Japanese Joinery in Practice

A privileged look at this historic art in today's context

BY EMI SHINMURA

My aunt, Harumi Shinmura, is a traditionally trained residential carpenter working in Japan's western island of Kyushu. She is a guiding figure in my life, and I've been fortunate to regularly learn a sliver of her craft while working on-site with her.

Part of my good fortune is because my aunt practices a disappearing craft. *Tekizami*, hand preparation of timber by craftspeople rather than entirely by machines, is unfortunately not common in Japan nowadays. Most houses are built with material precut in factories, including the joinery; the carpenter's job is to assemble all the premade parts on-site. Sometimes, though, there are clients who value the quality of the long-established methods practiced by my aunt and others like her.

So was the case with my aunt's recent project, a simple, single-story bunkhouse about 13 ft. by 26 ft. intended for cooking enthusiasts. The whole structure was made with cypress and cedar, which are ideal for Japan's hot and humid climate. Timber buildings in general are particularly good at regulating moisture in these climates and have been developed over many centuries to survive adverse weather and earthquakes. Traditional buildings in Japan were built with longevity and repairability in mind. With careful maintenance, these buildings can last for centuries. Today, even traditional buildings in Japan, once all wood, are required to have metal fasteners and brackets (much to the despair of some traditional carpenters).

Knowing that my aunt's carpentry knowledge was accumulated through many strict years of observing her master, I'm in a unique position to ask my aunt about her craft, something that is not allowed in a

Photos: courtesy of Emi Shinmura

traditional apprenticeship. I feel honored to have a direct glimpse into this world, but it feels somewhat intrusive at the same time.

The following illustrations grew out of working with my aunt on the bunkhouse. To practice layout and conduct self-guided research, I sketched the joints that were used.

The joints in this article are a mix of common, well-understood ones and alterations my aunt made for this particular build. The appearance or complexity of a joint is not most important; instead, its function is foremost. There are numerous variations of a joint type, and the basic types can be mixed and altered depending on the purpose. I often asked my aunt about the construction, and quite often the answer was that her master did it a certain way and she'd adapted it for this build.

Emi Shinmura is a U.K.-based artist and woodworker. To see more of her work, go to Instagram at @emi.shinmura.

OFF-SITE PREP

Emi Shinmura and her aunt, Harumi Shinmura, readied their workpieces at the aunt's workshop before taking them to the build site.

Set out to dry. *Master carpenters in Japan are traditionally responsible for most of the tasks an architect would undertake in the West as well as all the timber preparation, including the stock, joinery, and construction.*

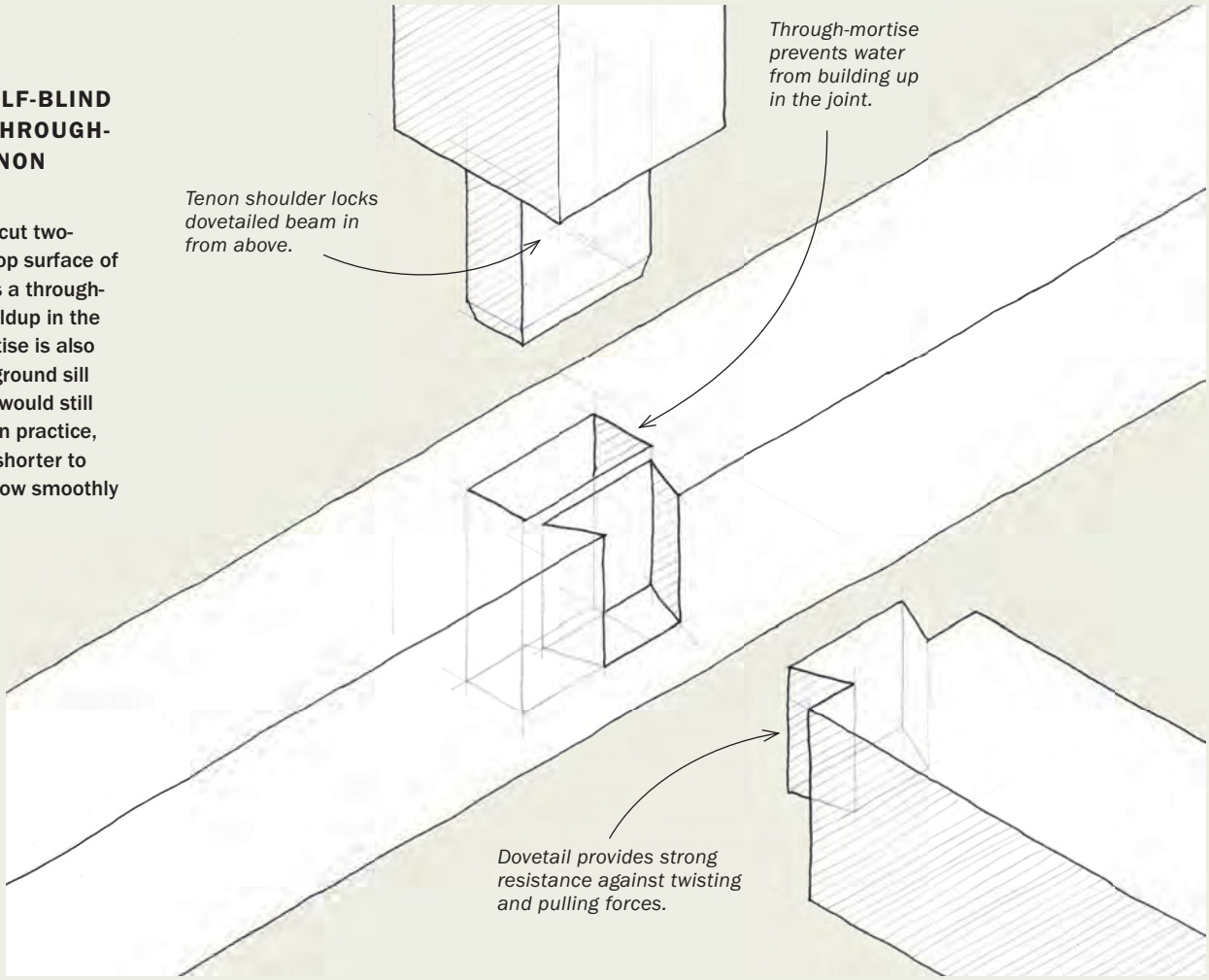
A human touch, but machines still have their place. *Modern home-building in Japan, like many other places, has become increasingly mechanized. In contrast, Emi and her aunt got more hands-on, from joinery to finish planing. While they often picked up a chisel, plane, or saw when necessary, the two turned to machines for the more back-breaking efforts, like the many wide and deep mortises.*

