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How to join two pieces of wood at 90 degrees like a pro

by Alex Mashinsky

How to join two pieces of wood at 90 degrees? Woodworking is often recognized as a form of art. And like many other arts, it has several disciplines. Joinery is one of them. It is a common name for various ways of joining two pieces of wood together.

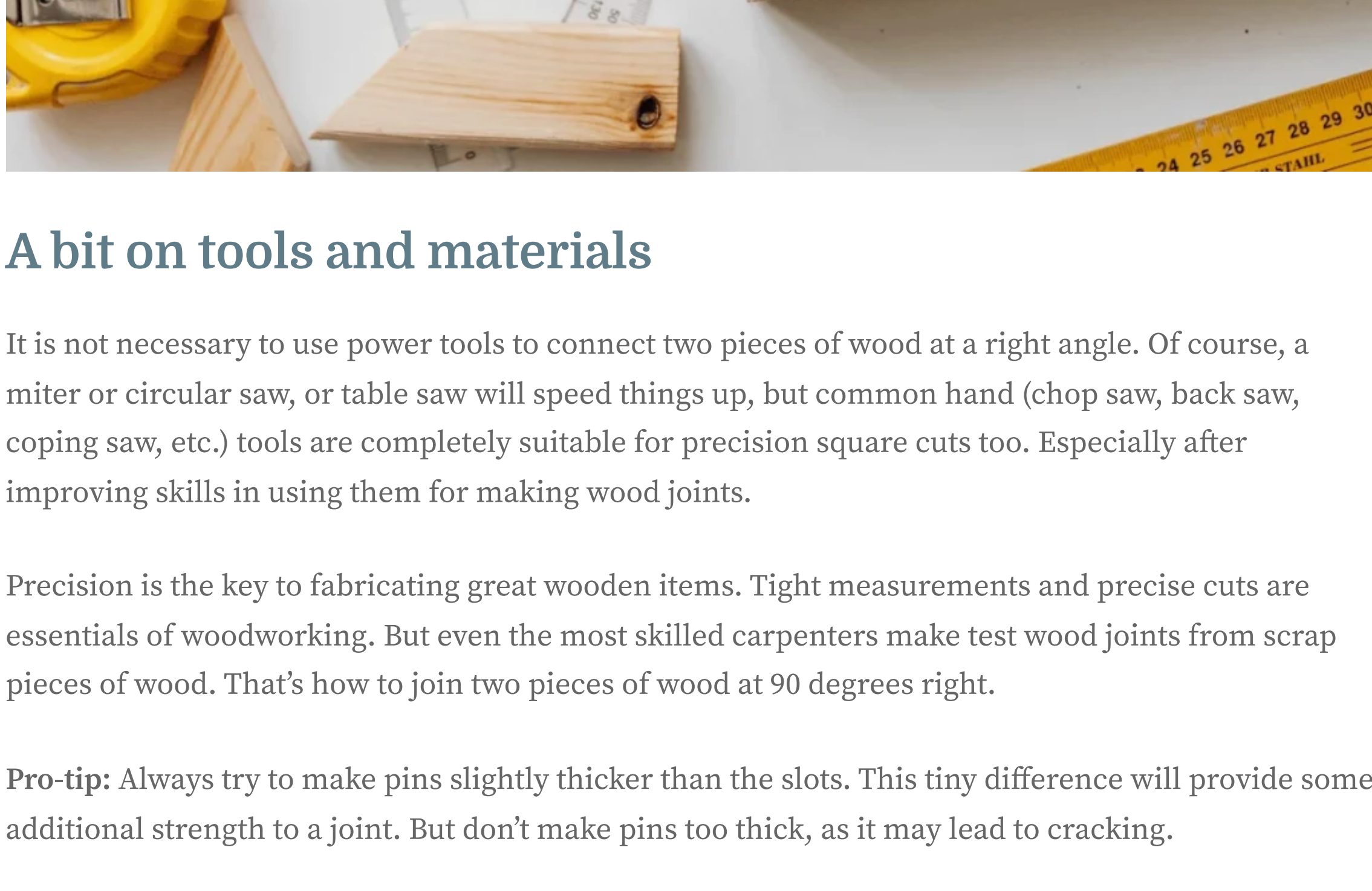
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The beginning of joinery

We'll take a look at some most used types of 90-degree wood joints, their aesthetic and functional features, as well as some implementations. There are many ways to join two pieces of wood.

