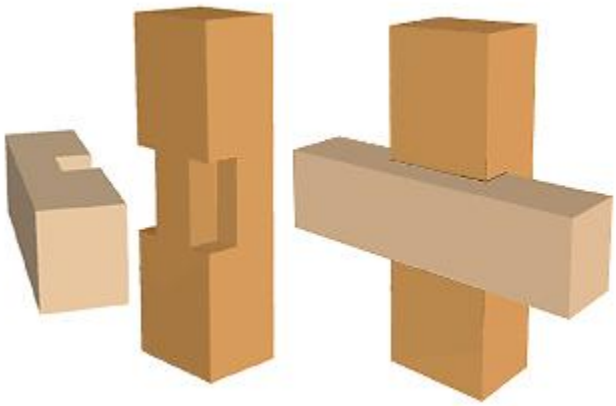
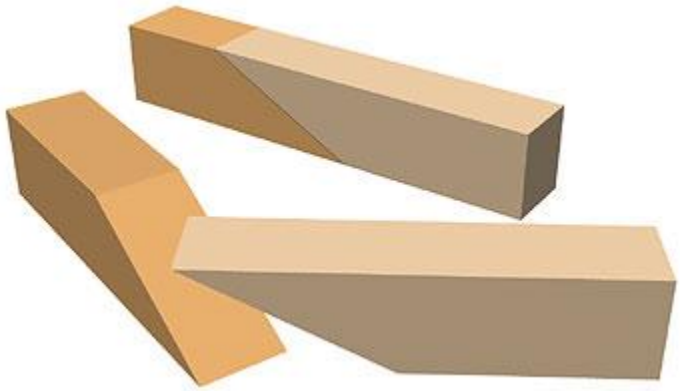
agokaki　腮欠

Lit. chin gap. One of many types of cogging joints. The joint is used to attach a horizontal timber to the face of a square post or pillar. Cuts are made on two corners on the same side of the post leaving an uncut center section. The horizontal beam has one notch cut out so that it can be pounded in until it is tight against the flat center part between the two notched corners. This beam can hug the pillar as the uncut parts fit into the corner gaps. If the entire width from corner to corner is cut out, and the horizontal beam is inserted into that cut, it is called *kirikaki* 切欠, or cogging.



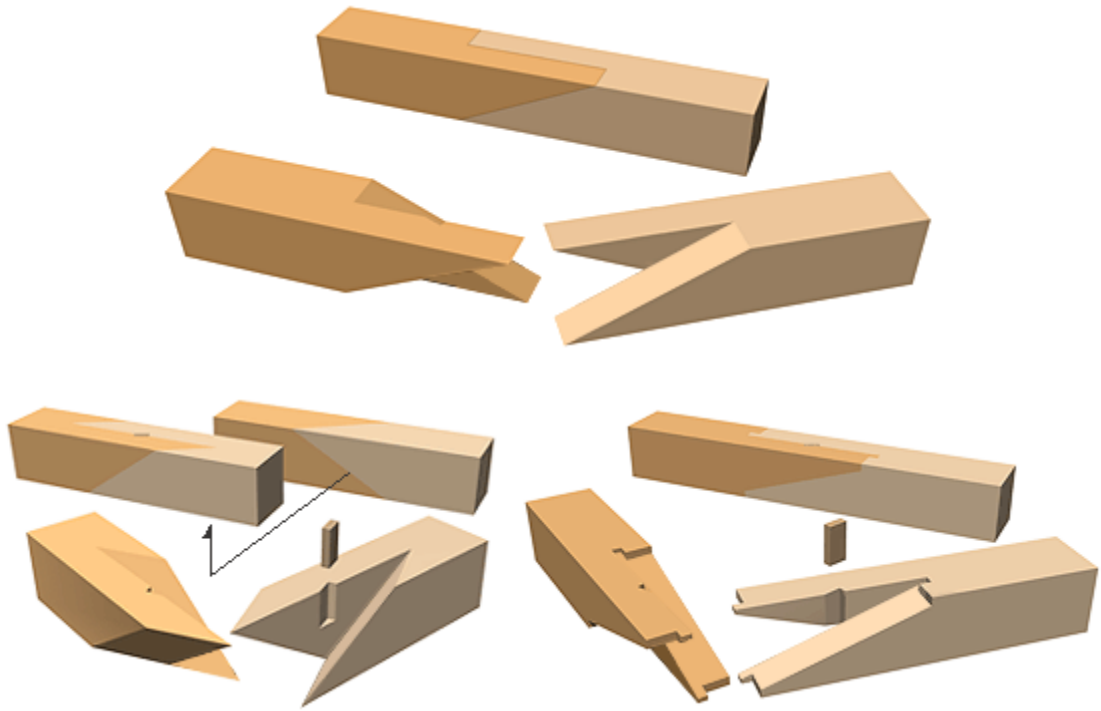
sogitsugi　殺継

Also called *suberihatsugi* 滑刃継; *hauchitsugi* 羽打継. A scarf joint. A simple butt joint made stronger by splicing the ends of a timber obliquely and joining the matching surfaces from the top with a type of nail called *awasekugi* 合釘. This joint is generally used only for light weight timber. If the scarf planes are too long, the joint will be weak. Hence, the oblique cut rarely exceeded a 30 degree angle. The joint was commonly used to extend the length of rafters, **taruki* 垂木. One or two heavy nails were often added to strengthen the joint. Without proper reinforcement the scarf joint and the lap joint, **koshikaketsugi* 腰掛継, were relatively ineffective except to adjust the alignment of members. Consequently, both the scarf and lap joints were combined with other methods of joinery to produce complex joints which could withstand tension and twist without the use of extraneous material to strengthen them.



isukatsugi　いすか継

A halved rabbeted (oblique) scarf joint. (See *[*sogitsugi* 殺継](). A simple scarf joint, often called a crossbill scarf because it resembles the open bill of a bird. The so-called 'female end' is spliced obliquely with half the width of the timber cut off from the top and the other half cut off on the underside. The 'male piece' is cut into exactly the same shape except that the oblique surfaces are reversed to allow them to fit together perfectly. Because this is a rather weak joint, a key, *[*shachi* 車知](), is inserted into the double-faced joint a little over half the thickness of the timber. It does not reach through the lower face. Stub tenons are cut in proportion to the width of the joint. Called the *sumikiri isukatsugi* 隅切いすか継, it is used in buildings like monks' dormitories where appearance is unimportant. Also used to join the ribs, *[*goubuchi* 格縁](), of a coffered ceiling, *[*goutenjou* 格天井](). More complex scarf joints include the one called the m*iyajimatsugi* 宮島継 which is a triple-faced, halved, rabbeted, oblique scarf joint with a key. It differs from ordinary triple spiced scarf joints in that it has a triple-faced cone shape at the end of the obliquely cut surfaces. One type of halved rabbeted oblique scarf joint has four faces. It looks simple but is very difficult to make. *Isuka tsugi* joint and all its variations are made in the direction of the grain. Examples: Okadera 岡寺, in Nara (1612), used on the eave purlin, *[*dashigeta* 出桁](), of the gate, Nioumon 仁王門; Itsukushima Jinja Ootorii 厳島神社大鳥居, in Miyajima 宮島, Hiroshima prefecture (1875). The *miyajimatsugi* is used on this gate, from which it derives its name.



hagi　矧

A suffix used to describe edge joints of various types.