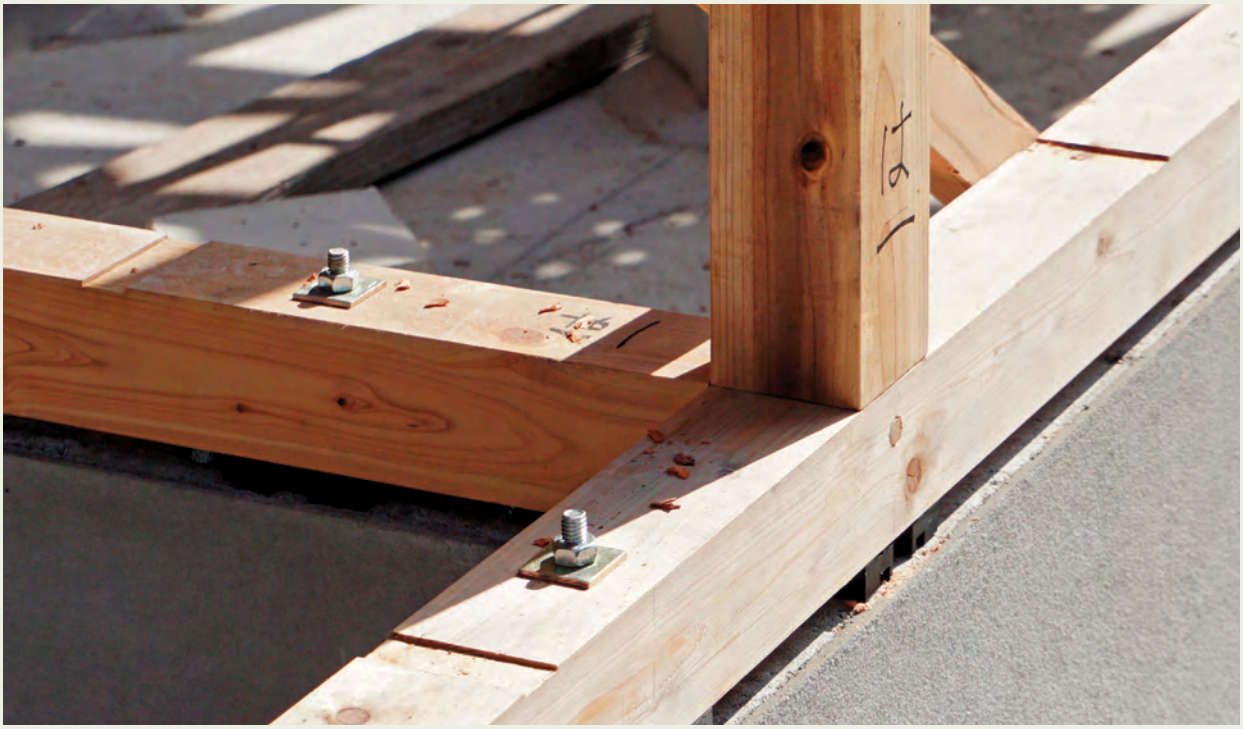
Foundation joints

ARI OTOSHI

HALF-LAPPED, HALF-BLIND DOVETAIL WITH THROUGH-MORTISE-AND-TENON

The dovetail joints are cut two-thirds down from the top surface of a beam. The mortise is a through-joint to avoid water buildup in the joint. The through-mortise is also insurance in case the ground sill rots, since the column would still touch the foundation. In practice, the tenon is cut 5mm shorter to allow construction to flow smoothly on-site.

