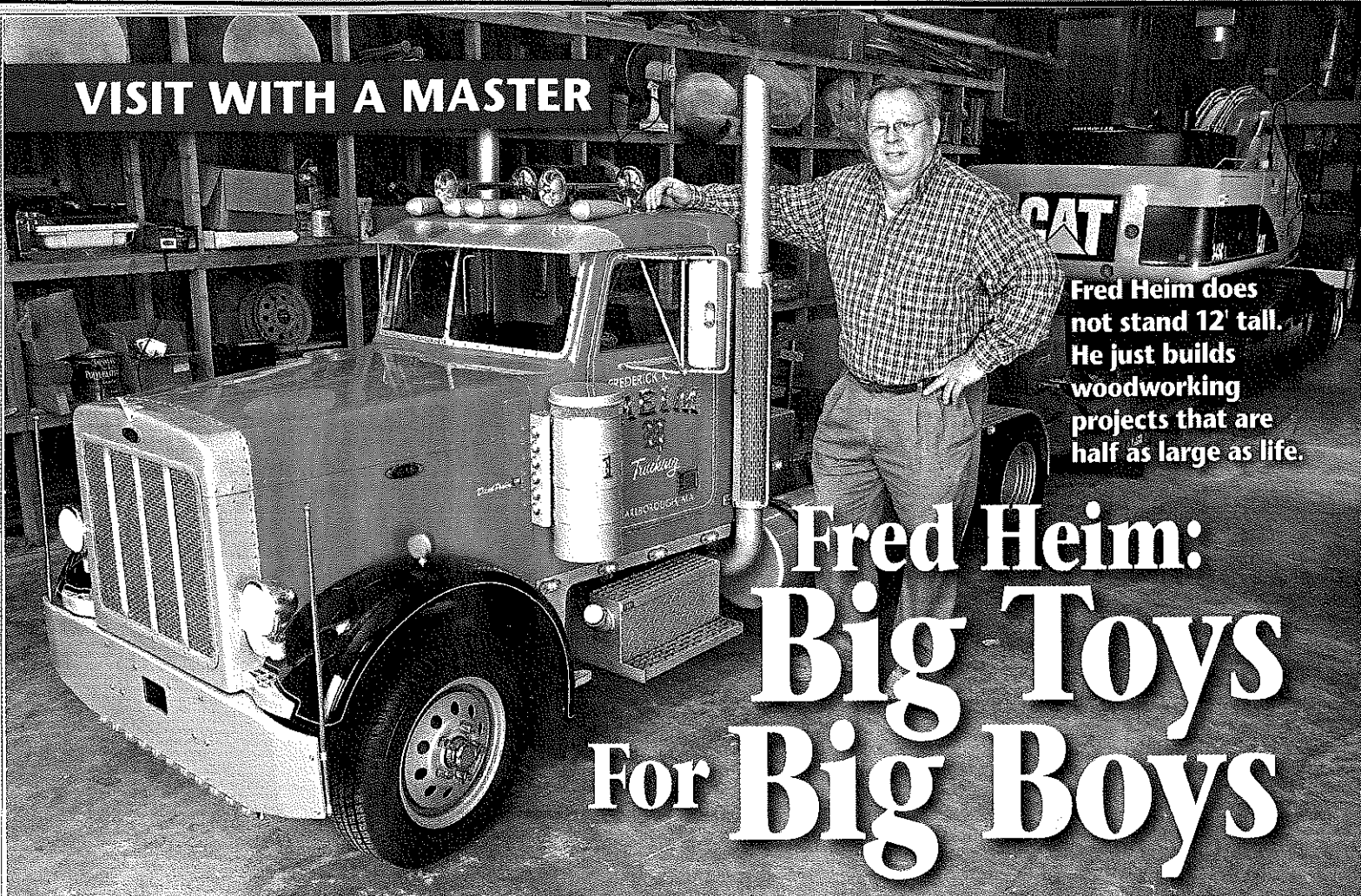


## VISIT WITH A MASTER



Fred Heim does not stand 12' tall. He just builds woodworking projects that are half as large as life.

# Fred Heim: Big Toys For Big Boys

**H**ow do you follow up a successful career constructing housing developments, shopping centers, and retirement communities? Rather than simply reminiscing, Fred Heim of Marlborough, Massachusetts, recreated the good old days...in half scale. His wooden models of heavy construction equipment are so detailed that, without a nearby size reference, they're indistinguishable from the real thing.