Everything you'll learn in the following article will help in your next woodworking projects or, at least, provide directions to dig deeper into mastering the art of carpentry.

Pro-tip: Before starting a project make sure that the workplace is tidy, all the materials are there and all the tools are sharpened, oiled, or ready for use in any other regard. Such preparations will provide maximum fun, satisfaction, and safety.



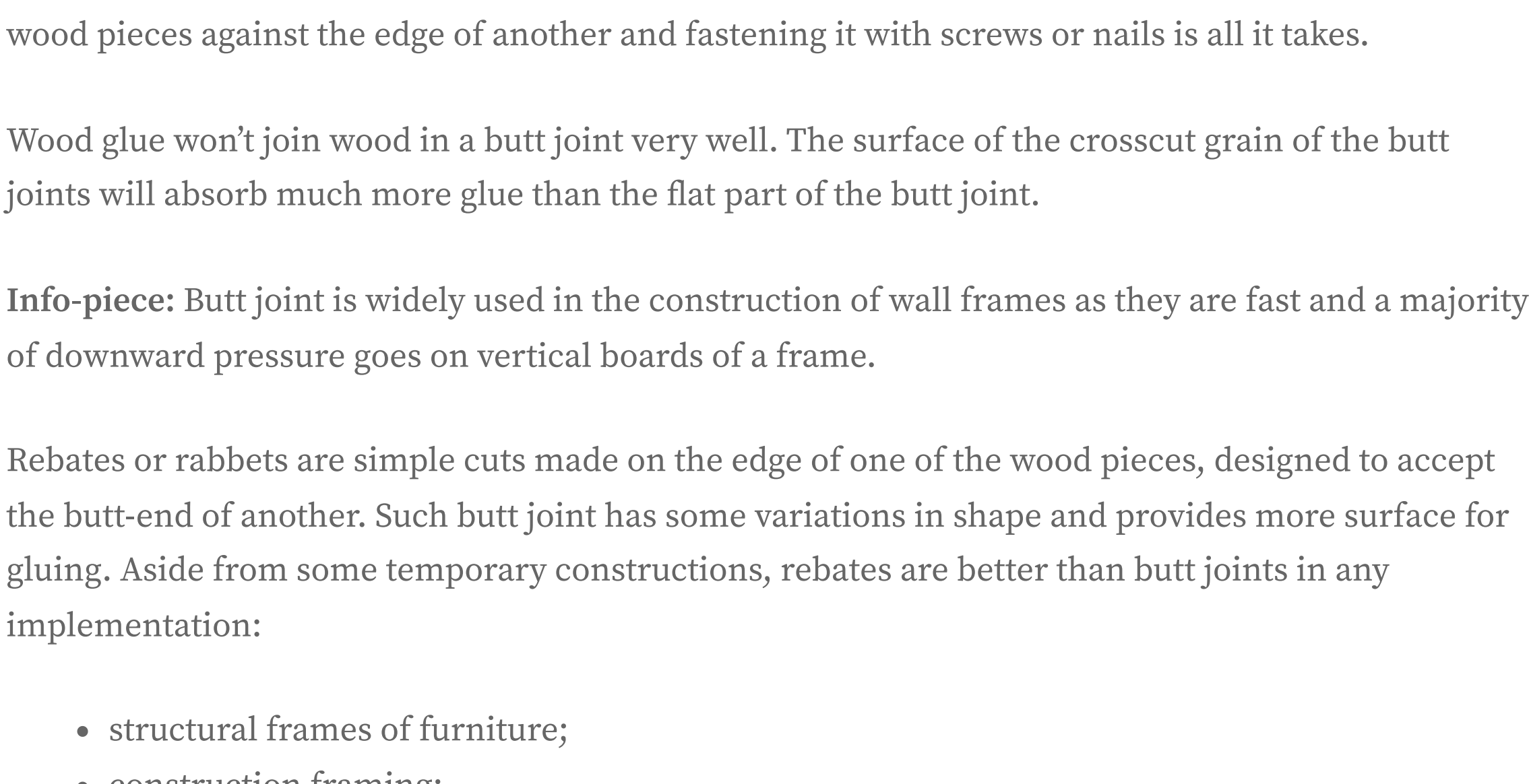
A bit on tools and materials

It is not necessary to use power tools to connect two pieces of wood at a right angle. Of course, a miter or circular saw, or table saw will speed things up, but common hand (chop saw, back saw, coping saw, etc.) tools are completely suitable for precision square cuts too. Especially after improving skills in using them for making wood joints.

Precision is the key to fabricating great wooden items. Tight measurements and precise cuts are essentials of woodworking. But even the most skilled carpenters make test wood joints from scrap pieces of wood. That's how to join two pieces of wood at 90 degrees right.

Pro-tip: Always try to make pins slightly thicker than the slots. This tiny difference will provide some additional strength to a joint. But don't make pins too thick, as it may lead to cracking.

The cheapest tools may completely ruin the experience of crafting, so invest some time and resources into picking suitable saws, planes, adhesives, and the rest of the equipment. They don't have to be the best, but even the ones that are a bit better than the cheapest ones will make a lot of difference.



The butt joint and the rebates

The butt joint is the most straightforward type of all of them. Pressing the butt-end of one of the wood pieces against the edge of another and fastening it with screws or nails is all it takes.

Wood glue won't join wood in a butt joint very well. The surface of the crosscut grain of the butt joints will absorb much more glue than the flat part of the butt joint.

Info-piece: Butt joint is widely used in the construction of wall frames as they are fast and a majority of downward pressure goes on vertical boards of a frame.

Rebates or rabbets are simple cuts made on the edge of one of the wood pieces, designed to accept the butt-end of another. Such butt joint has some variations in shape and provides more surface for gluing. Aside from some temporary constructions, rebates are better than butt joints in any implementation:

- structural frames of furniture;
- construction framing;
- simple boxes;
- window frames, etc.