1　*Imohagi* 芋矧, a straight joint. The lengthwise edges of boards planed very smoothly and butted together. It is used for flooring and paneling.

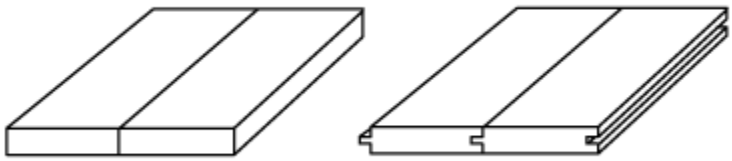
2　*Honzanehagi* 本実矧, a tongue and groove joint with the groove cut along edge of a one board and a

tongue cut from the edge of another board. The tongue fits snugly into the groove of the next board. Useful for hardwood flooring. Also called *sanehagi* 実矧 and *inroujakuri* 印籠決.

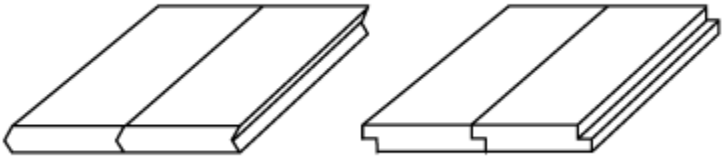
3 *Hibukurahagi* 樋部倉矧, a V-groove joint. A board with a V-angle edge protruding on one side and a V-groove cut on the opposite side. The two boards fit tightly together. This joint is not strong enough for flooring but works well for paneling.

4 *Chigaihagi* 違矧 or *aijakuruhagi* 合決矧, a shiplap, rabbeted or rebated joint. The length of one side of a board is stepped while the opposite side is rabbeted to fit over the stepped side of the other board. It is good for exterior siding and paneling.

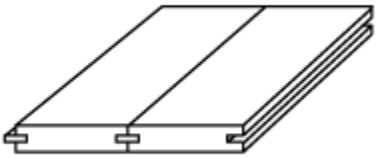
5 *Yatoizanehagi* 雇実矧, a spline or feathered joint. The spline is usually made of hardwood inserted into grooves cut on each edge of boards made of softwood. Sometimes the splines are cut across the grain to increase their strengh. This is not really a true joint. Used for flooring. These joints are frequently used in temple, shrine and domestic architecture.



1 *imohagi* 芋矧　　**2** *honzanehagi* 本実矧



3 *hibukurahagi* 樋部倉矧　**4** *chigaihagi* 違矧

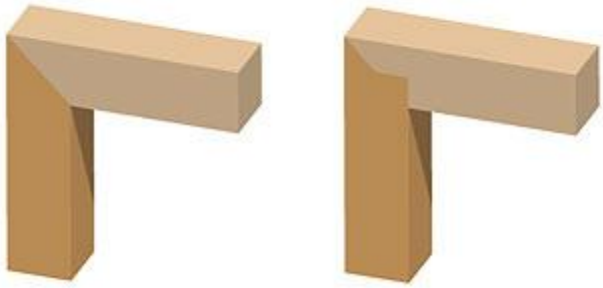


5 *yatoizanehagi* 雇実矧

tome　留

A simple miter. The timbers are cut obliquely, usually at 45 degrees, or any other angle as long as the two adjoining timbers share the angle equally. Because a simple mitered corner joint lacks strength, various types of mortises and tenons (**hozoana* ほぞ穴, **hozo* ほぞ) are used to increase durability and prevent separation of the parts.

There are several common variations: **1.** *Handome* 半留 a half mitered joint. Often called a shoulder miter. **2.** *Eriwadome* 襟輪留 lit. collar miter. A dado and rabbeted right angle joint. **3.** *Hakodome* 箱留, box-like miter. A mitered corner with a rabbeted tenon joint. **4.** *Oodome* 大留, a mitered corner half lap joint in which an oblique cut from the outer corner to the inner side half the depth of the female beam, forms the hypotenuse of a right triangle. This piece is removed. The same shaped piece is cut from the under side of the male beam. The triangular lip of this beam laps over the part remaining on the lower half of the female beam. **5.** *Kakushi domekata sanmai hozo* 隠し留形三枚ほぞ, a mitered joint with a hidden or blind stub tenon and mortise. **6.** *Kakushi domeari sanmai hozo* 隠し留蟻三枚ほぞ, a mitered joint with a blind dovetail tenon and mortise. These mitered joints are used for creating a fine finish in the corners of interior trim and for furniture.

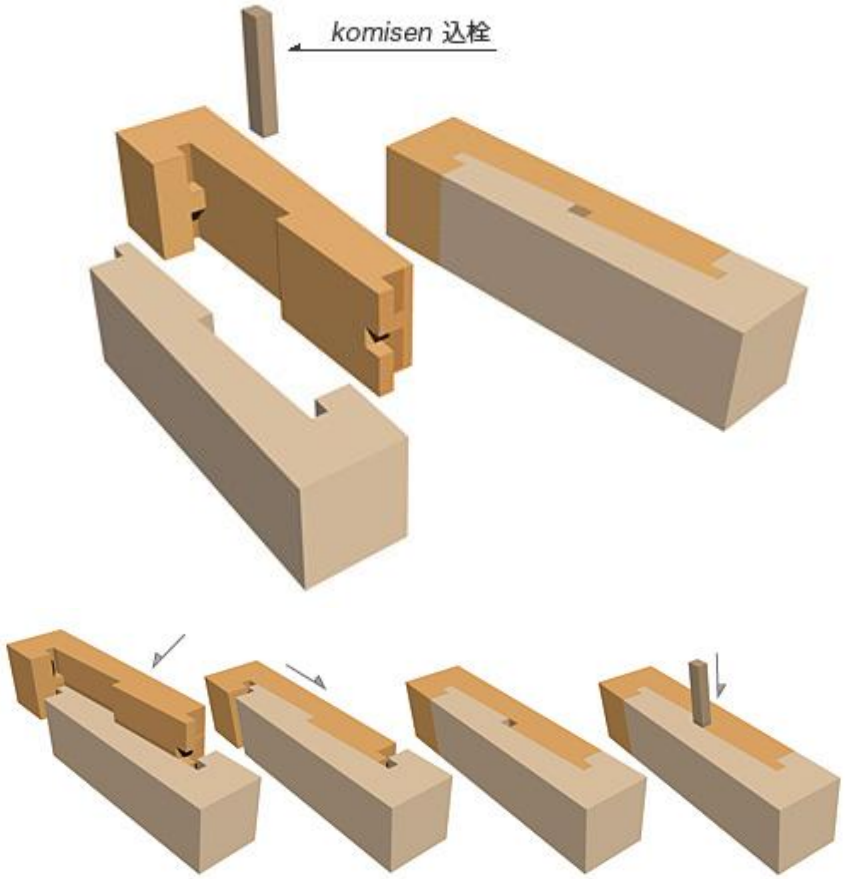


oodome 大留　　*handome* 半留

kakushi domeari sanmai hozo 隠し留蟻三枚ほぞ　　*kakushi domekata sanmai hozo* 隠し留形三枚ほぞ　　*hakodome* 箱留

shippasamitsugi　尻挟継

Also called *shiribasamitsugi* 尻挟継; *obasamitsugi* 尾鋏継. A blind, stubbed, housed, rabbeted, oblique, scarf joint. A type of *[*kanawatsugi*]() 金輪継, a mortised, rabbeted, oblique, spliced joint. The *shippasami* joint has a T-shaped tenon and mortise and the two members to be joined are slipped in from the side. A pin *komisen* 込栓 is inserted into a 15mm square hole at the center of the joint to hold it securely. The tenon and mortise are not visible from the sides of the joint but a fine, straight line is discernible. This is the chief difference between the *shippasamitsugi* and the *kanawatsugi* joint. This joint is used to connect beams and foundation footings.