## Models: A growing concern

As he prepared to hand over the construction business to his sons, Fred Heim decided to revisit a childhood hobby: model-making. The first models he tackled in "retirement," 1/6-scale wooden trucks, were incredibly detailed, made completely out of wood, and apparently unsatisfactorily diminutive. Looking at those models one idle day in his shop

office, he decided it was time to scale things up a bit.

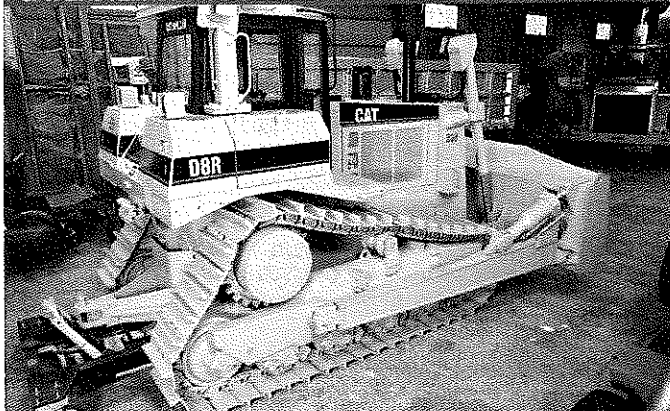
Fred built his first half-scale model, the Peterbilt truck, *above*, out of fiberglass, mahogany, and plywood on an aluminum chassis. And—get this—it *runs*. Powered by a 26-hp diesel tractor engine, the cab just fits Fred's six-foot frame thanks to a removable

PETERBILT 379 WITH HILL DUMP TRAILER



An aluminum frame lends Fred's 26' dump trailer strength while a professionally powder-coated body gives its mahogany-plywood sides the convincing look of metal.

CATERPILLAR D8R BULLDOZER

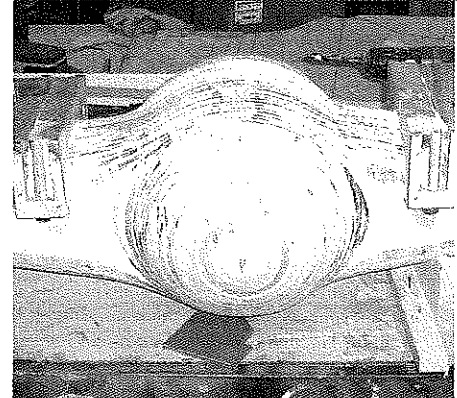


No half-scale construction business can get by without earth-moving equipment, so Fred made this half-size replica Caterpillar D8R dozer. Overlooking no detail, he had decals scaled from the original.

## Where's the wood?

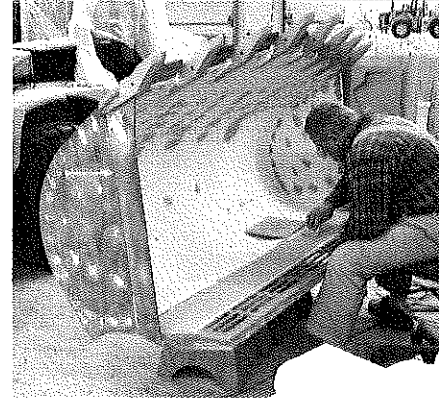
Even up close, it's hard to be sure that you're not looking at metal. Fortunately, photographic evidence proves the existence of wood underneath the powder-coatings and Caterpillar-yellow paint jobs of Fred's models.

NOW YOU SEE IT, NOW YOU DON'T



Blocks of dimensional lumber, aluminum plates, and layer upon layer of laminated, sculpted plywood hide under a powder-coating that makes the Caterpillar 980H's axle housing nearly indistinguishable from its full-sized cast counterpart.

A SMOOTH CHANGE TO METAL



Fred smooths auto-body filler over marine-grade mahogany plywood, disguising seams and nail holes.

steering wheel. The truck features working lights, 12" trailer wheels riding on golf-cart axles, an air-bag suspension system, hydraulic brakes, and a high-gloss automotive paint job. The fittings, mechanisms, latches, and trim had to be hand-made to fit or repurposed from smaller cousins of the real thing.

