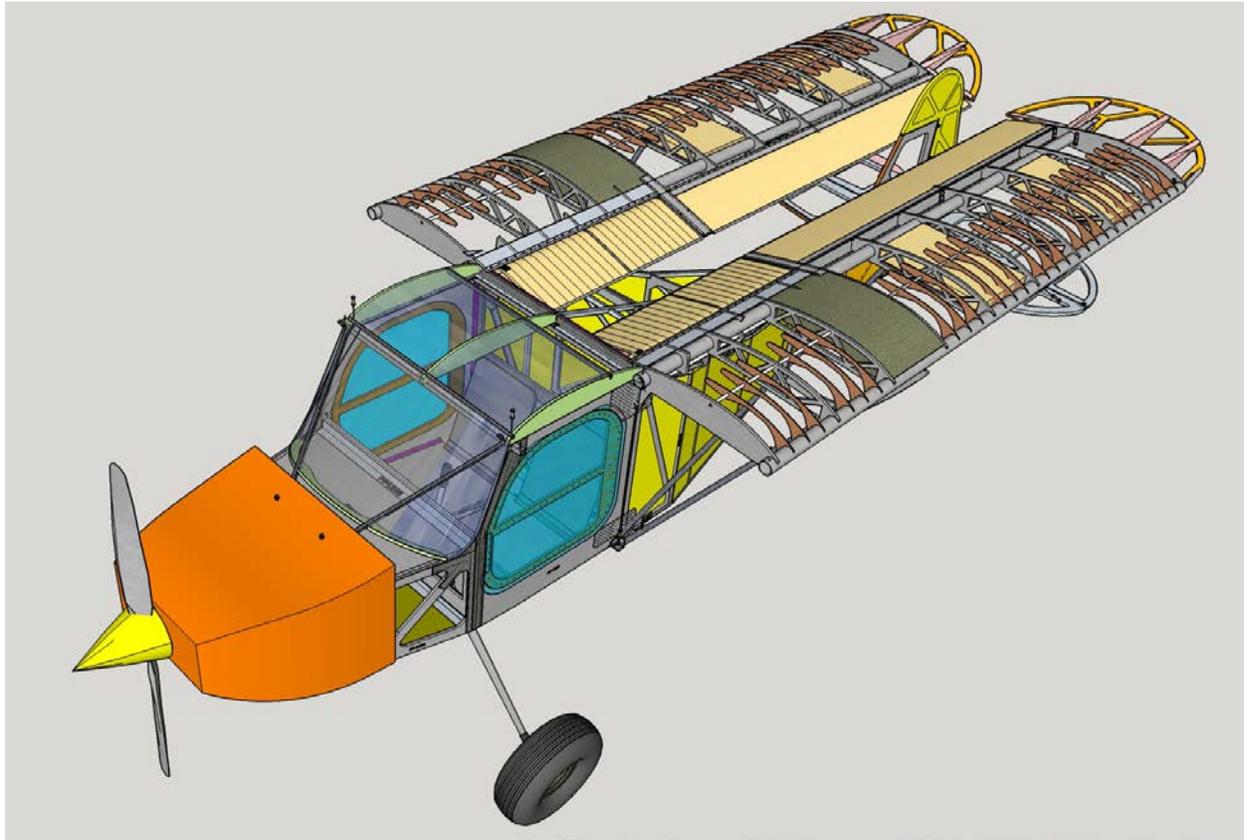


Belite Chipper

Folding Wing FAQs by James Wiebe

All information subject to change without notice

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1: Chipper with folded wings

- 1) Q: Why have folding wings on an airplane? A: The usual reason is because it provides an ability to store the airplane without paying hangar rent. Folding wings often allow an airplane to share a hangar with another aircraft. They also allow the aircraft to be stored in an ordinary garage. They also (in some circumstances) allow trailering of the aircraft.
- 2) Q: What are the dimensions of Chipper, when the wings are folded? A: 22' long by 101" wide by 70" tall (taildragger configuration.) A tricycle gear nosedragger would have similar dimensions except that the tail must be brought down after the wings are folded, in order to reduce the height of the rudder.
- 3) Q: What are the modifications required to make the wings fold? A: The two lift struts currently used on Chipper are combined into one, so that the pivot point can rotate towards the rear around a single bolt. This requires us to use a machined fitting and a really big bolt. The wing flap must be modestly reduced in size, in order to eliminate interference with the turtledeck

area as it folds. One of the flap hinge points must be moved, also to avoid interference with the cabin / rear fuselage mate area as the wing folds back. The turtledeck area requires a slot to be introduced into each side. This is easily done by a change in the honeycomb aluminum machining. A turtledeck topper must be fabricated; it is placed back after the wings are unfolded. The fuel tanks are in the wing; it is handy to add quick release connectors in the cabin so that the fuel lines can be disconnected before folding the wings. Our prototype Chipper already has them. The aileron cables are routed through the bases of the wing; they must be long enough to allow some stretching as the wings are folded. Electrical wires (tip lights, for example) must either be set up with quick release electrical connectors or routed through the rear spar, so that the wing pivot won't cause any wires to stretch and break. The pitot tube air line must also be routed through the rear spar area or provided with a tubing disconnect if routed in the front part. Finally, the flap mechanism must be disconnected, as it connects the flaps together using a solid tube through the cabin. I'll step through all of this once more, a little later in these FAQ's.