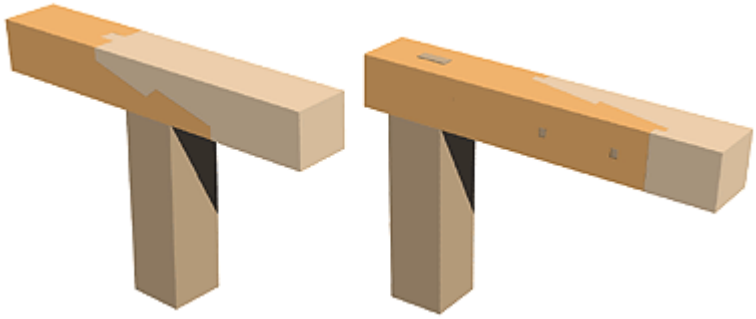


tsugite　継手

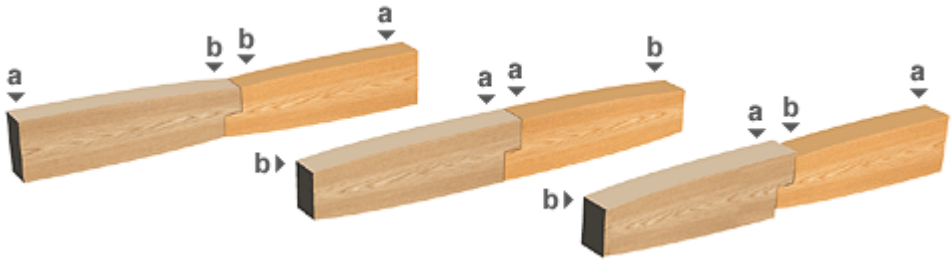
Also written 接手.

1　A generic term for joinery including spliced and angled joints. When used as a suffix in compounds, the *te* 手 is often dropped.

2　To join timbers end to end to increase their length; end or butt joints. Japanese joinery is divided broadly into two basic types: butt or straight joints, *tsugite*, and angle joints, *shiguchi 仕口. Consideration must be given to parts of the tree from which the timber has been cut. There are three basic arrangements: a) *yukiaitsugi* 行合継, to join timber ends which were both close to the top of the trunk, *sueguchi* 末口. b) *wakaretsugi* 別継, to join ends from the base of the trunk, *motoguchi* 元口. c) *okuritsugi* 送継, to join two timbers, one end of which came from the upper part of the trunk and the other from the base. It is also important to note the location of the jointed member in relation to the timber to which it is attached: **shintsugi* 真継, the joint itself is squarely set upon a supportive member such as a pillar; *mochidashitsugi* 持出継 the joint itself is in part of the member which extends beyond the supportive timber. This results in a certain weakness in the jointed member. Finally, the most fundamental methods of joinery include: a) *kirikumitsugi* 切組継, a joint dependent upon tenon, **hozo* ほぞ, and mortise, **hozoana* ほぞ穴; b) **koshikaketsugi* 腰掛継, a lapped joint; c) *soegi itatsugi* 添木板継 or *soegitsugi* 添木継, a splint or brace joint, d) **sogitsugi* 殺継, a scarf joint.



*shintsugi 真継　　*mochidashitsugi* 持出継



yukiaitsugi 行合継　　*wakaretsugi* 別継　　*okuritsugi* 送継

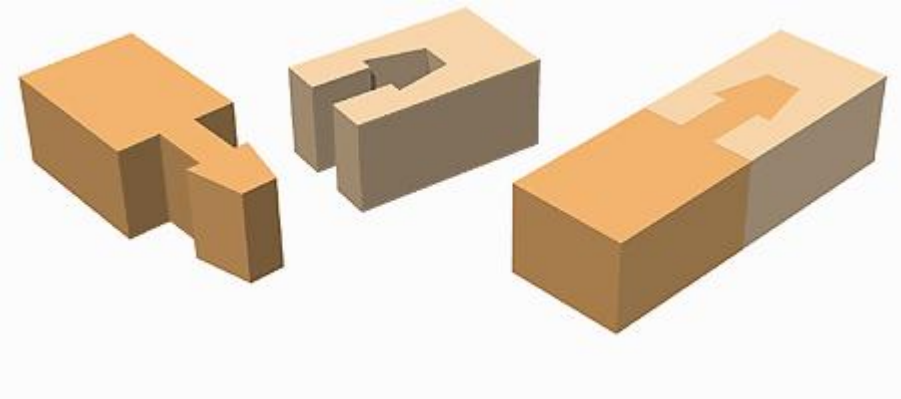
a) *motoguchi* 元口　　b) *sueguchi* 末口

kamatsugi　鎌継

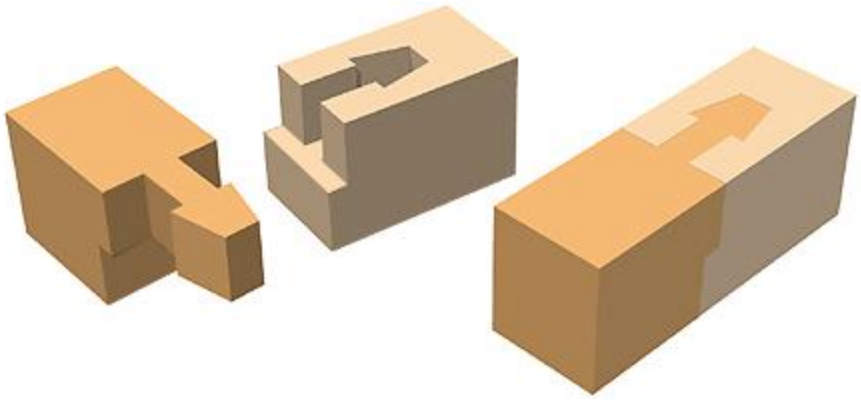
1　A gooseneck tenon and mortise joint. The mortise is cut into one section, and the tenon, with head and neck a single member, is cut into the other. The neck of the tenon is roughly square or rectagular and varies in length according to need. *Kamatsugi* were used as early as the 7c. By the medieval period (13c-16c), the head was tapered and resembled a blunted arrow. A variation resembling a double gooseneck with heads at each end of the tenon is set into the mortise of the same shape. Usually used to connect two beams. The joint is called **chigiritsugi* 千切継.

2　**Koshikake kamatsugi* 腰掛鎌継; also called *shikimen kamatsugi* 敷面鎌継. A lapped mortise and tenon gooseneck joint.

