



POWERFIN Propellers  
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*Propeller & Light Sport Aviation Manufacturing*

## Repairing Propeller Leading Edge Damage Document #20100601

The following is Powerfin's recommendation, qualifications and certification procedures for repairing light Leading Edge dents (slight damage) that cannot be beyond a **0.13** of an inch deep (roughly 1/8") in our carbon-fiber composite blades, models: "B", "C", "E" & "F".

**Read through all of the instructions first, before starting. And then please follow these instructions carefully. If you have any questions, please do not hesitate to contact the factory for a clarification of these procedures.**

*Failure to understand and apply this information could put you at risk of bodily injury and death*

### 1) Note your current pitch setting

Ideally – our Digital Blade protractor should be used to measure your current blade's tip pitch position. However, if using the Speed set Apex hub's window – you can also note the value of the feeler gauges between the dowel pin and the hub window to acquire a history value.

If using the Digital Propeller Protractor, then set the relative "ZERO point" of your digital protractor – your "Starting point" – as follows...

- Once your craft is positioned so that you can easily access the flat side of your prop blade tips, SECURE the application
- Turn the Protractor "ON"
- Place the side of the DIGITAL Protractor – the same side that you will be placing against the blade's flat surface - against your prop's mounting hub to 'zero-out' the angle of the mounting hub, and hence compensate for the sitting position of your craft.
- Press the "ZERO" button – the digital readout will then change to "0.00".  
*(This compensates for any angled-position of your secured application.)*
- Now, with the Digital Protractor secured and aligned flush at the tip of the blade, note the digital display pitch value (this should be in degrees of pitch, showing the blade's Angle Of Attack.



### 2) Prepare your Hub and Blades

Remove the blade. Remove any leading edge tape and **THOROUGHLY CLEAN** the area to be repaired.

*(For detailed direction on removing/installing the blades to the hub, please refer to our Propeller Assembly Instructions – on our website: <http://www.powerfin.com/instructions.html>)*

### 3) Test the damaged area for solidity

Using a coin (like the American quarter) or something similar, tap the area around the leading edge dent. You should hear a consistent 'sharp' solid sound. If you hear a 'dull', thud type of sound, then the area has suffered delaminating between the layers of carbon-fiber, etc, and hence this blade is NOT repairable.

*Use an un-damaged blade for reference to the sound quality/type.*

#### **4) Prepare the Dented area**

Once you have thoroughly cleaned the area, and determined that the damage did NOT delaminate the internal layers of carbon-fiber composites, then you can begin the repair.

First, you might want to consider placing a piece of Masking Tape on both sides of the blade, just below the dented area. This will tend to protect the faces of the blade from the glue – which is next to be added. Now secure the blade in an upright position (a padded vice will do) – in a well ventilated area.

#### **5) Fill the Dent: Adding Baking Soda and Super Glue**

Now you are ready to begin the repair. Here you will need Baking Soda and Super Glue.

First take a ‘pinch’ of Baking Soda and push it into the damaged area. Then add drops of Super Glue to cover the ‘pinch’ of Baking Soda in the dent. This combination should almost immediately harden.

Clean any excess of Baking Soda & Super Glue that fell outside of the damaged area; or onto the faces of the blade.

Sand/file the layer of repair to match the blades shape in the surrounding area.

#### **6) Continue to add healing layers: A ‘pinch’ of Baking Soda, followed by a layer of Super Glue.**

Repeat Step #5 until you have layered the dent back up to the un-damaged surrounding area leading edge of the blade.

Sand/file the layer of repair to match the blades shape.

#### **7) Cosmetics**

Once the leading edge is shaped and then cleaned; remove any Masking tape, clean and cover the repair with a Black ‘permanent’ marker to blend the repair ingredients with the color of the blade.

#### **8) Test the repaired area for solidity**

Once the ingredients have completely hardened, test the repair using a quarter or similar object; tap the area around the repair. You should hear a consistent ‘sharp’ solid sound. If you hear a ‘dull’, thud type of sound, then the area has NOT been successfully repaired. **And if the solidity test fails, the blade must be destroyed!**

*Use an un-damaged blade for reference to the sound quality/type.*

#### **9) Replace the Leading Edge Tape**

If the repair ‘passes’ the solidity sound test, then replace the leading edge tape with the same size tape that was removed earlier. *(The default size from the Powerfin factory is the 3M polyurethane 12” leading edge tape. This Leading Edge Tape can be purchased from Powerfin, or a Stocking Dealer of Powerfin blades.)*

#### **10) Balance your propeller configuration**

Place all of your blades back into the hub, and then using a Propeller Balancer, verify that you have maintained a balanced weight throughout all of your blades. As an example, Rotax requires that all the blades be within 1-gram of each other. Your prop configuration must be balanced – within specifications – of your engine/propeller mounting plate limits before the propeller configuration can be re-mounted to the mounting plate and the engine started.

#### **11) Verify the Pitch of each Blade**

Pitch adjust and verify that you have maintained the pitch of all of your blades. If all of the blades are consistent (within 0.2 of a degree) to your desired pitch then continue to the next Step to secure your blades; IF NOT, repeat this Step.

*(For detailed direction on pitching/installing the blades, please refer to our Powerfin Propeller Assembly Instructions – these can be found on our website:*

<http://www.powerfin.com/instructions.html>

## 12) Secure your blades in the hub

Using the recommended torque PATTERN for your engine/gear box mounting plate, torque your hub bolts to **175**-inch pounds on the Powerfin hub center bolts (the 6-center mounting bolts) and torque the blade bolts - the two bolts around each blade's root to the specification for your Propeller configuration.

*(For our "B", "C", and "F" model propellers, the torque setting to be used to secure the two 40-mm x 8-mm socket head bolts around each blade's root is **175**-in/lb.*

*For our "E" model propellers, the torque setting to be used to secure the two 30-mm x 6-mm socket head bolts around each blade's root is **125**-in/lb.)*

## 13) Test the repaired area for solidity during an engine run-up

After you completed your application's Preflight check and your engine warm-up, run your blades for at least 5-mins at full-RPM in a secured, safe area!

And then - after turning off the engine (*and yes I know that this should be common sense – but with today's law-suits, we may actually need to say that*) ...again test the repair using a quarter or something similar, tap the area around the repair. You should hear a consistent 'sharp' solid sound. If you hear a 'dull', thud type of sound, then the area has NOT been successfully repaired. **And if the solidity test fails, the blade must be destroyed!**

*Use an un-damaged blade for reference to the sound quality/type.*

## 14) Place the aircraft into Phase-I Testing, and then again, Test...

After you completed 1-hour, and again at 5-hours of Phase-I testing...

Again test the repair using a quarter or something similar, tap the area around the repair. You should hear a consistent 'sharp' solid sound. If you hear a 'dull', thud type of sound, then the area has NOT been successfully repaired. **And if the solidity test fails, the blade must be destroyed!**

*Use an un-damaged blade for reference to the sound quality/type.*

## 15) Ready for Flight - If all tests passed...

If **ALL** of the above Tests consistently passed the solidity test, and your repair still looks happy & healthy, then you are ready to resume normal flight operations.

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*Incorporating handcrafted integrity with carbon-fiber composite blade technologies!*

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