Ruud Complement Jig

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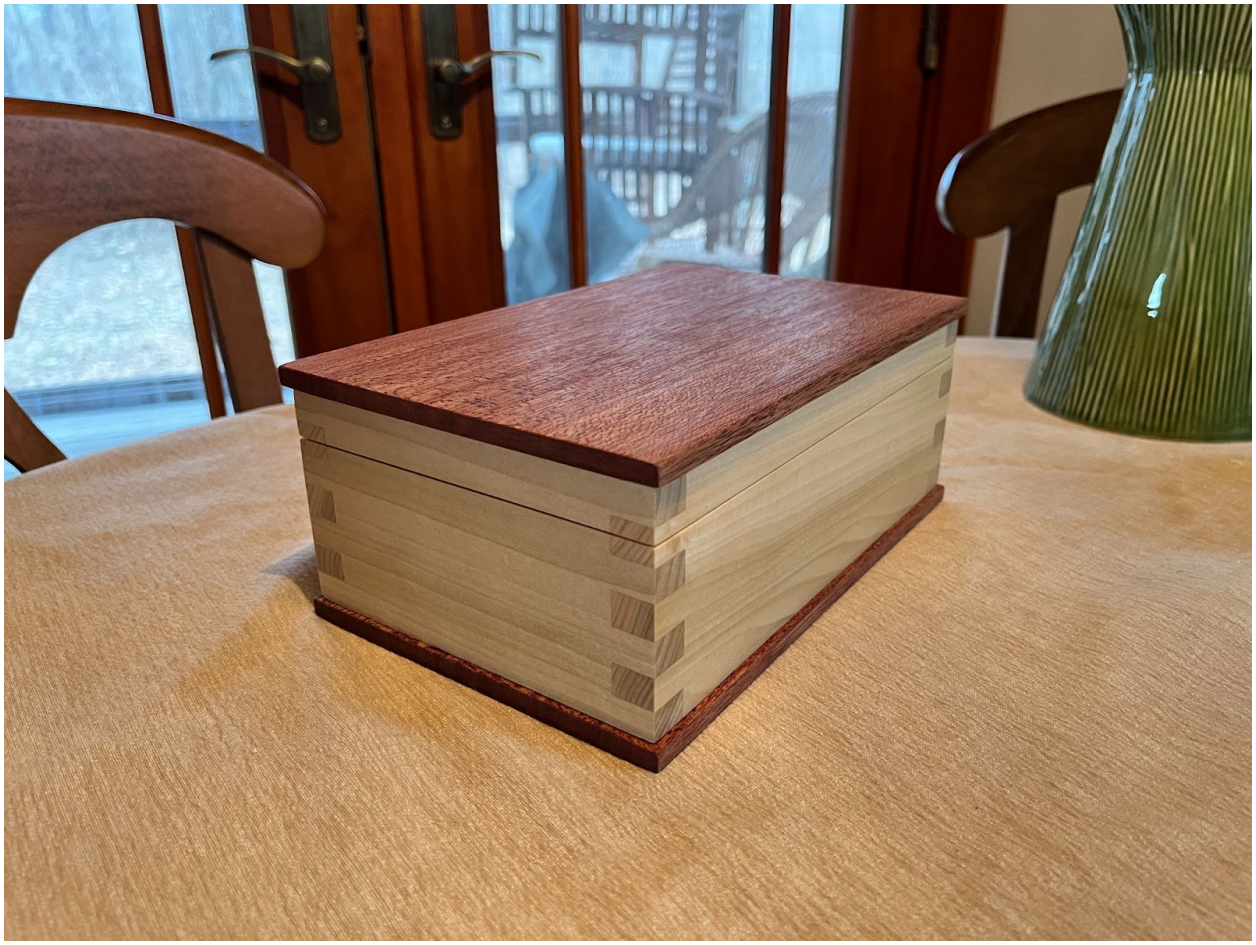
These are my notes for a presentation at the Northeastern Woodworkers Association (NWA) Showcase at the Saratoga City Center, Saratoga Spring, New York held March 25–26, 2023.



This is an example of a box with sides connected by box joints. While the spacing between sockets appears to be consistent, to make this box (with it's cut-off lid) one of the pins has to be extra wide to account for the saw blade kerf. Here is a picture of the box sides before glue up:

The most commonly used box-joint jig cannot cut patterns like this. The Ruud Complement Jig provides one way to make this joint. After first cutting one-half of the joint on one side, the other half is cut from the first, using the first as a template.

Alternatively, the jig can be used to cut box joints like this one:

The widths of the pins and sockets vary for visual interest.

Box Joints

Description

From [Wikipedia.org]

> A box joint is a woodworking joint made by cutting a set of complementary, interlocking profiles in two pieces of wood, which are then joined (usually) at right angles, usually glued. The glued box joint has a high glued surface area resulting in a strong bond, on a similar principle to a finger joint. Box joints are used for corners of boxes or box-like constructions, hence the name. The joint does not have the same interlocking properties as a dovetail joint, but is much simpler to make, and can be mass-produced fairly easily.
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> ### Creation
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> Box joints are generally created by using the same profile but displaced for both halves. In modern workshops these are often made on table saws,[1] sometimes using a dado set. [Also using a router.] Custom machinery can cut the entire joint in one pass, using a suitable jig multiple pieces, even of opposing senses, can be cut at once. They were traditionally produced manually using a tenon saw and chisel, and fine cabinet makers still use these methods. Jigs can also be used, as with dovetails, to help produce a consistent result.