3　Also **mechigai hozotsuki kamatsugi* 目違ほぞ付鎌継. A lapped gooseneck joint with half blind tenons-and-mortises. The tennoned piece has a blind tenon cut from the lower half of the beam so that its outer corners are in line with the corners made by the projection of the neck from the beam. A blind mortise is cut on the lower half of the matching piece. The upper sides are adjacent to the gooseneck mortise and are cut away to form benches **koshikake* 腰掛, on either side of the blind mortise. These fit snugly into the cutaway sides of the blind tenon. A variation used to further strengthen the joint and prevent twisting includes right angled blind mortises which may be cut on either side of the entrance for the neck. Blind tenons are then cut into the matching piece.



*koshikake kamatsugi 腰掛鎌継

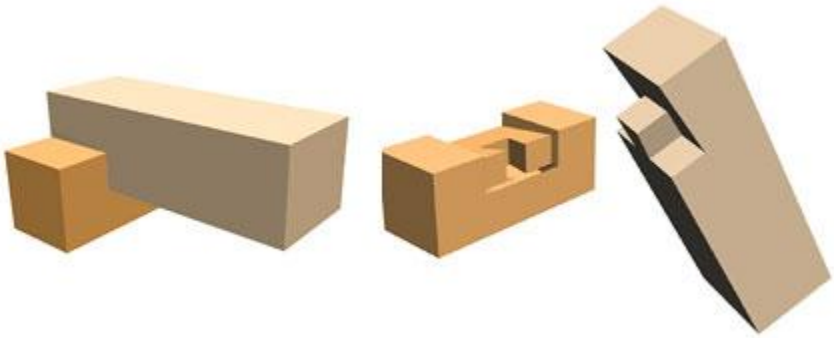


arikake　蟻掛

1　A dovetail joint with the dovetail tenon cut at the butt end about half the depth of one beam. It then is dropped into a mortise of the same shape, cut on the long side of another beam and joined at a right angle.

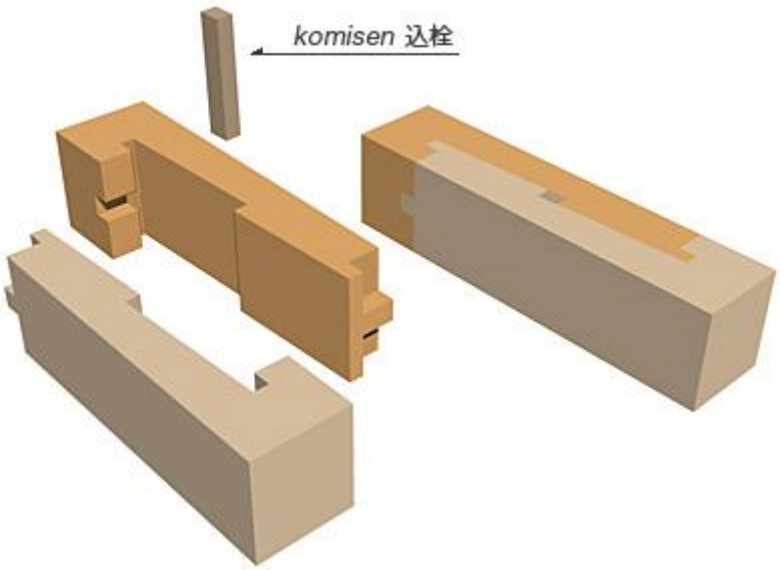
2　A variation closely resembling the housed dovetail joint *ariotoshi 蟻落, except that the *arikake* contains a bench cut on the mortised beam and a lap cut on the lower half of the tenoned beam. This is a stronger joint because the recessed part is cut from only half the side face. When the two beams are joined, the lap on the tenoned beam rests on the bench of the mortised beam. It is a half-lapped, half-blind, dovetail, right-angle joint with a rectangular pin　*koshikake aritsugi 腰掛蟻継. Used in ground sills *dodai 土台, where it must support a vertical member, for example, in floor joists joined to pillars or posts and in joining purlin ends to corner rafters.

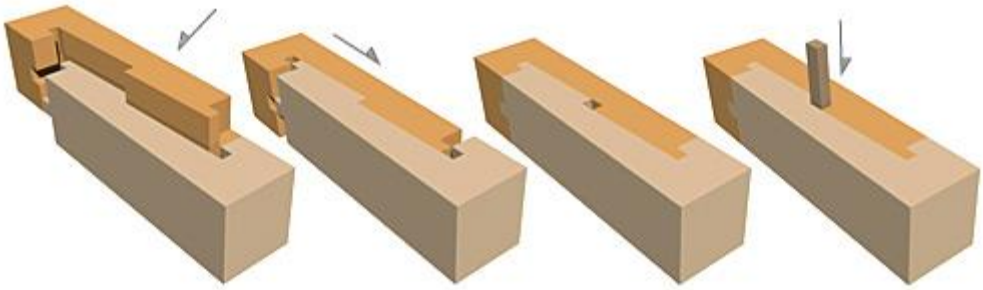
3 *Kabuto arikake* 兜蟻掛 or *kyouro arikake* 京呂蟻掛 is another variant of *arikake* but very similar to the *koshikake aritsugi* type. It is a housed, dadoed, half-lapped, half-blind dovetail joint used to join a purlin and a transverse beam to the top of a pillar.



kanawatsugi　金輪継

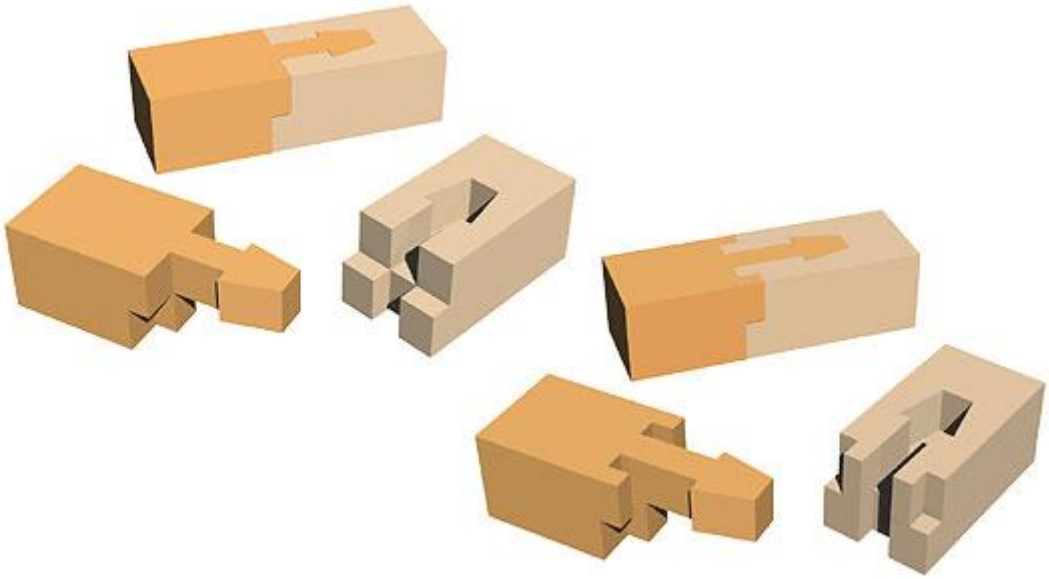
An oblique, housed (dadoed), rabbeted, T-shaped, half-blind, tenoned scarf joint. Because both the tenon and mortise are blind, the joint cannot be slipped together from the side, as in an oblique, housed, rabbeted, scarf joint **okkake daisentsugi* 追掛大栓継. The oblique surface on the mortised half of the indented part is decreased by the depth of the rabbet. Therefore, the end with the inverted T-tenon on the corresponding piece must be inserted in a lengthwise direction. Then a joining draw pin *komisen* 込栓 (see **sen* 栓) is driven through the opening provided in the center to lock the joints. Sometimes two keys **shachi* 車知 are used in place of a draw pin to strengthen the joint. This joint is commonly used in foundation footings **dodai* 土台, wall plates **daiwa* 台輪, the beam used for the bottom tracks for sliding doors or window **shikigeta* 敷桁, and in eave purlins **dashigeta* 出桁. The improvement in carpenter's tools in the Edo period made it possible to fashion complex joints such as this.