- 4) Q: What about trailering the aircraft, after the wings are folded? A: You must install two additional braces to each wing. One connects the leading edge of the folded wing to the base of the cabin, so that torque won't crack the upper rear spar attach point; and a similar brace is attached at the rear of the aircraft, providing a firm spot for the wing folding action to stop so that it won't over-rotate and hit the rudder; it also provides support. If these are installed, it would be safe to trailer the aircraft.
- 5) Q: What about towing the aircraft, by attaching a hitch mechanism to the tailwheel? A: Not a very good idea, IMHO. Any normal road pothole will destroy your aircraft landing gear, as it would for any other plane being pulled backwards behind a vehicle. You can do it if you want, but don't be surprised if you break your airplane. I'd recommend a flatbed trailer instead.
- 6) Q: Would a Chipper with folded wings fit in an ordinary auto garage? A: Yes, as long as it can accommodate a vehicle with dimensions of 22' x 101" x 70".
- 7) Q: What is the legality of towing Chipper? A: As long as your trailer is 8' 6" or less wide, you can do it legally in almost every state. There are a couple of exceptions which others have noted in many places all over the internet. This means a flatbed trailer (open) or *possibly* a canvas side trailer (enclosed). I would never personally tow an aircraft a long distance in an open trailer, but it might be a very good solution for people who are ferrying aircraft from their home garage to a local airport. A list of state regulations for towing is here:

<http://drivinglaws.aaa.com/tag/trailer-dimensions/>

- 8) Q: Are there any safety risks in flying an aircraft with folding wings? A: Absolutely. Top of my list is failure to secure the various bolts and pins back for airworthy flight. Several years ago, I arrived at the Sebring airshow to discover that a Remos had crashed immediately after takeoff, killing at least one. Cause? Failure to attach everything correctly after unfolding the wings. I

believe they left an aileron disconnected. I do not have any structural concerns associated with the folding wings.

- 9) Q: Can you step through the folding process, step by step? A: Yes. First, assumptions: all electrical and pitot lines are routed so that they do not need to be disconnected by folding actions. A1) Ensure flap position is full up. A2) Remove turtledeck. It is a single metal lightweight structure and is held on with some quick-turn half turn screw hardware. A3) Disconnect fuel line quick disconnect fittings at upper back of cabin. A4) Disconnect Quick Pin on each flap and remove flap spar tubes; set aside. A5) Remove single quick release pin from leading edge spar on each side. A6) Rotate both wings backwards. You'll want to move to the rear of the wing first, so that it doesn't get away from you and swing backwards and down. A7) Secure front leading edge with support tube using quick connect pins. A8) Do likewise with rear rudder are support.
- 10) Q: Can wing folding be done by one person: A: Absolutely, one person can do it.
- 11) Q: Please provide a shorter list of modifications required to make this work: A1) Different lift struts, you will receive them prewelded. A2) Different honeycomb aluminum structure on upper fuselage. A3) Different flap structure – minor changes to original design. A4) Turtledeck kit. A5) Leading and trailing supports, made of steel.
- 12) Q: Is this a standard feature? A: No. It is an option, as it requires additional material, welding, CNC routing and work on our side. While many people want this option, many more do not.
- 13) Q: What is the cost of the folding wing option? A: We've priced it at \$1000.
- 14) Q: Why did you hold off so long on making this option available? A: It was more important to get the airplane flying first and demonstrate the effectiveness and viability of the design. Folding wings is a very critical and important feature, and I occasionally said I wouldn't do it (that's my stubborn, stupid side) and I also said I'd look into it after I had the plane flying. I saw another aircraft at Airventure that resolved the issue as to how to do the lower lift strut attachment without getting into expensive machining (but still requiring welding, oh well...), and I also finally listened to the market. You want it → that makes it important → so I did it. Several of you said you'd purchase a Chipper kit if I did it; so here it is!
- 15) Q: Have you already built a sample of it? A: No; but I really don't foresee any significant issues in it. I've done folding wings before in our ultralight product line. The big challenge is making it simple to make and use, one person operation, and inexpensive.