

Why Didn't I Think of That?

Wood and metal working hints from a master: Part 1

BY BUDD DAVISSON

ONE OF THE GREATEST personality traits of the people who make up the EAA is their willingness, better yet, their compulsion to pass along things that they've learned during a lifetime in aviation. This is especially true amongst the homebuilding crowd: Rather than guarding the secrets they've unlocked in the process of building an airplane, they are eager to share what their experiences have taught them. And that was what award-winning builder Rick Hansen, EAA 143651, was thinking when he sent me a treasure-trove of photos showing his work in progress.

Rick belongs to that rarified category of homebuilders who are driven to do it all themselves. All of it! The airplanes that builders create exist only in tightly rolled sheets of paper—and in their heads. And so it was with Rick's first Hatz biplane. And his second. Then his third, which he brought to AirVenture 2014. It was parked with a "Judge Me" sticker on the prop. And so it was judged. They poked and prodded, peeked and analyzed, and when the judges were done, Rick brought home the Grand Champion Plans-Built trophy.

When he sent me the photos showing his techniques, he said, "As I got ready to do this last Hatz, I went into it determined to make it a learning experience for others by photographing everything I thought should be passed along. In effect, with these photos, I'm sharing what so many others have given me and then sprinkled some of my own discoveries in the mix. I'm happy to share some of those tricks through these photos."

I should mention that, when I received the photos, I popped some of them open, then closed the file and pouted for a day or

two before working on them again. His workshop is the kind most of us dream about: spacious, well-ordered, clean. Mine is the exact opposite on all points. However, there's no doubt that he could be working in a cave and still turn out championship quality work. It's not the tools or environment that is important. It is the hands, mind, eyes, and, most of all, experiences that count.

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I'm going to attach fat, explanatory captions to his photos, and rather than crunching everything together in postage stamp images, I'm going to make this a two-part series. That way the photos will have more room to breathe, and I can separate the wood from the metal techniques.

SCRATCHBUILDING RIBS: RIPPING THE CAPSTRIP MATERIAL

There are a million tutorials around that address building ribs, but none that take us through the beginning steps of how to produce high-quality strips of capstrip material or cleanly cutting the hundreds of pesky little plywood gussets. To build ribs you need about a million feet of 1/4 inch by 1/4 inch capstrip material. You can buy it already ripped to dimension, but by carefully selecting your boards you can do it yourself and save a lot of money. A lot of money!



True one edge of a straight grain spruce or Douglas fir plank on a jointer. A hand plane will also do the trick. Don't chintz on the lumber quality. Any serious grain run-out or wide grain will come back to haunt you later.



Cutting narrow strips has the problem of the strips getting caught in the gap that always exists between the saw blade and saw table. So set the fence at 1/4 inch for the capstrips. Then to eliminate the blade gap, Rick cuts a piece of 1/4 inch Masonite part way across and tapes it to the table. This makes the Masonite tight to the blade. Voilà! No gap!



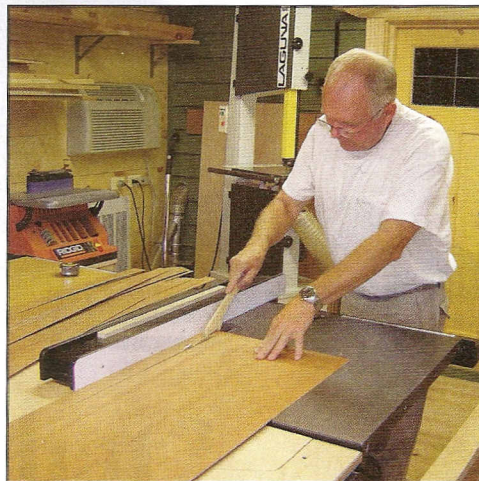
Feeding thin strips through a saw can be dicey. So each cut stops 6 inches short of the end of the board. Then the board is reversed and cut from the other end while holding it tight to the fence. Same thing is done when the wide pieces are laid flat and ripped to 1/4 inch square. This saves fingers.

IMPORTANT HINT

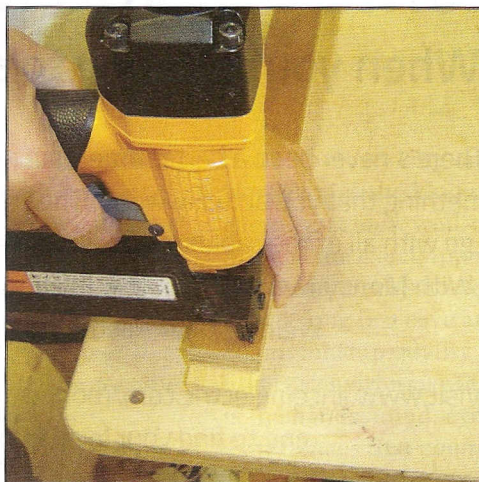
Rick uses Forrest brand 40 tooth blades. I ordered one and can't believe the difference. There's no splintering on either side of the kerf. This one hint is super valuable.