mechigaihozotsuki kamatsugi　目違ほぞ付鎌継

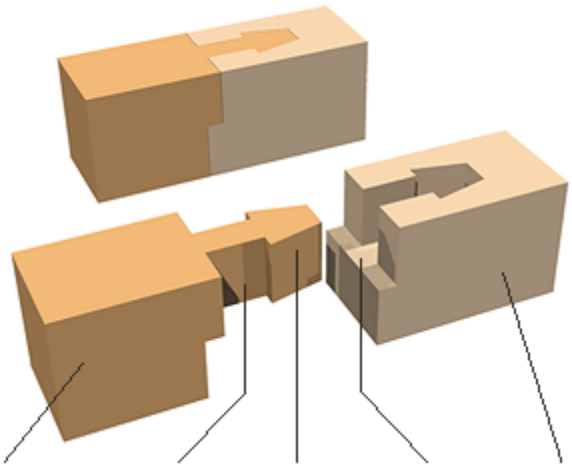
Also called *ookamatsugi* 大鎌継; *shinkamatsugi* 真鎌継. Half-blind mortise and tenon gooseneck joint. A variation of the gooseneck joint *[*kamatsugi*](#) 鎌継. An elongated gooseneck-shaped tenon, the male piece of which is made on the butt-end of one beam and the accommodating mortise is cut on the end of another beam. The gooseneck tenon fits perfectly into the mortise on the indented piece. Slightly over halfway down from the top of the beam on each side of the gooseneck mortise are an L-shaped slot and a reversed L-shaped slot. Projected half blind tenons *mechigai* 目違 slide into these slots. The shape of the joint is visible on top, but from the side, it appears to be an ordinary splicing joint. This joint is used for purlins and ground sills and must have supporting members beneath it.



koshikake kamatsugi　腰掛鎌継

Also *shikimen kamatsugi* 敷面鎌継. A half-lap, gooseneck tenon joint. An end joint which combines two joints: a half-lap *[*koshikaketsugi*](#) 腰掛継 and a gooseneck tenon joint *[*kamatsugi*](#) 鎌継. The gooseneck mortise and the bench, or seat, of the lap joint are cut so that the mortise occupies about half the thickness of the timber. The bench made from the remaining half extends like a step beyond the mortise. The second timber contains the gooseneck tenon; the undercut overlaps the bench when the tenon is dropped into place in the corresponding mortise. If a half-blind mortise, *mechigai hozoana* 目違ほぞ穴, is cut vertically into the center of the bench and a matching tenon is made on the undercut part beneath the dovetail, the combination joint is called *koshiire*

mechigaitsuki kamatsugi 腰入目違付鎌継. The half blind tenon prevents damage from twisting forces. *Koshikake kamatsugi* is based on the same principles as *[koshikake aritsugi](#) 腰掛蟻継; only the shape of the tenon and mortise differ. Frequently used to join two hidden purlins (roof joints), *[nogeta](#) 野桁, and foundation footings, *[dodai](#) 土台.



aritsugi　蟻継

A dovetail joint used to attach the ends of two boards. The tenon *[hozo](#) ほぞ or male part, is a splayed projection inserted into a mortise *[hozoana](#) ほぞ穴 or female cavity, of the same shape and depth. Although the two parts are easily interlocked, the joint is relatively weak and best used where stress is not a factor. It is most useful in furniture-making and door framing. If the joint is to be used on heavy timbers, it must be combined with other joints, for example; a dovetail lap joint *[koshikake aritsugi](#) 腰掛蟻継.

*[koshikake aritsugi](#) 腰掛蟻継： **a**) *[megi](#) 女木　**b**) *ogi* 男木

daimochitsugi　台持継

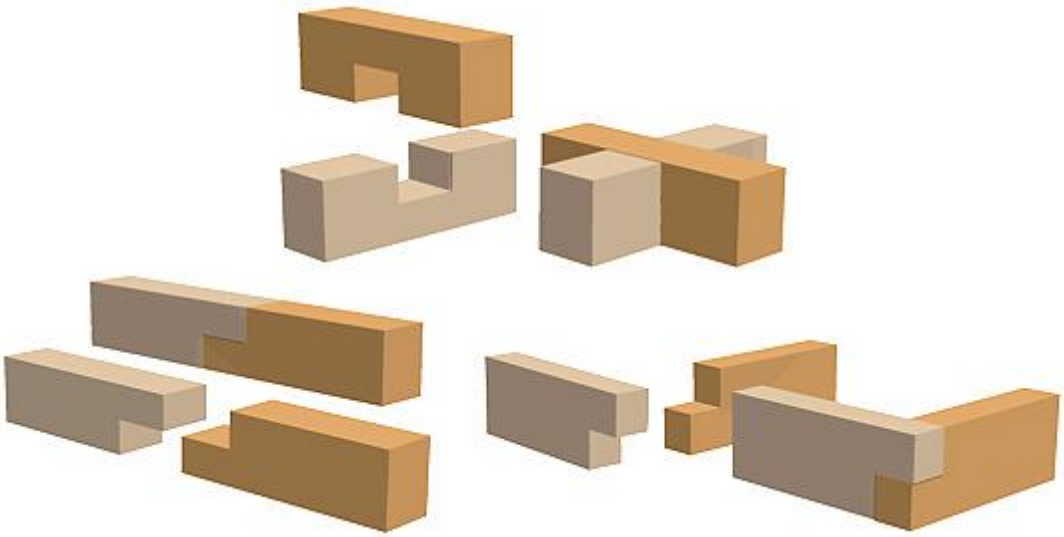
A center joint. An oblique scarf joint combining a housed *[daboso](#) 太ぼそ joint and blind tenons. The mortises are attached to the tops of posts and extend around 30cm beyond. Transverse beams in which the tenons have

been cut on each end fit securely into them. If necessary, hardwood pins are added to prevent slippage. This joint is also used to unite wall plates *shikigeta 敷桁, bottom transverse beams in a roof's framework *rokubari* 陸梁, floor joints *neda 根太 and sleepers *oobiki 大引. Also used in hidden transverse beams, *nobari* 野梁 from around the Muromachi period (1392-1568).