The natural first question everyone asks Fred is: Why? "I just have to keep going or I'd die. And I want to do something that no one else has done, something that makes people excited."

Even at half scale, the truck weighs more than a ton and measures 22' in length. Fortunately, Fred's three-story shop is spacious, because Fred's next project was a 26' dump trailer. Its sides look so much like metal that you can't resist knocking on the side just to be sure Fred's not pulling off some huge prank. Sure enough. Sounds like wood. Fred just smiles. "That's the first thing

everyone does," he says in a thick New England accent.

Fred took his massive models on the road to truck shows (both for real trucks and models), drawing amazed—and often confused—stares from drivers as he pulled the rig down the highway, and huge, curious crowds at the shows. "I couldn't stop at any gas station or rest stop for less than an hour. Every time I stopped, I'd have every trucker there asking me questions about it."

His construction connections gained him access to a nearby heavy-equipment dealer, so next up was a half-scale Caterpillar D8R bulldozer, along with a drop-bed trailer for it to ride on. He followed that up with a Caterpillar 345C L excavator, *below left*.

Although they are static (unpowered) models, both the bulldozer and the excavator feature rotating aluminum axles along with buckets, booms, and

pistons constructed so realistically that the models can move just like the real things. Fred handmade each link in the fully articulated tracks (88 for the dozer and 104 for the excavator) out of mahogany, solid-surface material, and PVC.

Fred's *pièce de résistance*, however, is his latest half-scale model, a powered Caterpillar 980H wheel loader, *below*. Large remote-controller box strapped around his neck, Fred steers the dirt mover around the basement-turned-parking-lot of his shop. He raises, lowers, and rotates the bucket, demonstrating that his "toy" can do anything the big boys can. See Fred's models in motion at [woodmagazine.com/fredheim](http://woodmagazine.com/fredheim).

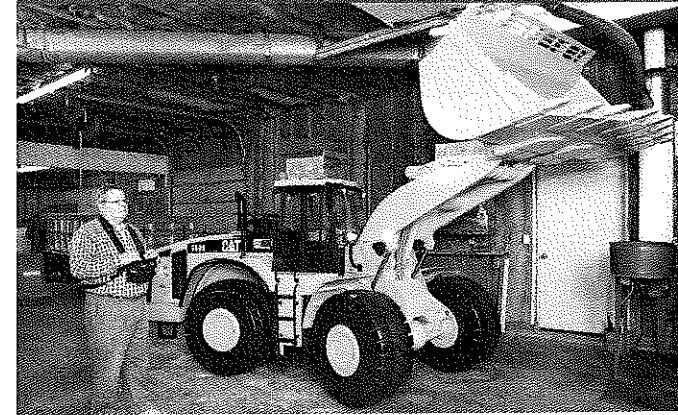
Fred claims that the 980H completes the set. "I keep saying this one's my last half-scale, and I keep doing something. It's a sickness." Never one to sit still, Fred began work on a vehicle of a different kind. And it's definitely not a model.

CATERPILLAR 345C L EXCAVATOR ON DROP TRAILER



Each link in the 345C L excavator's tread contains nine pieces of mahogany or PVC. Both of the fully-articulated, working treads have 52 links. That adds up to 936 pieces of half-scale detail.

CATERPILLAR 980H WHEEL LOADER



Fred drives his half-scale Caterpillar 980H wheel loader by remote control around the basement level of his shop. The hydraulics give the arms and bucket the full range of motion of the real thing.



## Scaling Projects from Photos and Illustrations

Fred took hundreds of reference photos and measurements for each model. Diagrams from manufacturers' brochures provided precise dimensions. Toy replicas served as both inspiration and confirmation as the projects progressed. Like Fred, you can reproduce or scale projects from photos by following these tips:

■ Take photos from all sides as straight-on as possible.

■ If you're unable to take measurements directly, include a tape measure in the photos for scale.

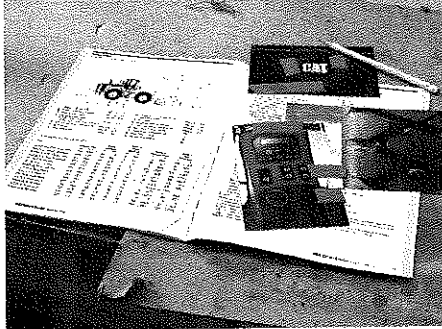
■ Lacking that, find a benchmark object in the photo, estimate its size, and use this measurement to produce a ratio for scaling the remaining dimensions.