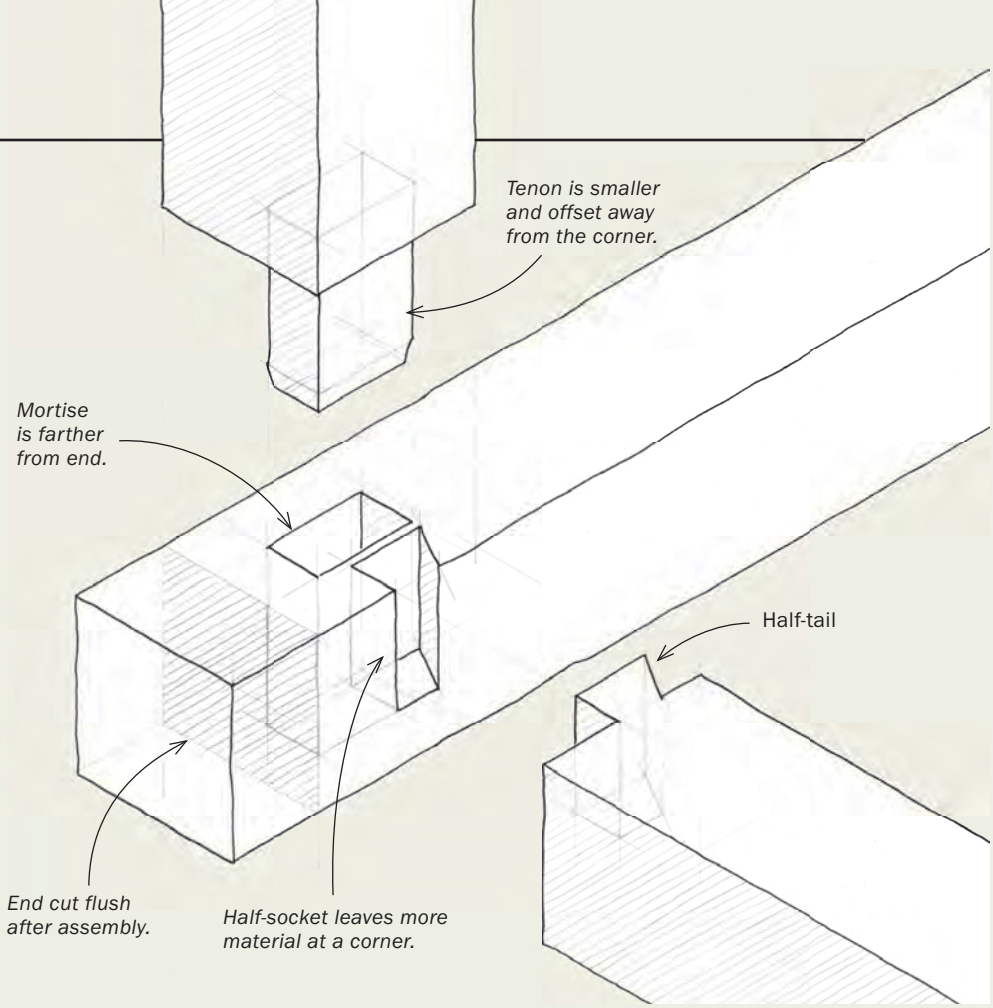




Ground-level joint. *The mortised beam sits on a solid foundation wall, and the dovetailed beam may be on a solid foundation or supported on posts to the ground.*