a) *daboso 太ぼそ

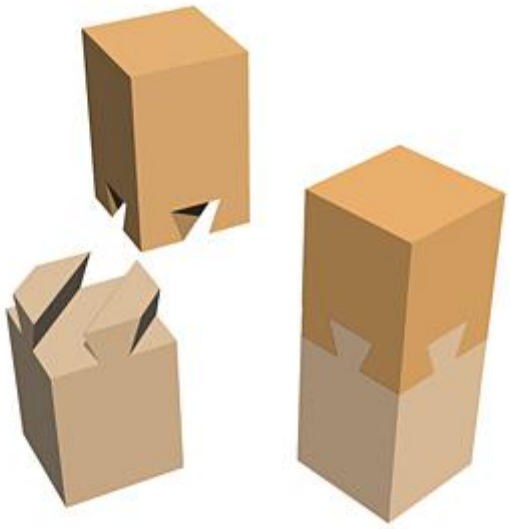
aigaki 相欠

Also written 合欠. A lap or halving joint. When used at a corner, it is called a corner lap joint. When used where two members cross each other at a right angle, it is called a cross lap joint. In either case, half the timber is cut from the underside of the other. The result is a perfectly smooth surface where the two members are joined. Lap joints are connected by bolts, nails, or cotters. If the lap joint is used on the side boards of drawers, seen when pulled out, or any other visible place, such as at the corners of chests, the nails etc. are pounded in and covered with dowels. Sometimes wooden nails are used effectively and do not need to be covered. *Aigaki* tend to be rather weak since half of each part to be joined must be removed. They are commonly used for ground sills *dodai 土台; wall corners; and joins of pole plates *hanamoya 鼻母屋, and cantilevers *hanegi 桔木 in roof construction.



shihouari　四方蟻

A dovetail splicing joint, *[*aritsugi*](#) 蟻継, made in such way that the dovetails are visible on all four sides of the joint. This is achieved by cutting the protruding and indented e sections from opposite corners, rather than on the face of the timber. The parts are cut diagonally and then slipped into each other. The same result can be achieved using a gooseneck splicing joint, *[*kamatsugi*](#) 鎌継, and is called *shihoukama* 四方鎌, or i the case of a simple 4-sided tenon butt joint, *shihou hozotsugi* 四方ほぞ継. These joints are used for example, at the base of belfry posts, *[*shourou*](#) 鐘楼, and in open sided shelters, *[*chouzuya*](#) 手水舎, at shrines, *[*jinja*](#) 神社.



sen　栓

Also called *komisen* 込栓. A pin, peg, key, cotter or dowel made of hardwood, usually oak or zelkova. It varies in shape and size depending upon need and placement. It is added to butt or end joints *[*tsugite*](#) 継手, and to angle joints *[*shiguchi*](#) 仕口, for strength and security. Holes are bored where necessary and pins are inserted and may pass through tenonned and indented pieces. The *sen* may be blind and only partially inserted to prevent slippage. There are many kinds of *sen*:

1　*komisen* 込栓 or *daisen* 大栓. A blind joint with pins slightly off center. See *[*okkake daisentsugi*](#) 追掛大栓継, *Komisengama* 込栓鎌 is gooseneck joint with pins or a mortise-and-tenon joint used on a penetrating tie beam, *[*nuki*](#) 貫. It is characterized by the addition of a pin or key inserted through the head of the tenon *[*hozo*](#) ほぞ, into the top of the pillar for purpose of tightening and strengthening the joint.

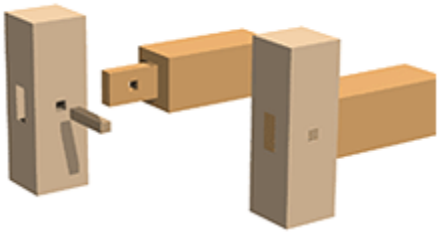
2　*hanasen* 鼻栓 (lit. nose pin). A blocking draw pin used in vernacular houses *[*minka*](#) 民家. For example, a suspended strut *tsurizuka* 吊束, is joined to a purlin *[*keta*](#) 桁. The end of the transverse beam *[*hari*](#) 梁, in the roof framework is cut into a large tenon that extends through and beyond the outer surface of the pillar. In order to draw the nose of the beam tightly to the pillar and to prevent the pin from penetrating the post or from slipping, the pin (*hanasen*) is cut at an angle and is driven through a mortise cut in the extended tenon.

3　*shachisen* 車知栓, *[*shachi*](#) 車知 or 鯱 are slightly tapered keys placed in haunched or right angle mortises formed by oblique positioning of matching right angle cuts in both the tenon and beam. When these parts are joined, the key's tapered ends are pounded into the resulting slots. The slots may be aligned, half or fully

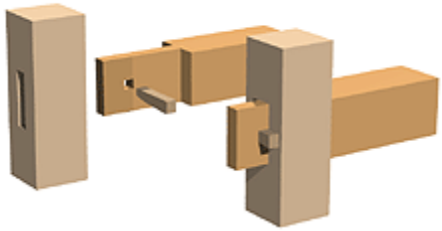
staggered. If two boards are held together by *shachisen*, only mortises are made obliquely, part on each board, to receive the pin. See *[*sao* 竿](), *[*saoshachitsugi* 竿車知継](), *[*isukatsugi* いすか継](), *[*saobiki dokko* 竿引独鈷]().

4 Another type of pin is the *yokosen* 横栓, a threshold-to-post pin. This is driven horizontally into a groove where the threshold and post meet. See *[*shikii* 敷居]().

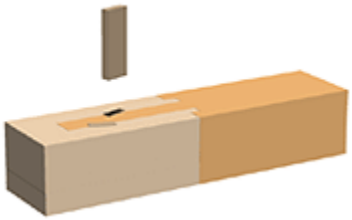
5 *hiyodorisen* 鵯栓. A long cotter with a head, *kashirasen* 頭栓, that passes through the tail rafters, *[*odaruki* 尾垂木](), where they meet at right angle on each side of the hip tail rafter *sumiodaruki* 隅尾垂木. It protrudes beyond the rafter on the side opposite its entry. A small pin called a *magosen* 孫栓 (lit. grandchild pin) is driven through the protruding part to prevent slippage and to tighten the pin. It is used in shrine and temple architecture.