■ Take close-up detail shots of joinery, moldings, carvings and trim pieces.

A SURPLUS OF SNAPSHOTS



SALES BROCHURES SUPPLY SIZES



A READY POCKET REFERENCE



## Fred goes full-scale with his latest project

Between building malls and models, Fred continued building full-scale boats, a hobby he started fresh out of school.

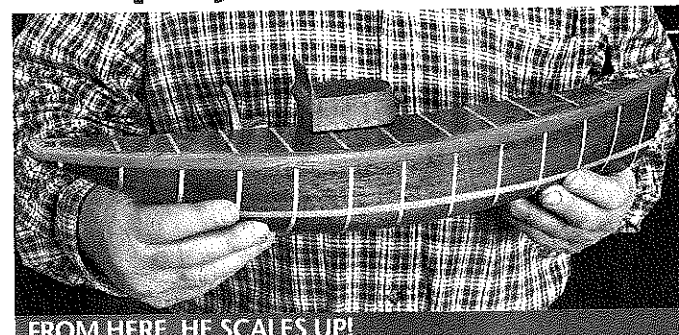
During the build, the Rachel H.—a mahogany craft with gleaming stainless steel trim—dominated the ground-level, second floor of Fred's 3-story shop. It's one of dozens that he's built over the past few decades. But this one holds special significance: It's a 50th-anniversary gift to the boat's namesake, Fred's wife. He chose the design, a 31' wooden fantail launch based on early 1900s runabouts, specifically for slowly cruising the Charles River, one of Rachel's favorite getaways. "Obviously, I have a very understanding wife of 50 years," Fred says. "After the half-scale models, I

thought that she deserved this."

The boat features all the amenities to pamper up to 13 passengers: a fully equipped head (bathroom), ample refrigerator space for beverages, plush upholstery, and a surrey canopy with all-weather curtains

to protect passengers from bad weather.

After a round of boat shows in early 2009, the Rachel H. settled into her berth at the Watertown Yacht Club for a life of

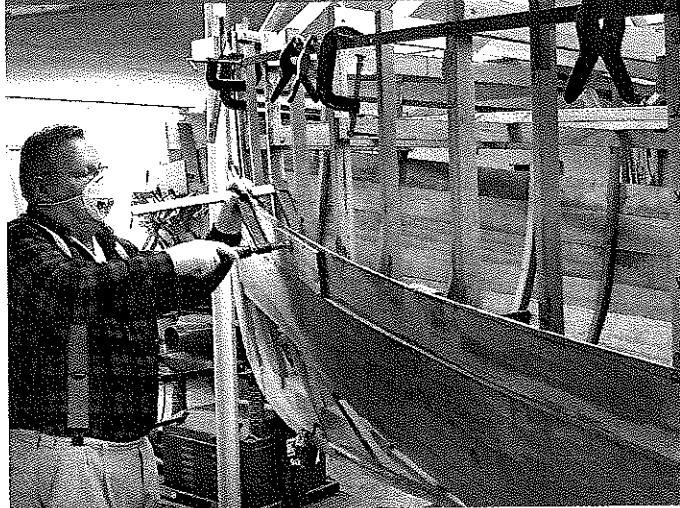


FROM HERE, HE SCALES UP!

The Rachel H. started as—what else?—a model. Points were pulled from the stripes and scaled up to make full-sized rib patterns

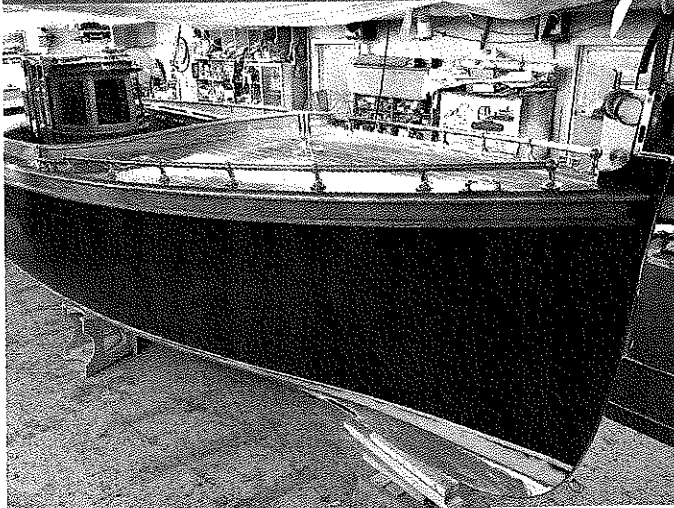
leisurely river cruising. Of course for Fred, leisure is all business. His next project—what else?—building model boats, this time in 1/12-scale.