ARI OTOSHI IN A CORNER

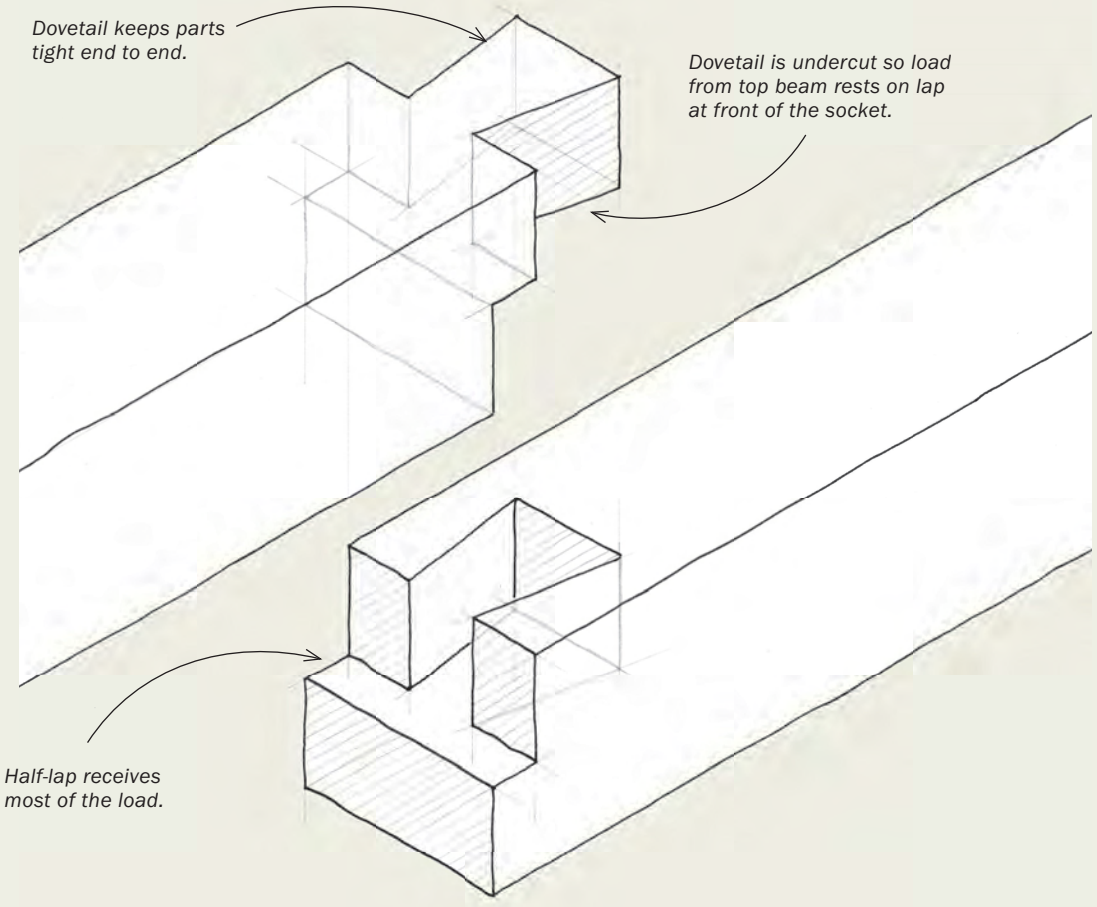
In high-quality builds, the corner joint would not expose the end grain but would consist of a cleaner, mitered option. However, taking into account the fact that the corner of the building would be clad and the length of time required to make a mitered joint that ties the beams together and accepts a column, we used an adaptation of the ari otoshi. To allow for enough material at the outer edge of the building, the dovetail has only one angled cheek and the tenon is smaller and offset away from the edge closer to the corner.



KOSHIKAKE ARI TSUGI

LAPPED DOVETAIL SCARF JOINT

This typical ground sill joint consists of a dovetail and a half-lap. The joint fits into place from above. The dovetail is undercut so the half-lap receives much of the load. It is necessary to place this joint where the least stress will occur. Also, because the joint allows twisting, it is mainly used to join ground sills on a continuous foundation wall. A high quality, water-resistant timber such as cypress is typically used because these beams are likely to be exposed to heavy rains and flooding.



