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RECOMMENDED MATERIAL AND TOOL LIST

- **Weldwod Plastic Resin Glue, 5lb tub.** This is available from Aircraft Spruce and Specialty. It is powdered, pre-catalyzed and water-activated. Do not buy the 1 lb tub (You will run out).

- **7" Disc Sander W/rubber backing pad.** I bought one from Harbor Freight and it worked great. They sell the Chicago Electric Power Tools model 90820, 7" polisher/sander.
- **5" Random Orbital Sander.** I used the Dewalt D26451 Random Orbital Palm Sander. This uses the 5" diameter Velcro-backed sandpaper discs.
- **Wood-cutting Band Saw.** Capable of cutting through your glued-up block.
- **Plastic notched putty knife, Qty 2.**
- **Metal notched trowel.**
- **Disposable gloves.**
- **Disposable plastic mixing containers, Qty 5.**
- **Stir sticks for glue.**
- **One piece ¼" hardwood dowel rod.**
- **Cheap polyethylene drop cloth.** To cover bench.
- **Caul blocks.** If you are using C clamps you may need small pieces of plywood to keep the end of the clamp from digging into your wood.

- **10" Profile gauge** Available from www.main.tiletools4less.com, part #70867
- **C-Clamps** If you are going to use C-clamps to apply glue pressure, you will need one for every 6" around the perimeter of your glue block. These are available from Harbor Freight.

- **Large Outside Caliper** Calipers can be purchased from Amazon.com (search for *outside caliper*). You could also make calipers out of thick aluminum strips and a rivet.
- **Electric Chainsaw** Initially I bought the Harbor Freight model, but the bearing housings melted after 30 min. I had to go back to Home Depot.

- **An Accurate Drill Press** for drilling the bolt holes.
- **String** for establishing the blade stations and for the lateral balance operation.
- **Very Small Nails** for establishing the blade stations.
- **Round Barreled Common Lead Pencil** This is the “special” tool used for the main balancing operation.

WOOD SELECTION

The first step in carving any propeller is deciding what species of wood to use. Many different kinds of wood can be used based mostly upon personal preference. In the past, mahogany, walnut, oak, and cherry wood species have been used to carve vintage propellers.[1] Jerry Thornhill used mahogany on the EAA replica Bleriot propeller, and hickory on the Sopwith Camel. If a harder wood is used, naturally, the propeller will be tougher and more abrasion resistant. Ash is also good, but there is such a difference in hardness between the spring and summer wood of the ash, after final sanding "waves" are visible in some areas. To correct this issue, the craftsman must go back over portions of the propeller with a metal file in order to “knock down” the high spots.

Page 5 of NACA Technical Note No. 212 provides an empirical method for determining the correct type of wood to be used for propeller construction. “If the product of the revolutions (per minute) and the diameter in inches (ND) is less than 170,000, the stresses in the particular design of propeller used in this report will be so low that spruce can safely be used. If it is under 210,000, walnut or white oak will be sufficiently strong, but for anything over this figure, birch or hickory should be used. If, as very rarely happens, ND exceeds 240,000, this design cannot be safely used, and a thicker blade will be necessary, entailing a loss of efficiency.” [2] The data contained within the NACA Technical Note No. 212 can be used for low powered aircraft engines with up to 50 hp.

I chose ash and indeed had to go over some areas with the file, but this was not hard to do. I think that if I were to carve another propeller, I would use hickory. With this "all power-tool" method, the hardness of the wood is of no consequence because it is just as easy to "carve" a hard wood as it is a soft wood.

There are many sources of wood. I found several places online that sell ash planks. I ended up using Baird Brothers Sawmill from Canfield Ohio.[3] They have a nice website to order from, and they ship via UPS. I would specify to them that you need near perfect planks, without pitch pockets or knots etc. The plank width you will need is

[1] http://www.woodenpropeller.com/Propeller_Identification.html
[2] http://naca.central.cranfield.ac.uk/reports/1925/naca-tn-212.pdf
[3] http://www.bairdbrothers.com

Figure 6 Try to keep the glue off the two good faces.