THE CAPTAIN BUILDS HIS SHIP



The Rachel H.'s hull consists of two layers of overlapping mahogany planks attached with stainless steel staples. A coating of epoxy inside, in-between, and outside the planks ensures a watertight hull.

PREPARING FOR HER MAIDEN VOYAGE



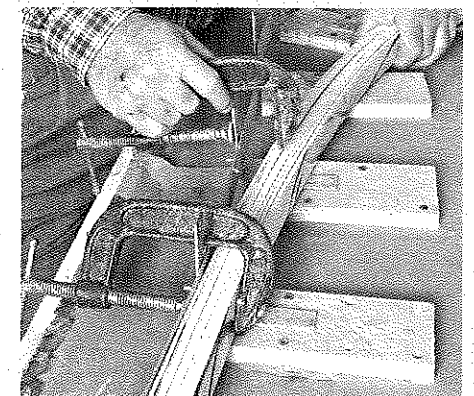
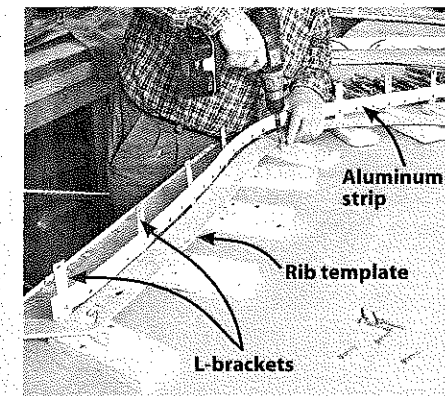
Nearly completed, the Rachel H. awaits a few final details. The flat-bottomed-hull design limits the boat's speed to about seven knots, perfect for leisurely river cruises.

## 3 Techniques for Crafting Colossal Curves

The complex curved hull of a boat requires precisely mating joinery—and lots of it—to keep her from visiting Davy Jones' locker. Here are three ways that Fred uses small jigs to break down the large task:

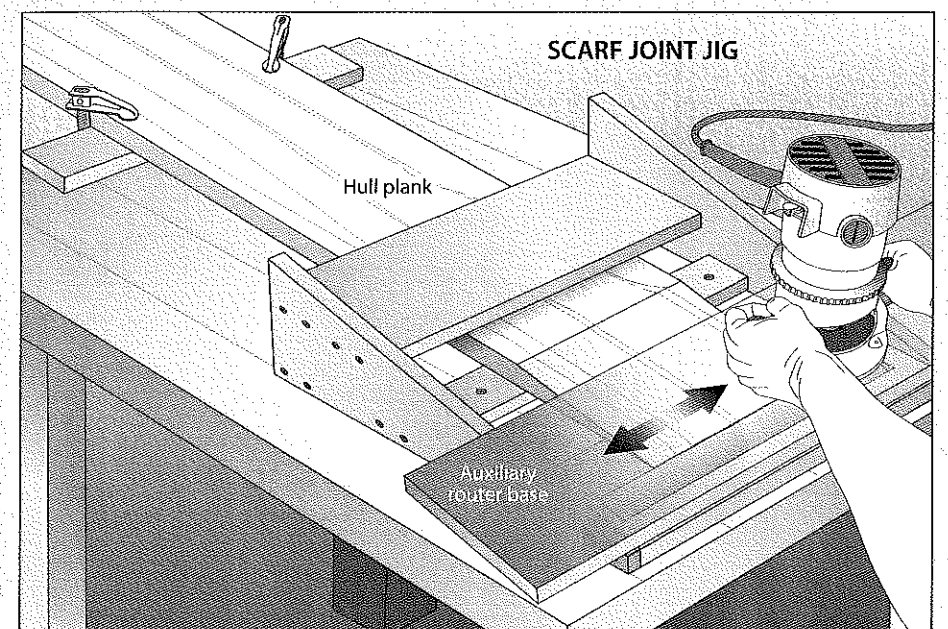
### 1. Laminating strips into curved parts

Home-center, steel L-brackets screwed to plywood scraps form a base to hold a flexible aluminum strip. Fred forms the reusable, shop-made "spline-and-duck" mold around a full-sized, plywood template of one of the boat's ribs and secures the bases to a work surface (near photo). Epoxy-coated strips of oak are pressed into the curve and clamped to the spline with C-clamps (far right). To watch a free video on using a spline and ducks to lay out irregular curves go to [woodmagazine.com/duckvid](http://woodmagazine.com/duckvid).



