

Propeller care: Preventive maintenance

By Jeff Simon

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In the last article, we reviewed good practices for propeller care and built up a little more respect for the importance of keeping your prop in top shape. In this instalment, we'll talk more about preventive propeller maintenance and how to make minor repairs.

Preventive maintenance begins with regular, careful inspections of the propeller. Even small areas of damage such as nicks and rock dings can represent stress points that can lead to cracks or corrosion. It pays to be vigilant and attend to small areas of damage before they become big ones.

Making minor repairs to propeller blades is not a particularly challenging task, but technique is important, and it's not something that owners can do themselves. FAA Advisory Circular 43.13-1B is an excellent reference for understanding blade repairs.

Patience and careful planning are key. It's fairly easy to remove aluminum from a propeller blade and impossible to put it back. This is especially important when you realize that every propeller blade has dimensional limits that restrict the amount of metal that can be removed during repairs before the propeller becomes unairworthy.

So, proceed with caution and follow these basic steps:

1. Using a hand file, carefully remove the damaged material until you reach the bottom of the nick, ding, etc. None of the original damage surface should be left, but the minimum material should be removed to accomplish this.
2. Dress out the repaired area, making a smooth transition into the surrounding material. The general rule is to dress out the repair to an area 10 times the depth of the damage. For example, if you have to file down one-eighth of an inch to get to the bottom a nick on the leading edge, you must dress out the repair five-eighths of an inch on either side of the center of the repair for a total repair span of 1.25 of an inch. Try to maintain the original airfoil shape, blending the repair into the surrounding area.
3. Remove file marks with emery cloth until the surface is smooth. Then inspect the area carefully, using dye penetrant to reveal remaining marks or cracks.
4. Treat the repaired area with Alodine and paint to protect against future corrosion.
5. Use emery cloth to smooth leading edges as necessary and apply a thin coat of oil to help resist corrosion.

Blades can be maintained in the field, but maintenance on constant-speed propeller hubs is far more complex. Lubrication or charging with nitrogen (on certain hubs) are the only field-serviceable tasks on most constant-speed hubs. Lubrication of the propeller hub is very important because it keeps the mechanism operating smoothly and changing the grease will help eliminate contaminants that can cause corrosion. However, it must be done according to the

manufacturer's exact instructions and only with the specified grease. Anything beyond these tasks should only be performed by a propeller maintenance facility.

Regular oil changes are also very important in aircraft with constant-speed props. Since engine oil provides the power source for controlling propeller pitch, ensuring that the oil is clean will reduce the chance that the propeller and governor will have problems caused by sludge or water contamination. Also, be sure to leave constant-speed propellers in a horizontal or, in the case of three blades, in a "Y" position to minimize any water collection on the hub.

Wooden propellers are truly works of art and should be treated as such. They should be inspected regularly for damage and delamination. Pay particular attention to the metal tips, looking for loose screws, rivets, or solder. The varnish coating serves a critical role in protecting the propeller from moisture damage and should be carefully maintained. If the propeller is removed for any reason, the bolt holes and hub bore should be inspected for elongation and damage. Then, the holes should be treated with a moisture preventive such as asphalt varnish.

The compressible nature of wood requires that the torque on the propeller bolts be checked regularly. If moisture enters the wood, it can swell and then become loose after drying out. Typically, propeller torque should be checked 25 hours after installation and every 50 hours thereafter.

Finally, regardless of the type of propeller that you have, perform a propeller tracking check. This is a fairly simple procedure that any owner can do. Ensure that the mags are off, then remove one spark plug from each cylinder so that the propeller can be easily rotated. Next, rotate one of the blades so that it is pointing down and place a wooden block under the blade tip, marking the exact spot that the tip passes over on the block. Finally, rotate the propeller, checking the other blades to ensure that they track within one-sixteenth of an inch of the mark. Any variation beyond one-sixteenth of an inch is cause for concern. It may be caused by a bent blade and should be inspected and repaired by a propeller maintenance facility.



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