said about the U.K.'s weather, "if you don't like the weather today, don't worry, it'll be different tomorrow". Remember, during these short winter days, with little or no flying, that your aircraft still needs a bit of love and attention. Winter brings wide swings in temperature and relative humidity; cold surfaces collect water which can cause corrosion in areas you didn't know existed, or can pool over a wooden seam or joint causing separation or delamination of plywood components. Make sure, for example, that if your aircraft is going to sit in a cold hanger over the January bleakness that the fuel tanks are full; half empty tanks collect water at an alarming rate, with obvious consequences.

There was a recent example of water collecting actually inside a hollow fibreglass propeller blade, it wasn't much, but the centrifugal forces acting on the water split the propeller tip open like a banana. Most composite blades have a plug to stop water creeping in, this blade didn't and it caused the owner a few anxious moments and quite a lot of money. More propeller problems later in the article.

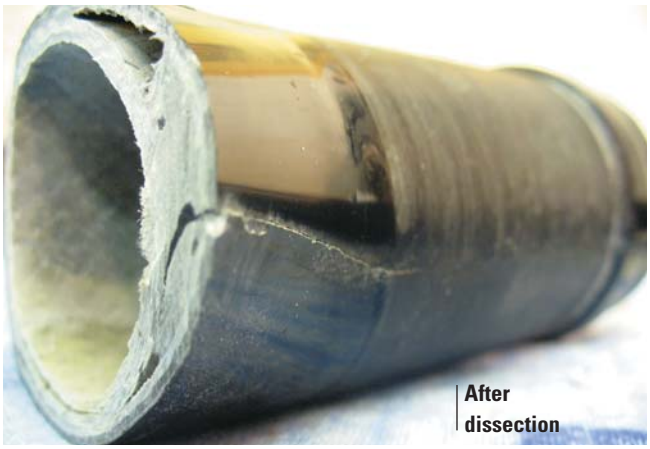
If you run a two-stroke engine and your aircraft is sitting doing nothing for ages, give the fuel tank a shake before you next fly; at low temperatures some of the lubricating oil can separate from the petrol, which is not good. Purge the fuel lines and make sure that you give the engine a really good ground run before committing to the sky. I like to run the various engines in my care regularly, this not only burns off any condensation but forces all the components to work; electrons are forced through the wires, drive belts are given a good stretch, oil is forced through the bearings and, especially if you are lucky enough to fly an open cockpit aircraft, the wind is forced through the hair …. What a tonic!

Woodcomp Klassic blade – Seam cracking

Woodcomp Propellers

Back in October we received a report from the owner of a Zenair Zodiac about what looked like cracks in the surface finish in a couple of his propeller blades. Most of the Zenair Zodiac fleet use the Woodcomp Klassic three blade composite propeller, as do a few of the Aerotechnik EV-97 Eurostars. The propeller blades are clamped into an aluminium hub and are ground adjustable.

The owner spoke to the manufacturers who advised him that the cracks were only in the surface and therefore nothing to worry about but, sensibly, he sent us some pictures of the cracks to confirm this. Aeronautical Engineers get good at spotting cracks and learn early in their apprenticeship that they are always something to worry about. After much discussion the cracked blades were sent to us and, with great credit to the Woodcomp management team, the suspect blades were replaced free of charge.



After dissection

In August 2005, a PFA Airworthiness Information leaflet was published grounding all aircraft using Woodcomp Klassic propellers with serial numbers below 600 due to chord-wise cracking on the face of the blade. The blade design was improved and the grounded aircraft were cleared for flight after the blades were replaced with blades of the improved design. The PFA's view at the time was that any cracking in the surface gelcoat of a composite structure is, or at least probably is, the first sign of an impending failure and cannot be ignored. I must say that I wholeheartedly agree with this view.

What is it that they say about busses, "they always run in pairs" well guess what? OK, no prizes this time as I am sure you all guessed right, we got another case of propeller cracking and, this time the local inspector, Raymond Proost, didn't hesitate in grounding the aircraft, another Zenair Zodiac, another Woodcomp Klassic, this time though a completely different failure mode.

Initially, the failure in this propeller appeared to be limited to a separation at the trailing edge between the top and bottom surfaces (I suppose front and back would be more accurate, but I am sure you get the picture). This separation extended for about 6" to 7", starting about 12" from the root end. There was no bonding material left in this joint, which pre-supposes that the resin based adhesive was thrown out buy the rotational forces in the propeller after the joint had failed; this particular propeller had done a little under 300 flying hours.

Closer inspection of this blade revealed however, a far more sinister problem; we found quite severe cracking at the root end of two of the three blades. These cracks were between the two halves (top and bottom) of the blade, and seemed to emanate from inside the hub. This cracking extended for about an inch up the blade. As you can see from the photograph of the dissected root end, the cracks extend right through to the tubular composite spar.

Components on aircraft are a bit like children, if you're not actually there you can't be sure what they're up to! The group that fly this aircraft assured Raymond that there had never been a propeller strike and that the propeller had not been mistreated in any way. For example, the aircraft had never been pulled out of a bog by a tractor using a rope tied to one of the propeller blades; daft as it might seem I have actually seen this happen.

The Engineering Department will be writing to the owners of aircraft using this propeller shortly but, in the meantime, if you are using a Woodcomp Klassic propeller on your aircraft, carefully check the blades for signs of cracks before you next fly. Note the picture showing the chord-wise cracking and pay scrupulous attention to the area around the hub; if you find anything unusual contact me as soon as possible please ….. An in flight blade failure would definitely spoil your day. Conrad Beale, the UK Woodcomp agent, and I have spent some time dissecting blades to establish the extent of the stress fractures. The design department is checking whether the actual propeller build meets the design approval basis and we want to get the failed blade looked at by a composite expert so, no doubt, more to follow.

WE'RE OFF!

I am writing this article just before the Christmas hols and, yes, I'm really looking forward to the festivities; right now I work for the Popular Flying Association. By the time you read this Christmas will be just a memory (God willing, a happy one) as will be my job with the PFA! I shall be working for the Light Aircraft Association. I would like to take the opportunity of wishing all of you a happy, interesting and rewarding new year; thanks to all of you who have written in with suggestions and stories, keep them coming. For those regular readers who were looking forward to the Carboxyhaemoglobin feature, sorry, the props got in the way and I've had to re-schedule.

Make this year a good one; if you are thinking about learning to fly, do it; if you are thinking about building an aeroplane, gyroplane, powered parachute, microlight, glider, seaplane, hang-glider or any other device that will get your backside into the air, just do it. If you are at the other end of an interesting aviation career then spend a bit of time with a pen and paper, you know you want to.

Fair Winds ■

Chord-wise cracking – difficult to see but not to be ignored.