Bridge #:
9FNST32RVWJ

Air-Be-In-Beam

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Cat. B

PROBLEM STATEMENT

Design a new version of the Carbon Fiber Square Beam Design to hold 7,200 lbf.

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- UW SAMPE Officers & Members

Initial Design Decisions

Our carbon box has utilized a dedicated sock material in the past. This is no longer an option, so we have switched to using rolled and layered dry plies in place of a sock. This year we made some modifications to how we designed this sock, by adding a seam and adjusting production. As we used this material, it created problems with application to plate without deformation.

We also changed our process for wetting noodles. We did this by applying resin in advance as well as by using a wedge to stick the noodles farther in.

Figure 1: carbon box substitute sock being rolled on carefully.

MANUFACTURING

Prep: A 2” x 3” x 30” steel tool was sanded (up to P400), cleaned with acetone and isopropyl, then coated with three layers of 710-NC Aero Mold Release. 4 other tools were sanded and wrapped in release film.

Fibre: HexForce® 43193 plain weave

Resin: Pro-Set LAM-125

Cure: Autoclave 89 PSI, 100F Overnight (12 hrs)

Beam Extraction: A mechanical extraction device was required to remove the part from its tool.

Figure 2: carbon box plies being debulked under vacuum before going on the tool.

Figure 3: carbon box substitute sock being saturated with resin before application.

Design Changes

The challenge this year was saturating the all the fibers. A couple of our practice beams ended up coming out to dry because of this. We messed with seam placement and seam overlap but noticed no effed. Our final design was also adjusted to reduce the voids and dry spots present in prior iterations.

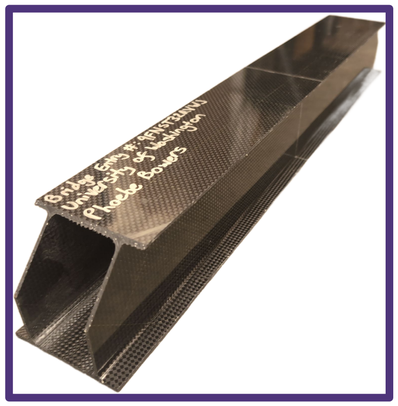

Figure 4: final carbon box beam for 2026.

Figure 5: dry spots on first attempted beam this year are circled in red.

Figure 6: delamination in first beam of the year is circled in red.

Future Changes

Voids and Dry spots: A more formalized method of saturating plies would help prevent voids.
Improved Cohesion: methodology to improve ply cohesion and prevent delamination

Figure 7: carbon box ply having resin applied.