

# Study on surface treatment for the Strength of bonded joints between CFRP Components

---

## Popular Science Summary

Bonded joints, or connecting part with structural adhesive, are one of the most common attachment methods used for carbon fiber reinforced polymers (CFRP). This is commonly used in aviation, where carbon fiber and composites are popular material choices due to its characteristic high strength and low weight. Bonded joint is, for these applications, sought after since the load doesn't have to be distributed over a few local, often reinforced attachment points. Instead, they are better at distributing load over a larger surface compared to bolts or rivets.

For bonded joints to handle their intended load, it is of highest essence that proper bonding methods are performed. This includes correct surface preparation in terms of sanding and cleaning of the areas to be bonded. Sanding is however a time-consuming activity. Therefore, this paper, in collaboration with Blackwing Sweden AB, investigates alternative methods to remove the sanding as a part of the bonding process without losing significant strength.

The alternative surface preparations consist of treating the carbon with peel ply. A textile film used for removing extra resin, protecting the laminate from the breather and ease to remove the vacuum bag post curing of the carbon fiber. To test this out, samples bonded in the traditional way (by sanding) are used as a baseline (BL) and compared against samples bonded with two different types of peel ply based on their respective bond-strength in peeling and shear. The two-peel plies used are one pre-impregnated with resin to be used between the mold and carbon fiber i.e. the A side (A). And another one to be used between carbon fiber and bag. i.e. the B side (B). In addition. The three surface preparation methods are also tested on three different types of layups to test how the bond strength is affected by three different fibers (T600), (T285) and (Tx) as outer skin. All different fibers are used in production at Blackwing Sweden AB.

All iterations of surface preparation and layup are tested in the pure shear scenario. While for the peeling scenario, only the layup consisting of the T285 are tested for all three surface preparations. Results from the pure shear scenario indicated that both types of peel-ply (A and B) perform equal, or better, compared to the baseline (BL) bonding method. For the peeling scenario however, the result points toward the (A and B) method performing equal or worse compared to the (BL). The sample size, consisting of only the (T285) samples, is regarded as too small to give any final decisions if the (BL) method is safe for Blackwing to substitute for (A or B). Therefore, further testing needs to take place to make the transition.