

Propellers

a red arc on the tachometer. Operation is not permissible in the red arc except to pass through it, which is why it is important to have the tachometer checked for accuracy every 100 hours.

Thrust, aerodynamic twisting, torque, and centrifugal force (as much as 20 tons) are operational forces that act upon the propeller. With so much working against the propeller, there are amazingly few failures. Generally, prop failures are caused by fatigue cracks resulting from nicks and other scars left unattended. Therefore, because of the potential for problems more so than the likelihood, manufacturer-prescribed routine maintenance should be carefully adhered to. This is especially true for manufacturer-recommended overhaul of the constant speed prop. Typically based on hours in service and calendar time, it includes complete disassembly, inspection, reconditioning, and replacement of parts as necessary, and reassembly.

Despite years of faithful service and their aesthetic value, the wooden prop does have a wide range of potential problems. In particular, delamination (separation of laminations) is cause for hanging it in the den; repair is possible if only the outer lamination has begun to separate. Dents and other scars indicate real trouble in wood because they indicate cracks, and cracks lead to failure. If caught in time, small ones may be repaired with an inlay. Other minor defects may be curable with filler; small cracks, parallel with the grain, may be stopped with resin glue. Tip fabric should always lay neatly and metal tipping should be smooth and in good repair, or a repair station should be consulted as these problems tend to worsen rapidly. Cracks in the solder joints near the metal tipping may indicate wood deterioration beneath and always merit a thorough inspection by a mechanic. Some defects are beyond repair. They include a crack or cut across the grain, elongated bolt holes, warped blades, nicks or chips with significant wood missing, oversized crankshaft bore, a split blade, and cracks between the bolt-attach holes.

Aluminum alloy propellers have many advantages over their wooden equivalents. They are thinner with equal or greater strength and often weigh less if they are of the one-piece construction type. Leading and trailing edge defects may be dressed out by a power-plant mechanic, provided the finished size is less than 1/8th inch deep and 1.5 inches long and the repair has smooth and gradual curves. A slightly bent blade can be repaired, but there are precious few degrees of freedom.

Corrosion

The snake-in-the-grass for aluminum is corrosion; owners should do all they can to ensure against its insidious effects. Corrosion forms tiny, deep cavities that may extend inward, tunneling under the surface of the propeller and reappearing elsewhere—chemical wormholes eating your airplane. Props with de-ice boots and leading edge abrasion boots should be carefully checked for corrosion during 100-hour inspections because the damage may be hidden. Corrosion is especially a problem for aircraft routinely operating in high moisture or saltwater areas, and these aircraft should receive more care. Never attempt to remove corrosion with steel wool, emery cloth, steel (except stainless steel), wire brushes, or severe abrasive materials. Particles of steel wool or emery cloth will become embedded in the aluminum and lead to an even greater corrosion problem.