CUTTING RIB GUSSETS SAFELY AND EFFICIENTLY

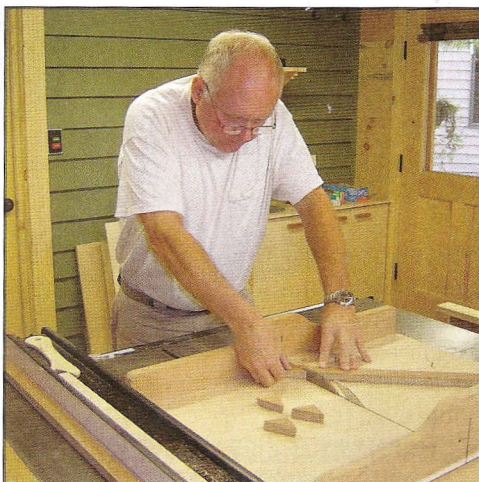
As with the capstrips, you need lots and lots of ready-to-use gussets pre-cut to the shapes required. Rick has a really efficient way of doing that with a minimum of waste.



Study the rib design and decide the best dimension that will work with each of the different gussets called for. Different ribs need different widths. Rip 1/16 inch plywood into strips on the table saw using a push stick to keep the fingers clear.



Stack 10 strips together and put two brads in one end to secure the stack. Make sure they are even.



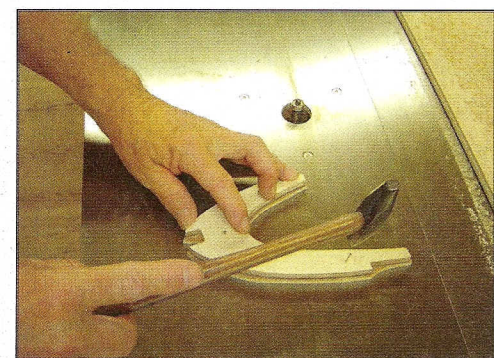
Note the cutting box on the table. The whole thing slides so pieces can be jigged on it for various angles of repetitive cuts. Note Rick's amazing work on the cutting box. It looks like furniture! Tack a fence onto it at the right angle and start cutting. With each cut, flip the strip over and cut the other angle. Not only is this an efficient way to cut gussets, but also by cutting everything in a stack, burrs on the gussets are reduced.

MAKING IDENTICAL NOSE RIBS

Getting the nose ribs exactly the same is critical to a good-looking leading edge.



Rough cut 1/4 inch aircraft mahogany plywood on a band saw. Stay within 1/8 inch or so of the line, but that's not critical.



Make an exact hardwood, or birch ply, template of the nose rib and tack it to the rough-cut rib blanks.



Route out the nose rib with a 1/2 inch diameter carbide router bit equipped with a pilot bearing. Note: A DIY router table is easily constructed and a hand-held router bolted to the bottom.



The Hatz requires 40 nose blocks plus those for the center section. Rick said this process made it easy and fun.

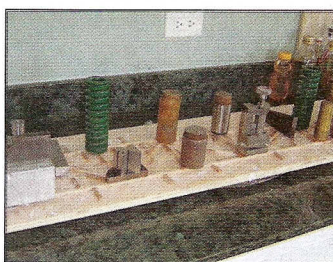
MAKING RIBS

Everyone has their own system for cutting the capstrip material to lengths with the correct angles and then installing and trimming the gussets. Rick's system seemed easy. Notice that dozens of 1 inch pieces of capstrip material are tacked in position on the work board around a penciled outline of the rib and its structure. They hold everything in place while the glue (he uses T-88 epoxy) sets. Note the inexpensive razor saw and aluminum miter box screwed to the bench. They are available online from hobby shop sites. *EAA*

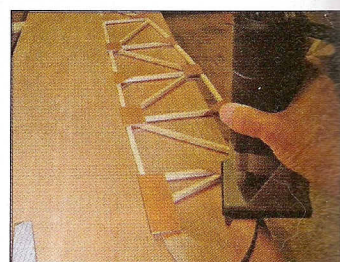
Budd Davisson, EAA 22483, is an aeronautical engineer, has flown more than 300 different types, and has published four books and more than 4,000 articles. He is editor-in-chief of *Flight Journal* magazine and a flight instructor primarily in Pitts/ tailwheel aircraft. Visit him on www.AirBum.com.



Rick said he cuts each capstrip and finishes it to dimension with a small disc sander. He explained, "After all pieces are fit, I then remove them all and place Glad Cling Wrap over the rib jig, then replace all of the capstrips, gluing each as they are put into the jig. Cling Wrap allows for easy removal of the rib after the glue sets."



Gussets are glued to the top side with a light weight to hold each in place as the glue dries. Gussets are not nailed or stapled, and clamping pressure is fairly light.



After the eight-hour curing period, the rib is moved from the jig and the excess gusset material routed off. To speed up the process, several duplicate wing jigs can be made.



A sanding block is used on the reverse side to level the surface and remove any excess glue.



With the back side sanded, the other gussets are glued in place. Paper clips make a great clamp for this application. The excess gusset material is routed off, and the rib is finished.