Fin Root Bonding Procedure

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1 Abstract

We describe how to perform the root bonding of composite fins onto a 6.1" OD G10 fuselage, using the provided alignment jig.

2 Materials

- G10 Mission Package Tube (Fuselage)
- 4 CF-layup fins
- Alignment Jig
- Epoxy/Hardener mixture, in correct ratios
- Popsicle sticks or other epoxy application tool
- Level
- 4 Clamps, ideally 8 (see step 18)
- Large vice (Rkt Team Lab)

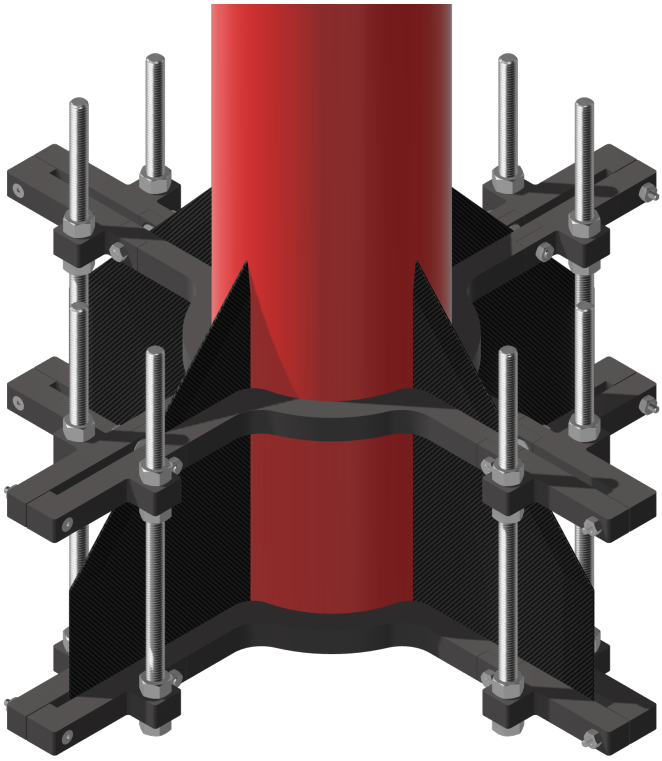

Figure 1. Fin Alignment Jig Setup.

3 Procedure

1. Begin by obtaining all materials.
2. Prepare the epoxy-hardener mix, and let it sit for 30-45 minutes in order to decrease the viscosity. Be sure to mix it periodically within that interval.
3. Label the branches of the jig as A, B, C, D, clockwise.
4. Insert the G10 into the center of the jig, aligning the bottom of the G10 with the bottom of the 3D printed pieces (not the bottom of the bolts).
5. Tighten the far screws on A and D to the maximum.
6. Loosen the far screws on B and C slightly, so that a fin can be smoothly inserted.
7. Open the vice enough so that branch A of the jig can fit in the vice, with the vice axis parallel to the G10 axis.
8. Ensure that the bolts holding the axles have a flat side when resting on the vice holder. Tighten the interior bolts as needed to maintain grip on the 3D printed pieces.
9. Tighten the vice until resistance is encountered, then one half turn more.
10. Use a level to verify that the two axles closest to the vice (those of branch A) are parallel to the ground. Calibrate your level to this.
11. Prepare the root chord of the fin that will enter in branch B with the epoxy/hardener mix
12. When ready, insert it into the branch B.
13. Then, tighten the screws on branch B until resistance is encountered.
14. Then, push the fin up to the G10, ensuring that the trailing edge is flush with the end of the 3D printed pieces, and the root chord is flush with the G10.
15. Tighten the screws on branch B fully, and use two of the clamps to eliminate space between the jig and the fin near the root chord (between the axle and the G10).
16. Repeat steps 11 through 15 for branch D and another fin.
17. Let the epoxy harden.
18. Confirm with the level that the fins in branches B and D are level according to the calibration.
19. Repeat the steps 11 through 18, but this time with branch B in the vice, using first branch A and then C, and removing the clamps only if 4 clamps total could be found (but not loosening the screws).
20. Once all fin bonding has hardened, remove the jig from the vice, remove all clamps, unscrew the external screws of each branch completely, and decompose the jig, leaving a root-bonded fin can.
21. Place this fin can in the vice (gently) and use a level to confirm that the angles are correct.
22. Et voilà !