The miter joint

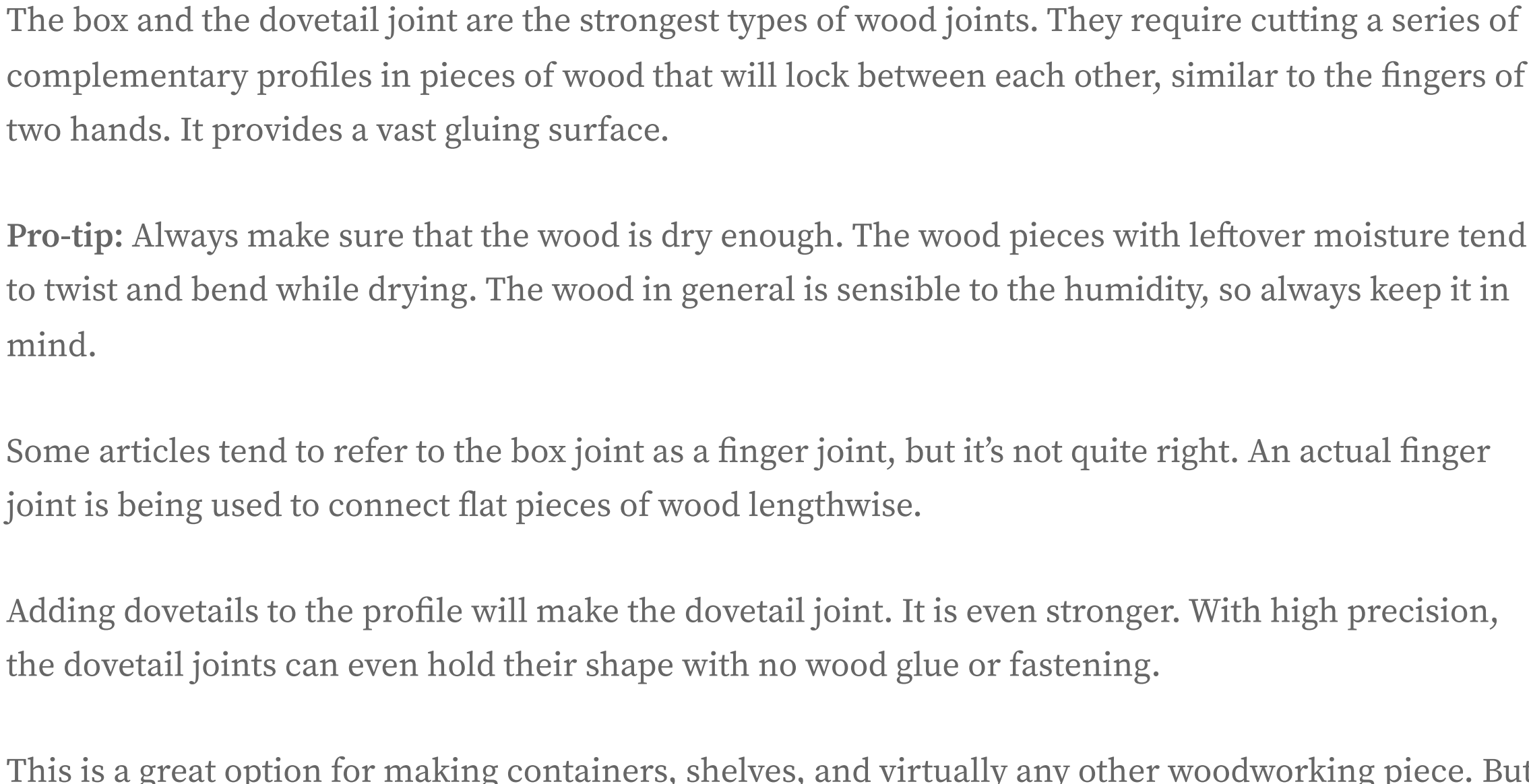
The miter joint is valued for its looks; however, it's a bit tricky in the making. The point of a miter joint is in cutting both joining ends at 45 degrees, gluing them together, and optionally, fastening them with inserts or mechanical fasteners.

Pro-tip: Try to match the grain pattern of the pieces of wood pieces for the miter joints. The result will look much nicer that way.

Precision is crucial in fabricating miter joints. Usually, they are used for various framing:

- paintings and other artwork;
- doorways and windows decorations;
- decorative trims on furniture etc.

In case of no power tools, a miter box will help to make all the needed cuts with precise angles. A plane, a file, or a simple piece of sandpaper will come in handy for making adjustments after test fitting of already cut pieces of stock.



The half-lap joint

The half-lap joint is a type of flat joint. All it takes is cutting half thickness from each of the wood pieces in a way that will allow them to mate neatly.

Unlike the usual lap joint that implies overlapping edges of two boards and fastening them with no additional cutting, a half-lap joint provides more surface for gluing.

In addition to end-to-end 90-degree joining, half-lap joints are also suitable for:

- t-shaped joints at a right angle;
- stronger t-shaped joints with the addition of a dovetail;
- cross joints.

This kind of joint is being used in making wood framing. It provides decent strength and uniform thickness throughout the whole length. Visible end grain may also serve some decorative purposes.

The box and the dovetail joint

The box and the dovetail joint are the strongest types of wood joints. They require cutting a series of complementary profiles in pieces of wood that will lock between each other, similar to the fingers of two hands. It provides a vast gluing surface.

Pro-tip: Always make sure that the wood is dry enough. The wood pieces with leftover moisture tend to twist and bend while drying. The wood in general is sensible to the humidity, so always keep it in mind.