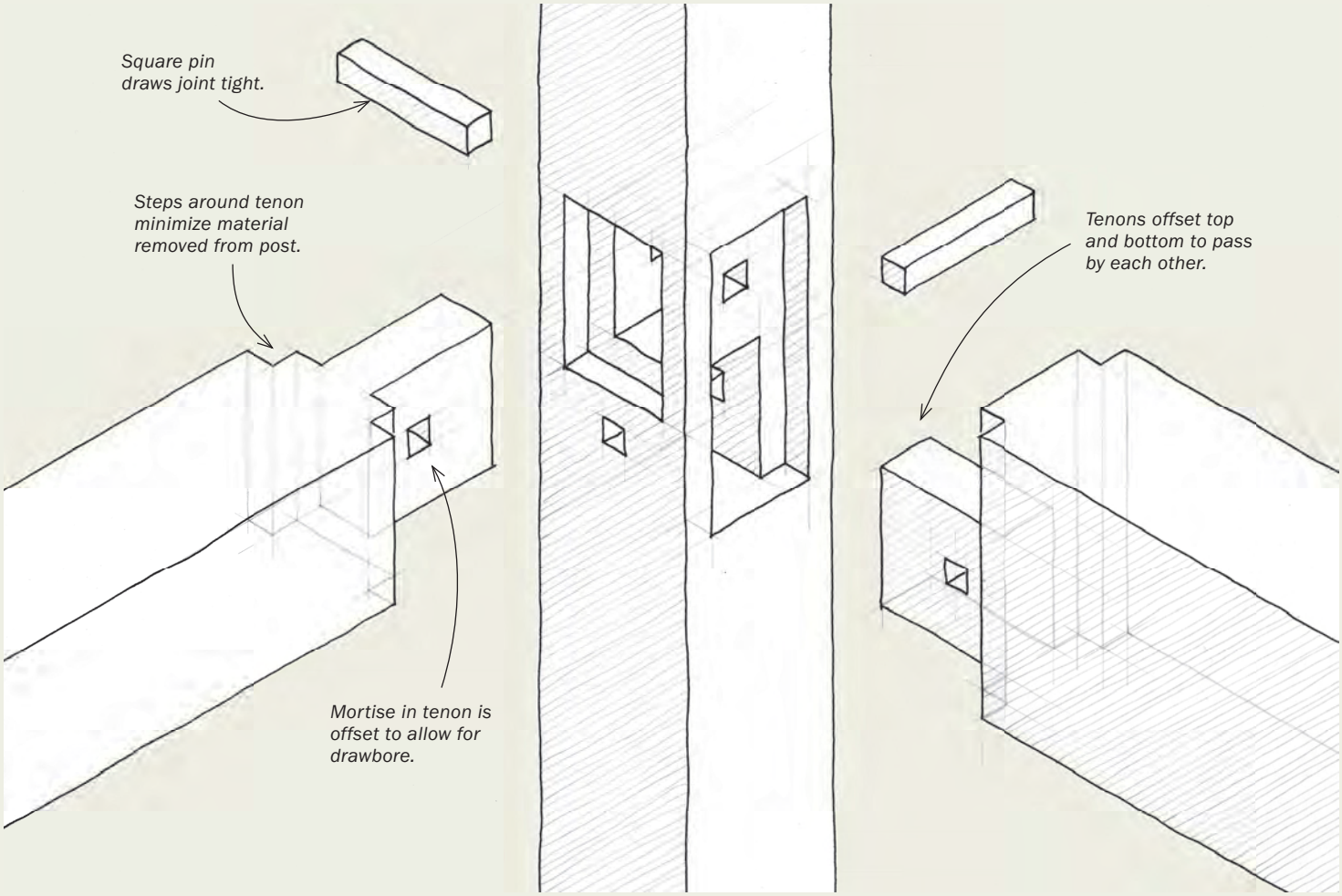
Drawings: Emi Shinmura

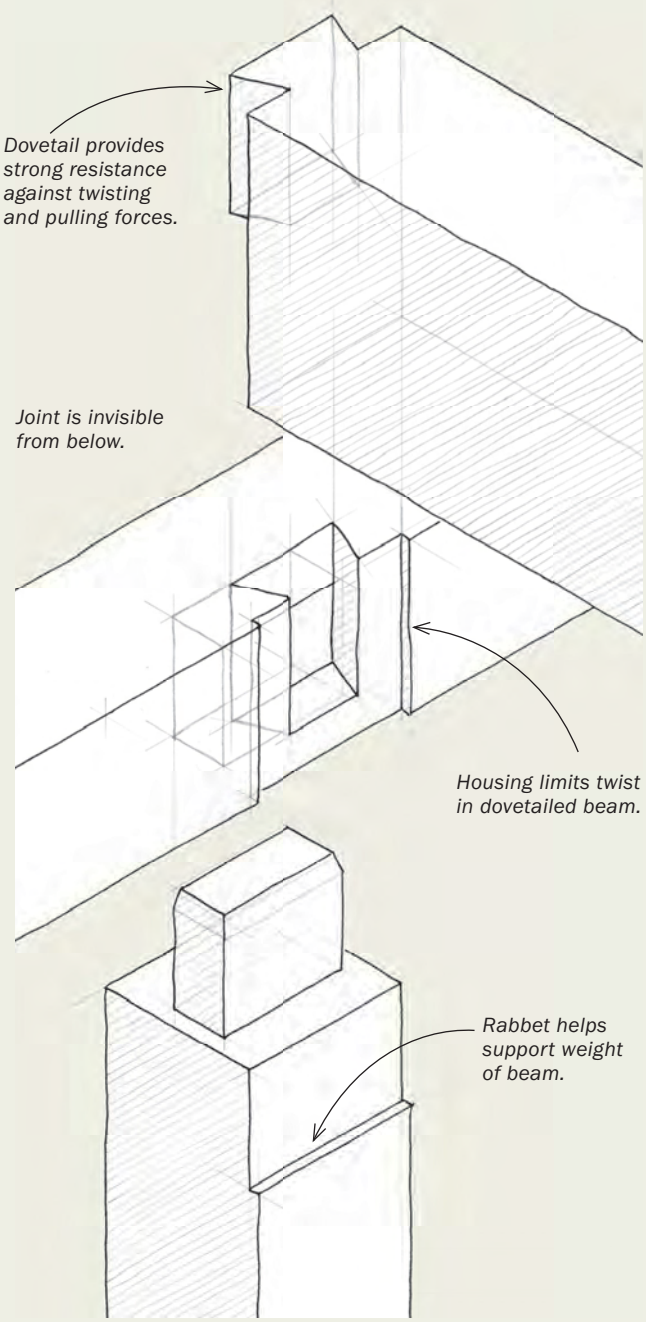
Post-and-beam joints

ERIWA TSUKI DOTSUKI KOMISEN UCHI

HAUNCHED, HOUSED, AND PINNED MORTISE-AND-TENON

This joint is commonly found in corners of a two-story house or in places where a post extends past the ceiling beam and to the roof. The post's housing eases some of the weight on the tenons. The stepped tenons reduce the amount of material removed from the post, keeping it more intact for strength. Both tenons are secured with square hardwood pins. The corresponding square holes in the tenons are offset 1.5mm to pull the beam in tight against the column during assembly.