History

From Woodcraft Magazine

> In the history of woodworking joinery, box joints (sometimes called finger joints) are a fairly recent arrival. That's because before the circular saw blade, cabinetmakers didn't think that the square-shouldered joint was worth the effort. They viewed box joints as harder to cut than dovetails. Plus, the joints required glue. True to its name, the box joint found its first practical use later in mass-produced boxes and crates for storage and shipping purposes. Today, it's far outgrown its humble beginnings.
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> Because the fingers multiply the gluing surface area, box joints are super strong, making them the perfect choice for utility boxes and tool chests. Their decorative appearance is a bonus, lending a unique design element to jewelry boxes and projects like the steak knife box on page 52. The best thing is that with the right jig, you can fashion box joints quickly and easily with either the table saw or router. … [The] table saw offers more flexibility and variety … .

From Forest Products Journal

> ## Past
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> Most wood adhesives and bonded wood products—and the processes for making them—have been developed in the past century and have allowed for a great increase in wood utilization. The first Wood Adhesives conference was held in 1960, and in 1970 the conferences started meeting on a 5-year basis and in 2009 on a 4-year basis to bring interchange of knowledge and ideas among industry, university, and other researchers, starting mainly with those in the United States but with a growing international representation. The conference proceedings—available from the Forest Products Society—provide access to information that is often not published elsewhere.
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> ## Natural product adhesives
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> As early humans moved from a nomadic to settled existence, they needed structures and furniture in those structures that were more permanent. Many of these were made using mechanical connectors, but humans were also looking for adhesives from plants and animals. Some, such as blood, pitch, gums, and rubber latexes, could be used as adhesives and sealants with no processing. Others, such as casein from milk, soybean proteins, and collagen adhesives, needed more processing.
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> Animal glues from collagen, blood glues, and casein glues from milk have been used for a very long time; fish glues originated in the 1800s and soy glues in the 1900s. The first wood glues needed limited strength because they were used for interior applications, such as furniture. The desire to use wood more efficiently was an impetus for adhesive development in the 19th and 20th centuries. Two major early developments were the use of casein for glulam production and soy adhesives for interior plywood. Despite

some success with biobased adhesives, they were replaced by synthetic adhesives starting in the 1930s, mainly due to economics, water resistance, and ease of use.

Tannins have been used for many years as a wood adhesive in locations where they are readily available and where phenolics are more limited in supply and are more costly. Despite much research showing that lignin can be used to make plywood that meets performance standards, it apparently has not been used much in commercial manufacturing of wood products. Carbohydrates are not used in wood bonding because of their water and thermal sensitivity.

Internet Resources

Commercial Box Joint Jigs

Leigh, a template router jig also for other joints including dovetails

Incra I-Box, an screw-adjustable index pin

Rockler.com with index pin for a router table

Woodcraft.com with index pin (free plan); also a paid version with an interchangeable pin

Woodpecker.com (Woodlsmith router and template)

YouTube Videos

Hand-Cut Box Joints

Wood by Wright

Template-and-Index-Pin Jig (Router or Dado Stack)

3 x 3 Custom - Tamar (clip shown in presentation)

William Ng

Bourbon Moth bare bones

Stumpy Nubs

Make Something

Epic Woodworking

Steve Ramsey - Woodworking for Mere Mortals

WoodworkersJournal

Jonathan Katz-Moses

Rag ‘n’ Bone Brown

Template Jigs

Fisher’s Shop (clip shown in presentation)

Eric Sorensen

The Woodfather - Mario

Drive-Screw Jigs

Matthias Wandel (a human CNC jig)

John Heisz - I Build It (really a form of template-and-index-pin jig)

Stumpy Nubs (also a template jig)

Fit

The pins must be thinner than the gaps. William Ng recommends 0.006”, having tested spaces in one thou increments. Some YouTubers pay attention to adjusting the fit and some do not.

Ruud Complement Jig Demo

1. Here’s a YouTube video showing the jig in action for this joint: Ruud Complement Jig demonstration.
2. Here’s a Sketchup file that I will use to explain the jig: Sketchup file. And a video of the Sketchup file animated. (The Sketchup file can also be used as a plan for making another jig.) It’s all about the index pin.
    a. Explain how the Ruud Complement Jig is another template-based jig, except the complement of the template can also be cut and the template is a piece to be fitted. And rather than fixing the index pin, the pin moves in the kerf.
    b. The index pin fits in the kerf and is turned 180 degrees for half of the faces to be cut.
    c. Look at the joint itself to compare copying and complementing. This explains the index pin.
3. Look at the demonstration video a second time, but this time I narrate.
4. Return to a discussion of fit.

    a. Show the three fits for the one joint shown in the video with one thou differences in the index pin shims.

    b. Show the box as an example of a good result from a “loose” fit. (Wood fibers swell as the PVA glue soaks in. Really tight joints can be awkward to glue up.)

5. Back to the Sketchup file to see how the jig is adjusted by inserting shims into the index pin.

6. If there is time, talk about how I made the jig. More images in Sketchup file.

Additional Uses of the Jig

1. Cauls for glue-ups.
2. Multiple mortise-and-tenon joints.
3. Dovetails. Requires two sleds.