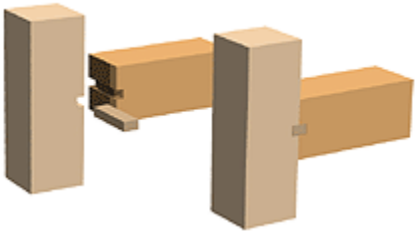
1) *komisen* 込栓



2) *hanasen* 鼻栓



3) *shachisen* 車知栓



4) *yokosen* 横栓

5) *hiyodorisen* 鵯栓

kai-no-kuchitsugi　貝の口継

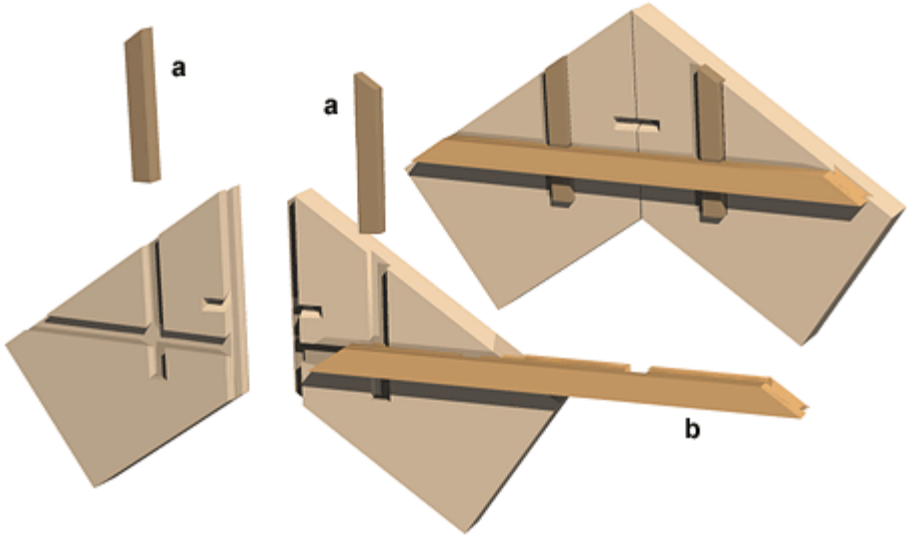
Lit. shell mouth joint. A straight end-to-end joint *[*tsugite* 継手]() used for very tall pillars that must be assembled in two or three sections. The timber sections are cut into four sections in an x shape. The inner parts of the cuts have a raised collar *[*eriwa* 襟輪]() while the two remaining parts of the x are spliced down to a length slightly longer than the diameter of the timber. At the base of these long cuts, there are small grooves into which the collars of the abutting piece fit. Thus the two parts are tightly secured. This joint is used most frequently to join the parts of the central pillar *[*shinbashira* 心柱]() of a pagoda. The joint resists twisting but is said to be somewhat weak in regard to tensional deformation.

konehozo　小根ほぞ

An angle joint *[*shiguchi*](#) 仕口 with a rabbeted tenon *[*hozo*](#) ほぞ. The rabbeted part is also called a hip *[*koshi*](#) 腰. The full width of the hip on the lower part of the tenon is called *oone* 大根, lit. large root (also called *shitakoone* 下小根, lit lower root). The part of the tenon that extends above the *oone* is called *kone*, lit. small root (also called *uekone* 上小根, lit. upper root). This tenon fits into a mortise cut in the same shape. The rabbeted tenon and mortise is a stronger joint than a single elongated tenon and mortise joint. Therefore, the *konehozo* joint is especially useful for connecting beams to corner pillars and posts to foundation footings *[*dodai*](#) 土台.

hafuogami　破風拝

Also called *hafugashira* 破風頭 or *hafu no ogami* 破風の拝. The joint between two bargeboards *hafu-ita* 破風板 (see *hafu 破風). The joint used to connect the two parts of the bargeboard where they form a peak was relatively simple from the end 7c-12c. A rectangular piece was cut out of the top of one bargeboard and the same size cuts were made on each side of the top of the other bargeboard. The central, extended piece fitted snugly into the cut-out on the peak of the other bargeboard. The two were secured by a wooden pin that penetrated from the exterior face to beyond the interior side. Example: Houryuuji Kondou 法隆寺金堂, Nara, late 7c. After the beginning of the 13c more complex methods of joinery were devised. Generally, a mortise and tenon with haunched keys *daimochishachi-tsugi* 台持車知継 were employed. Sometimes a tenon and mortise joint was used at the peak, but a wooden scab *suitsukizan 吸付桟 was attached to the interior face by means of wooden pins *shachi 車知 that were pounded into slots prepared at the top of the bargeboards. These pins secured the scab, and the entire arrangement pulled the bargeboards tightly together at the peak.

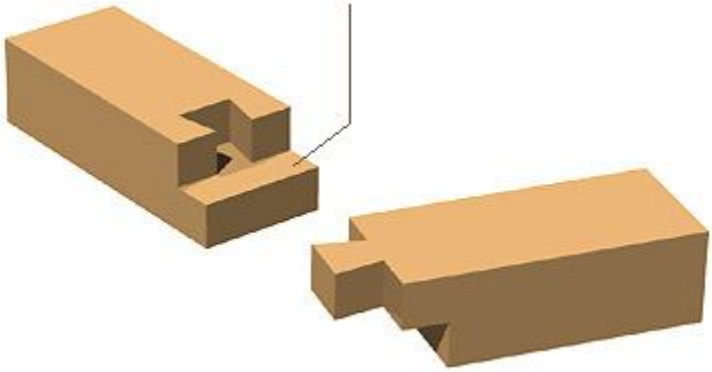


a) *shachi 車知　　b) *suitsukiarizan 吸付蟻桟

koshikake aritsugi　腰掛蟻継

A half-lap, dovetailed joint. Also *shikimen aritsugi* 敷面蟻継, *shikimen arihozotusgi* 敷面蟻ほぞ継, *koshikake arihozotusgi* 腰掛蟻ほぞ継, *shikimen koshikake aritusgi* 敷面腰掛蟻継; *koshikake arikake* 腰掛蟻掛. An end joint which combines two joints: a half-lap and a dovetail. The dovetail mortise and the bench, or seat, of the lap joint are cut so that the mortise occupies about half the thickness of the timber. The bench made from the remaining half extends like a step beyond the mortise. The second timber contains the dovetail tenon; the undercut overlaps the bench when the dovetail tenon is dropped into place in the corresponding mortise. If a half-blind mortise, *mechigai hozoana* 目違ほぞ穴, is cut vertically into the center of the bench and a matching tenon is made on the undercut part beneath the dovetail, it is called *koshiire mechigaitsuki aritsugi 腰入目違付蟻継. The half blind tenon prevents damage from twisting forces.

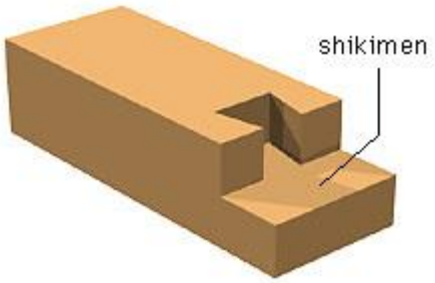
koshikake 腰掛, *shikimen 敷面



shikimen　敷面

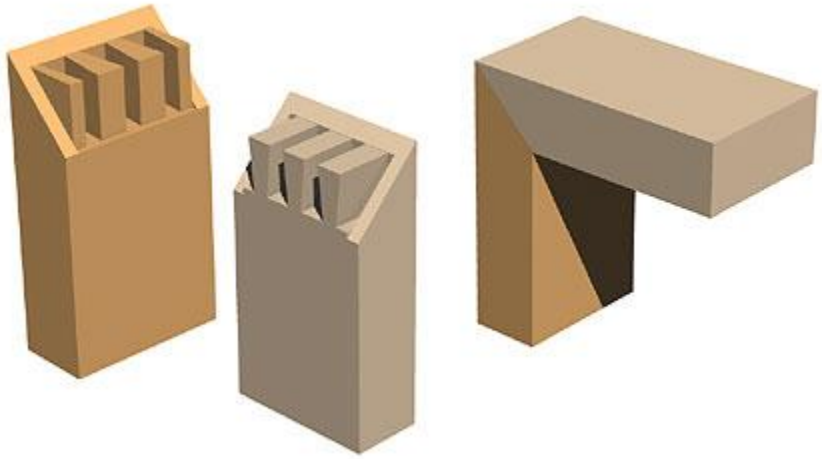
Also read *shikitsura*; also called *[koshikake aritsugi](#) 腰掛蟻継.