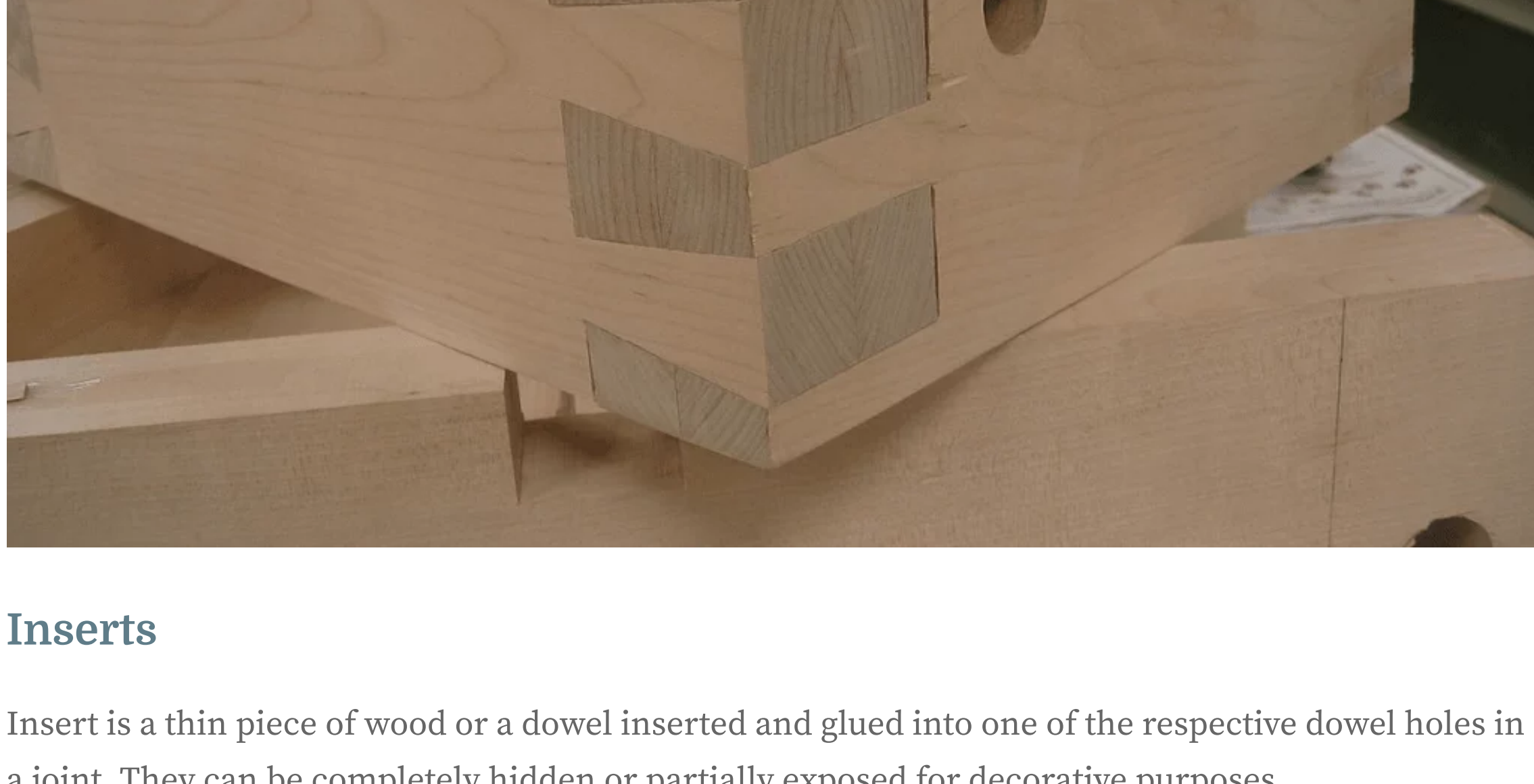
Some articles tend to refer to the box joint as a finger joint, but it's not quite right. An actual finger joint is being used to connect flat pieces of wood lengthwise.

Adding dovetails to the profile will make the dovetail joint. It is even stronger. With high precision, the dovetail joints can even hold their shape with no wood glue or fastening.

This is a great option for making containers, shelves, and virtually any other woodworking piece. But sometimes it is complete overkill.