### 2. End-to-end joints

With the boat's frame complete, it's time to add the planks. The length of the boat necessitates multiple lengths of mahogany. Joining wood end-to-end under tension requires a long, tapered joint, called a scarf joint, overlapping between the ribs to maintain the continuous curve. Fred crafts a scarf joint using this simple router jig. The slanted base defines the 10° angle of the joint, while the extra-long auxiliary router subbase slides back-and-forth to nibble away the waste with a straight bit in successively deeper passes.

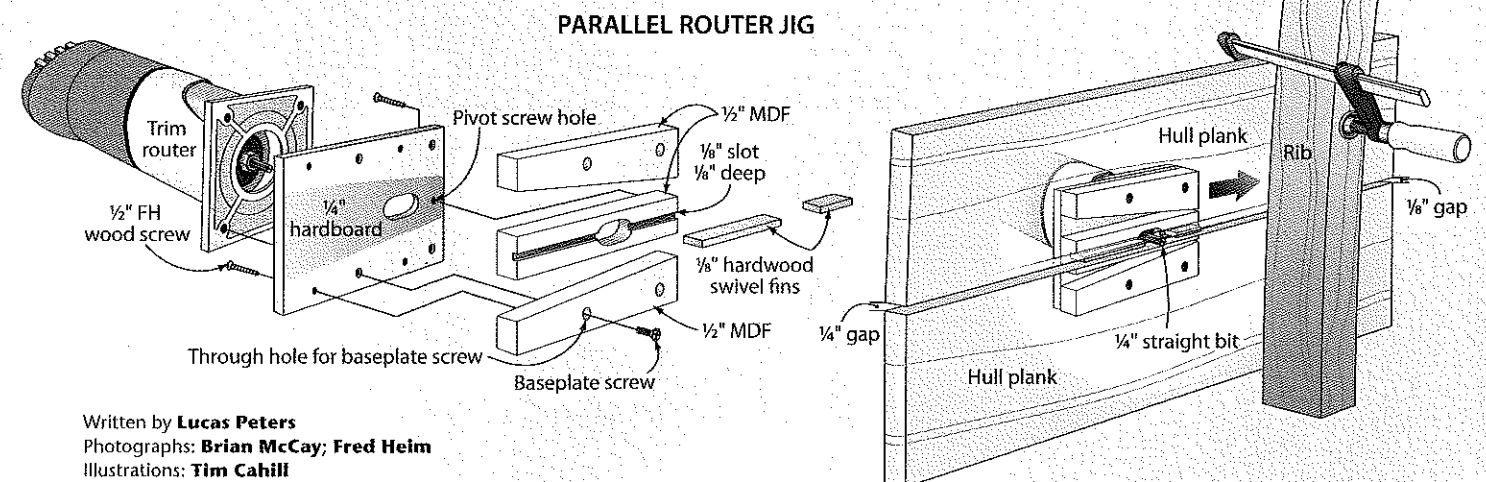


### 3. Jointing curves for a seamless fit

After one plank is attached to the ribs, the next plank is clamped above the previous leaving a 1/8"-3/16" gap. The two planks must fit together seamlessly in a sweeping curve around the ribs. To

accomplish this, Fred uses a trim router equipped with a 1/4" straight bit and this shop-made auxiliary subbase. The swivel fins on the subbase slide in the gap between the planks while the 1/4" straight bit cuts the mating edges of the planks

parallel to each other. The process can be repeated to fine-tune the fit by sliding the upper plank down slightly and making a second pass.



Written by **Lucas Peters**

Photographs: **Brian McCay; Fred Heim**

Illustrations: **Tim Cahill**

[woodmagazine.com](http://woodmagazine.com)