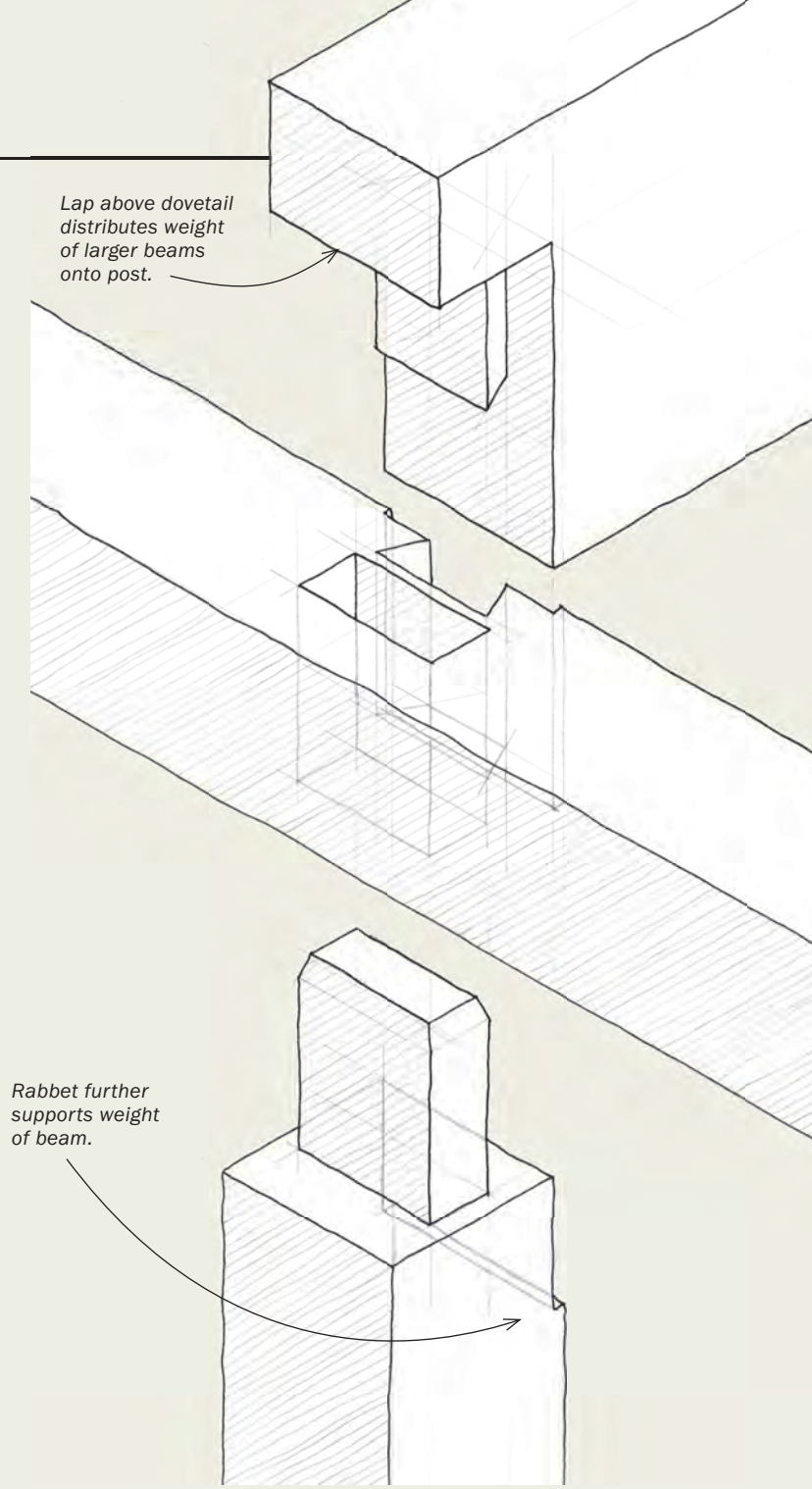




OOIRE ARI OTOSHI

HOUSED, HALF-LAPPED, HALF-BLIND DOVETAIL WITH STUB MORTISE-AND-TENON

This joint is very similar to the ground sill ari otoshi except for the 5mm-deep housing in the mortised beam and the corresponding rabbet in the post, which have several benefits. For one, the rabbet takes some of the beam's weight off the dovetail. The housing, meanwhile, reduces the amount of twist in the beam as it ages. Third, the pair ensures the joint will be completely hidden, including any gaps.



OOIRE KABUTO ARI KAKE

END LAP JOINT WITH A THROUGH-TENON AND HOUSED DOVETAIL

This is very similar to the koshikake ari tsugi. It is used when the transverse beam is particularly large, as it displaces some of the weight to the top of a post. There is also a housing in the mortised beam, and a rabbet on the post to further support the dovetailed beam's weight. When this joint is used without a post to support it, the dovetail should be smaller to avoid over-compromising the beam at this connection.