Pro-tip: You can fill small gaps in the dovetail joints with thin pieces of wood or adhesive combined with fine sawdust.

End grain coloration is the main downside of this kind of joint. Half-blind joints hide the end surfaces of pins, preventing it. Also, this feature may serve as a sort of decoration.



The bridle and the mortise and tenon joints

The bridle joint offers a balance between complexity and strength. It is very similar to the mortise and tenon joint. Bridle joint implies making a whole through slot rather than a cavity (mortise hole) and a full-width tenon tongue rather than a shaped pin. It looks much like the butt joint.

Both bridle and mortise and tenon joints make some sturdy and neat connections. Furniture legs, as well as structure frames, are some typical implementations of a mortise and tenon joint.

The mortise and tenon joint is also suitable for fabricating t-shaped joints meant for significant horizontal pressure. It takes some time and skill to make a tenon joint mortise, but the result is completely worth mastering.

Pro-tip: Never forget to wipe the excess glue, or else it might ruin the looks of a piece or require additional work on the surface.

Strengthening and fastening the joint

Friction and glue may provide enough force to hold two pieces of stock together, but the actual use of the finished project may require a lot more strength.

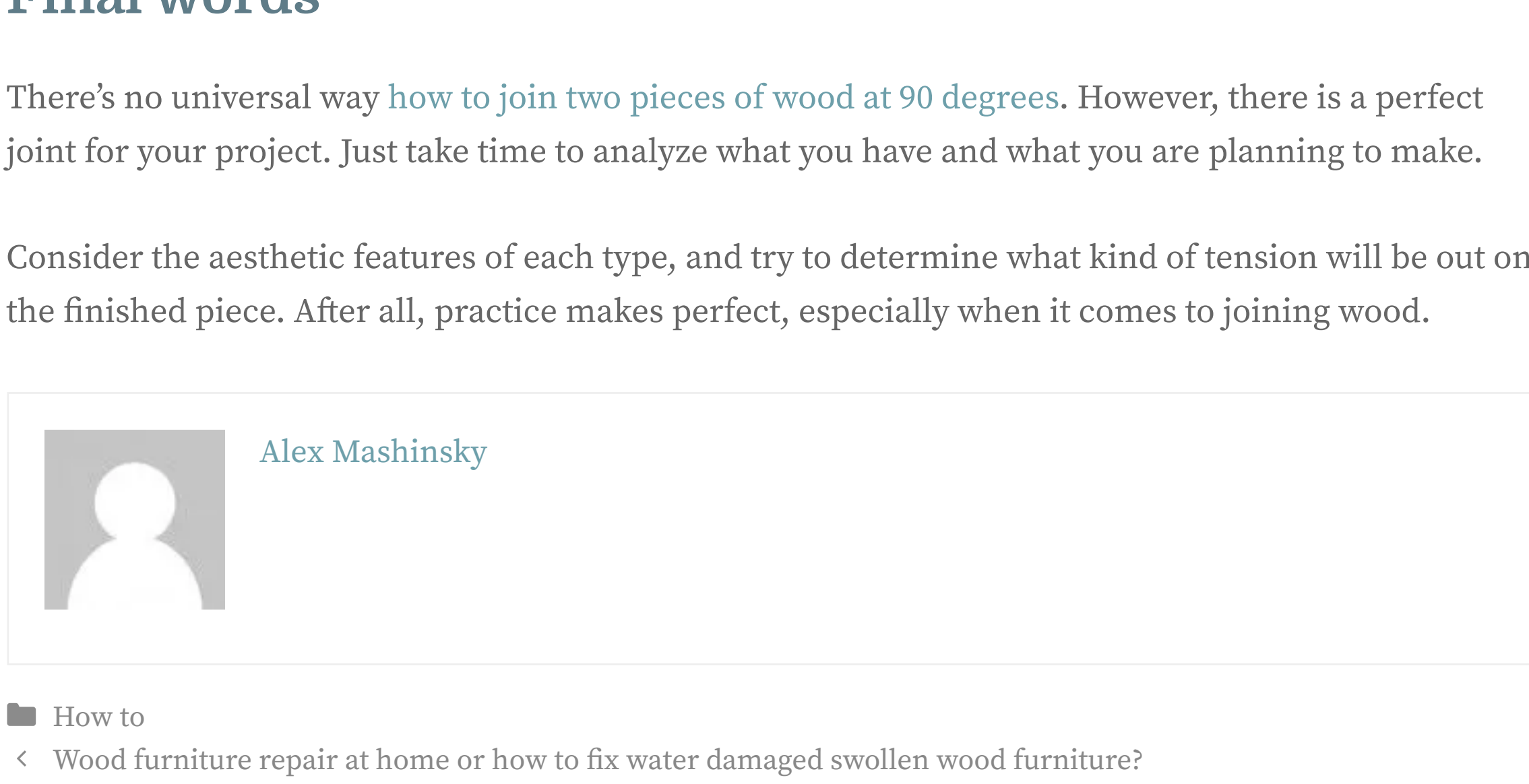
So it is never a bad idea to fasten joints with screws, nails, or inserts.

