

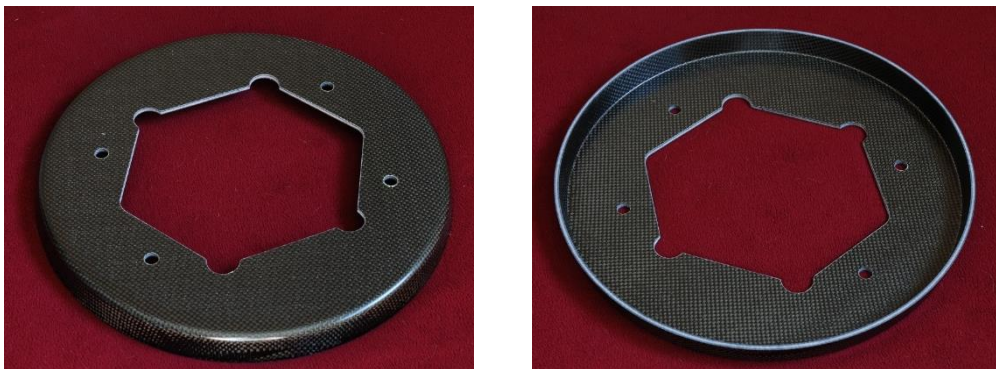
Spinner Back Plate Cracking

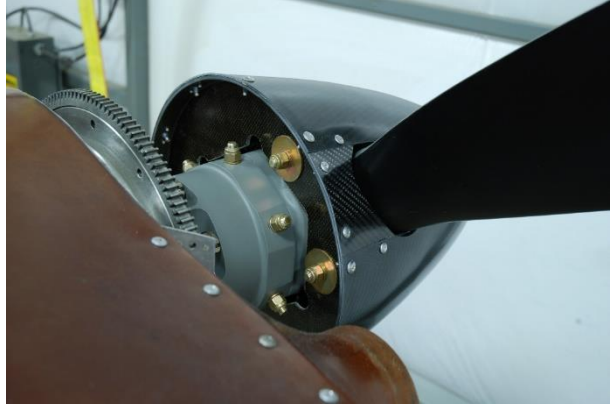
Aluminum spinner back-plates provide no end of frustration for aircraft owners. The Lancair 320/360 seems to be particularly vulnerable. My original aluminum back-plate lasted about 150 hours before I spotted cracks emanating from the mounting holes. This was back in about 1998. I switched to a prototype carbon back-plate and have been flying trouble free ever since. Composite materials are a natural choice for applications subject to high cyclical loading and vibration. The very nature of composites makes it naturally resistant to cracking.

The following photos show a back plate recently removed from a Lancair 320. Some cracks had progressed to the point of complete fracture. The pieces were fortunately still retained by bolt compression.



I used the opportunity to fabricate a batch of carbon spinner back plates. The back-plates were cured under high temperature and pressure. The high pressure (150 psi) produces an excellent fiber to resin ratio. The back plate is pressed between male and female molds which produces a mirror flat surface on both sides. The use of a high temperature epoxy (350 degF cure) produces an enormously stable part, even at elevated temperatures. Spinner back plates have brief exposure to hot air. After engine shut down the back plate is exposed to hot air from the engine compartment until the engine cools. This temperature exposure is not that severe, but since the back plate is used in a bolted connection, on four bolts that also hold the propeller hub together, samples from each part (the center cut-out) were tested for creep. This is done by heat soaking a bolted connection at 230 degF. After cooling, the joint is checked for loss of torque. 230 deg F is well below the Tg (glass transition temperature) of the epoxy and it showed no signs of creep or loss of torque during testing.





Carbon Spinners: I recently saw the beautiful spinners used on the Carbon Cub. They have that aesthetically pleasing Satin (284) fabric appearance. I had been making carbon/glass spinners with a white gel coat finish. I decided to make another spinner replacing the gel coat with 284 carbon along the same lines as the Carbon Cub. The weave pattern creates some very interesting visual effects.