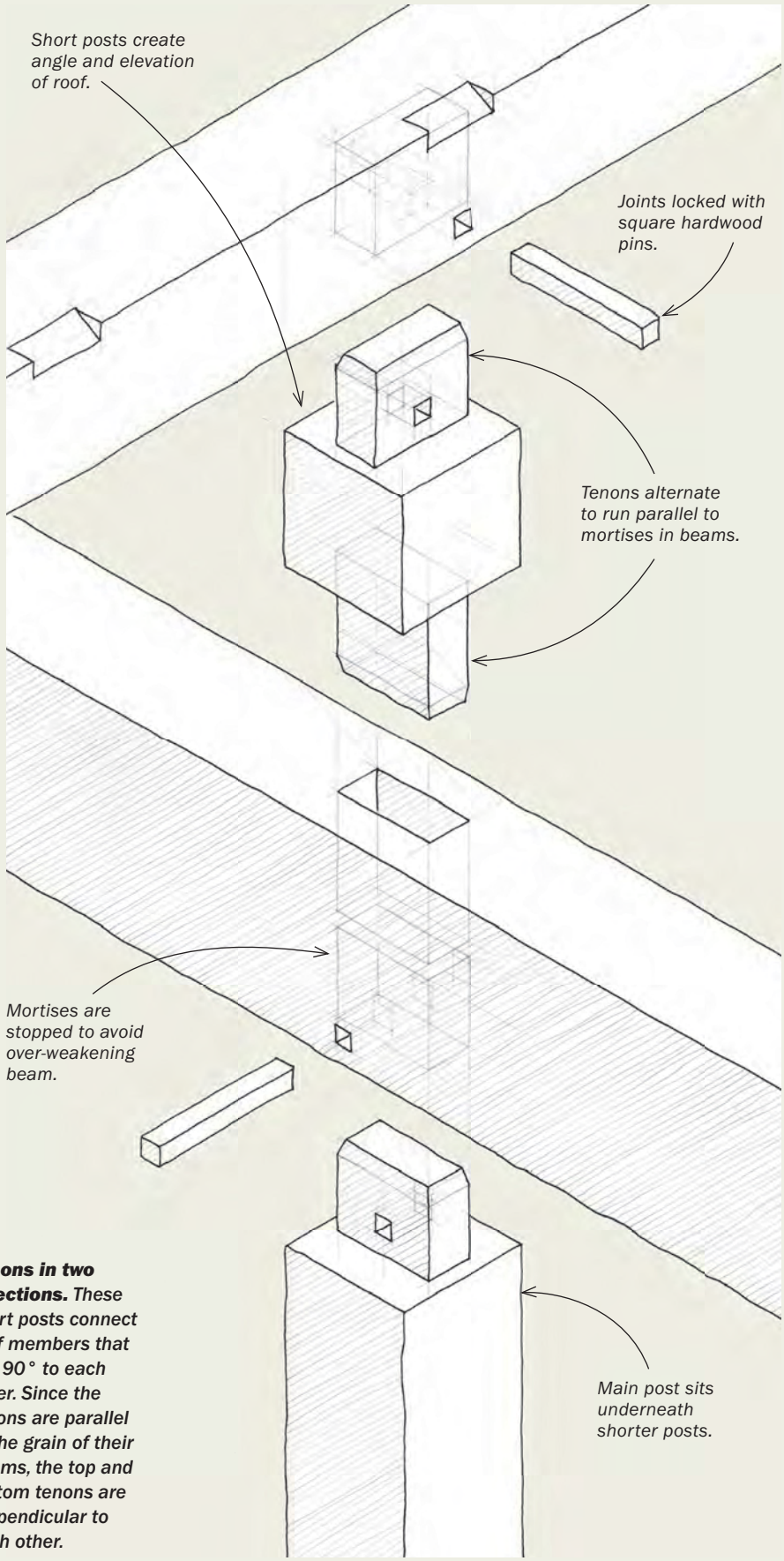
Post-and-beam joints

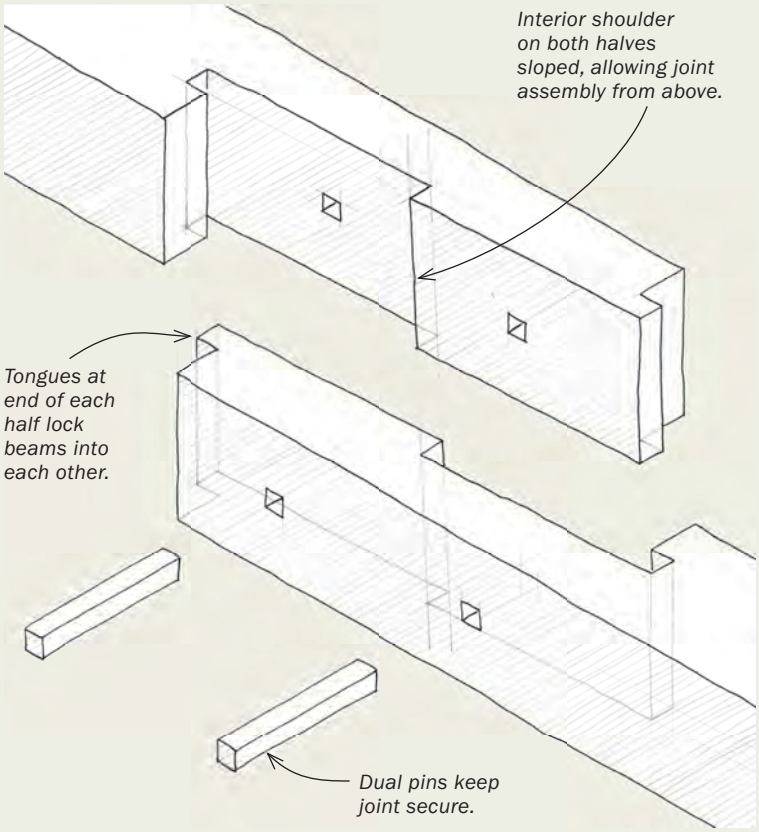
KOYAZUKA

END POST

Short posts of varying heights are used to achieve a certain angle of roof. These posts are installed on top of the girders and support the transverse beams and ridge beam. Tenons on both top and bottom run parallel to the corresponding beams so the beams are not weakened in their width. The thickness of the tenons is half to two-thirds of the beam's width. To maintain the strength of the beam, it's better not to connect the mortises between the tenons. The tenons are secured in place by hardwood pins.

Tenons in two directions. *These short posts connect roof members that run 90° to each other. Since the tenons are parallel to the grain of their beams, the top and bottom tenons are perpendicular to each other.*





OKKAKE DAISEN TSUGI

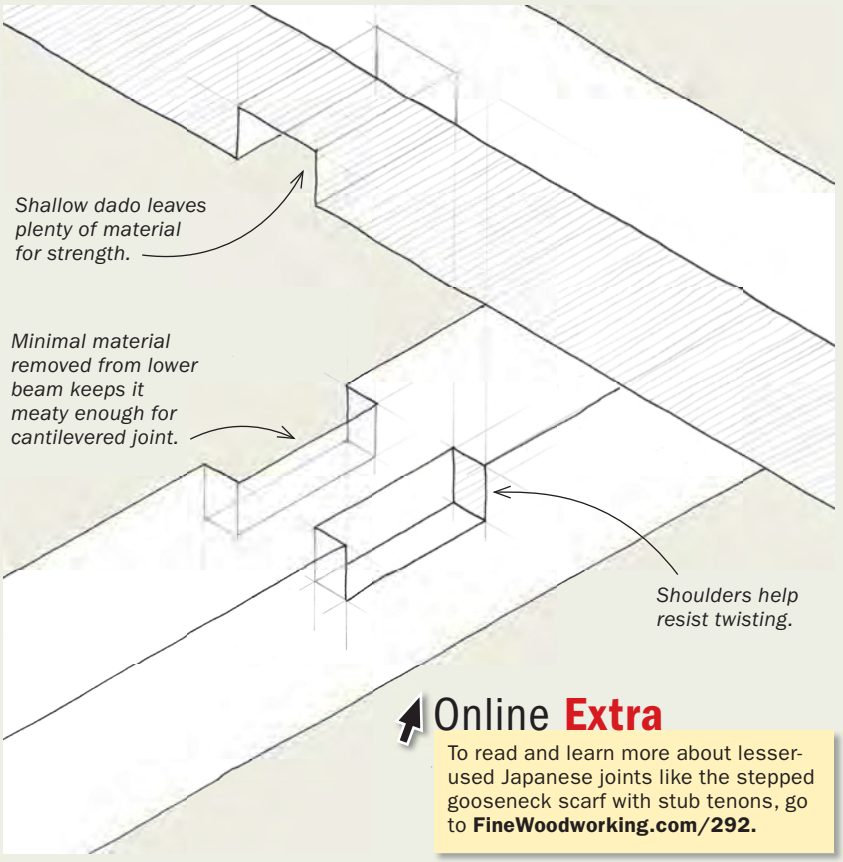
DADOED AND RABBETED SCARF JOINT

This splice is typically used to join ground sills, girders, and beams. This is a very reliable and stable joint that resists tension and bending stresses well. The two sides of the joint are mirror images of each other. The middle shoulder has a 1:20 slope, meaning the joint can be assembled only by sliding the top piece onto the bottom. The slope also stops the upper member from passing the bottom of the beam. The lower, receiving part of the joint needs to be near a column for support. The wooden pins strengthen the joint and prevent movement.

WATARI AGO

DADOED CROSS-LAP

In this joint used for cantilevered beams, the upper member typically overlaps the lower by one third. So, unlike a full lap joint, the lower workpiece is not halved but has only small mortises cut into it, resulting in a stronger beam. The shoulders add strength against twisting compared with a half-lap joint. The joint is also used to connect floor joists to beams and is commonly secured by nailing. It is less used today, giving way to strong screws and brackets.



Online Extra

To read and learn more about lesser-used Japanese joints like the stepped gooseneck scarf with stub tenons, go to **FineWoodworking.com/292.**