Mechanical fasteners

Nails and screws are mechanical fasteners. They may affect the looks of a joint or even ruin it. Here are some tricks that will prevent it:

1. Drilling holes before putting the fasteners in will prevent cracking.
2. Use a pocket holes jig to hide the screws on the inner side of the joint.
3. Use cylinder plugs to hide the heads of nails or screws.
4. Chip off a 'tongue' above the place of screwing or nailing and glue it back afterward.
5. Use wire nails with small heads.

Mechanical fasteners serve mostly for increasing the physical strength of a joint. Inserts serve a similar purpose, but also provide additional aesthetic features.



Inserts

Insert is a thin piece of wood or a dowel inserted and glued into one of the respective dowel holes in a joint. They can be completely hidden or partially exposed for decorative purposes.

They are usually made of ordinary wood of matching color, but you can pick colored splines and dowels to make a color variation.

For instance, splines are made with a biscuit-cutting jig. Leaf-shaped spline is glued in grooves on both ends of the stock, thus binding them together.

Info-piece: Some carpenters tend to put a dowel joint in its separate category. But it is not completely right. The dowel joint itself is more like a reinforcement of other joints.

Where to put the inserts?

Splines and dowels are often inserted in perpendicular cuts or holes to the seam line of the joints. They provide additional binding and when polished add visual accents. There are many ways of putting splines in an angled or crossed fashion to push decorative features even further.

Q&A piece

Let's wrap the overview of basic 90-degree wood joints with answers to some frequent questions.

What is the strongest 90 degree wood joint?

There's no ultimate joint. Every type works best depending on the type of load. But in general, the more gluing surface there is, the stronger the joint. Also, the quality of manufacturing directly affects strength. Only the butt joint can be considered a 'no go' for serious projects.

How do you connect two pieces of wood 90 degrees?

There are hundreds of variations of the right-angle joints, but each of them will do if you were wondering how to join two pieces of wood at 90 degrees. Just make sure to measure precisely and cut tidy.

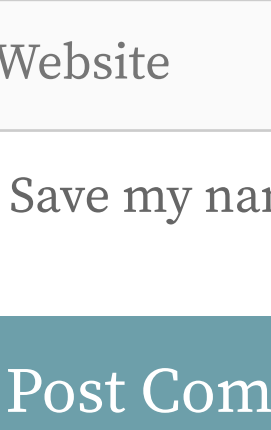
Is it necessary to glue a joint?

It completely depends on the purpose of the piece in the making, the type of joint, and the skill of the carpenter. But a bit of glue will never harm. In a worst-case scenario, it won't make much difference.

Final words

There's no universal way how to join two pieces of wood at 90 degrees. However, there is a perfect joint for your project. Just take time to analyze what you have and what you are planning to make.

Consider the aesthetic features of each type, and try to determine what kind of tension will be out on the finished piece. After all, practice makes perfect, especially when it comes to joining wood.



Alex Mashinsky

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