A bench joint. A flat surface in front of a mortise (*[hozoana](#) ほぞ穴), which receives much of the load of the tenon (*[hozo](#) ほぞ). The tenon has an undercut that fits on the bench when it is inserted into the mortise. Examples include the half-lapped gooseneck joint (*[kamatsugi](#) 鎌継) and the half-lapped dovetail joint (*[aritsugi](#) 蟻継). The names for these joints are occasionally prefixed with the word *shikimen*. The tenons for these joints are then called *shikimen kamahozo* 敷面鎌ほぞ and *shikimen arihozo* 敷面蟻ほぞ.



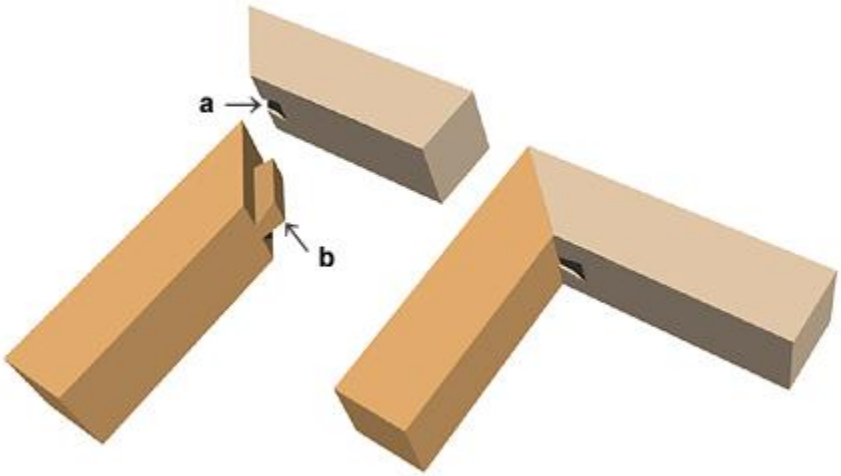
kakushi aridome　隠蟻留

Lit. a hidden mitered dovetail joint, or blind mitered dovetail joint. Also called *kakushi arigata kumitsugi* 隠蟻形組接; *kakushi arihozo* 隠蟻ほぞ, corner miter, *sumitome* 隅留, *sumitomeari* 隅留蟻, or *hinadome* 雛留. An angle joint *[shiguchi](#) 仕口 used at the corners of a building to attach non-penetrating tie beams *[nageshi](#) 長押 to a pillar. Two to four dovetail tenons and mortises *[arihozo](#) 蟻ほぞ and *arihozoana* 蟻ほぞ穴, cut on the cross grain, are joined in such a way as to be hidden.



aridome　蟻留

A type of right angle, mitered, housed, and dovetail joint used mainly on flat timber as, for example, in the upper architrave of an alcove in a mansion, *tsukeshoin* 付書院. The front corner and top edge of this joint are mitered because a triangular space is created on the inner end of the dovetail groove, *arimichi* 蟻道. This joint is suitable for producing a clean line.

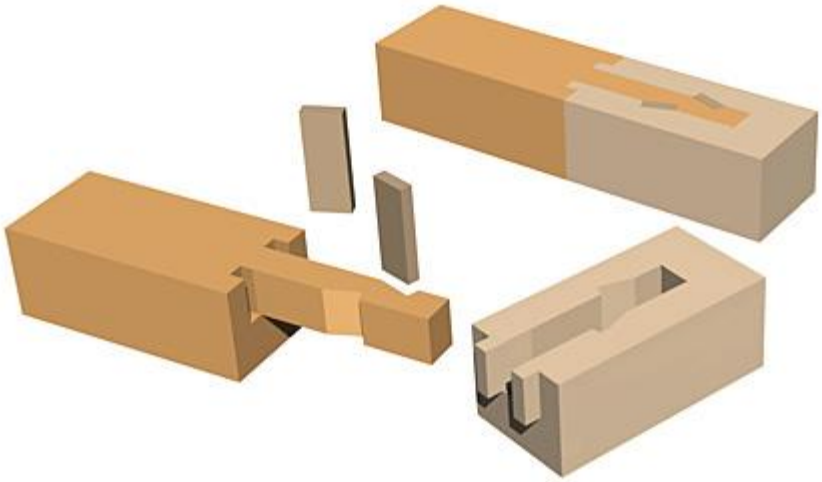


a) *arimichi* 蟻道　b) *[*arihozo*](#) 蟻ほぞ

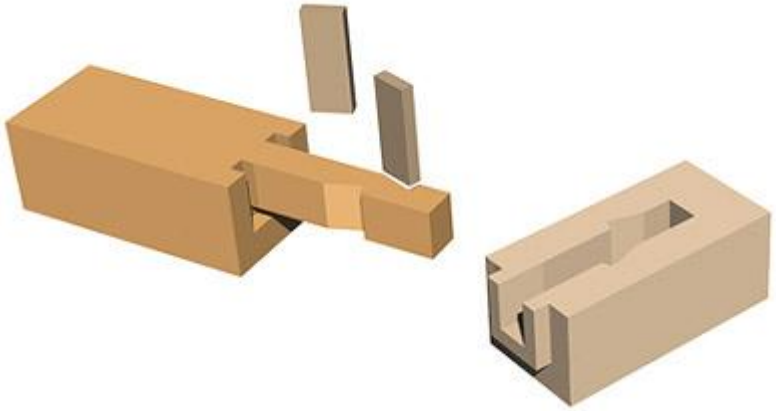
saoshachitsugi　竿車知継

Also *saotsugi* 竿継. Joint with long, rather slender tenons called *saohozo* 竿ほぞ (rod or pole tenons) and mortises called *saomichi* 竿道.
A straight drop-rod joint with keys *[*shachi*](#) 車知 used to join two timbers. Blind or stub tenons *mechigaihozo* 目違ほぞ and regular tenons cut into either side of the joint add extra strength. Haunched mortises are cut in both male and female sections to form slots into which the keys *shachi* can be driven. *Sanbouhako mechigai saoshachitsugi* 三方箱目違竿車知継 refers to a 3-faced boxed blind rod timber with keys. The mortise has a

square blind U-shaped tenon cut on the face. A haunched rod tenon and the U-shaped cavities fit into the mortised part and keys are inserted.

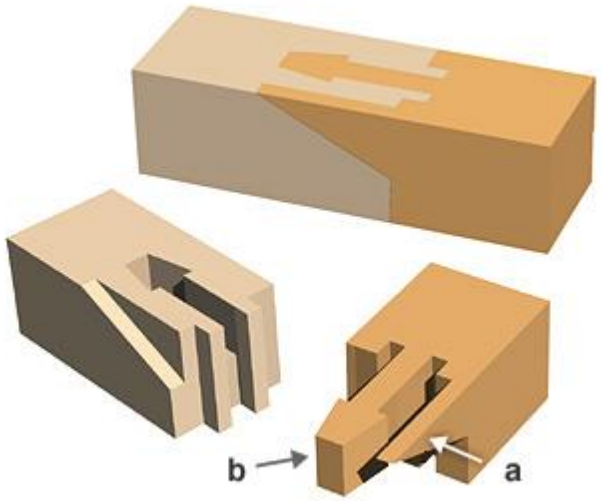


↓ *sanbouhako mechigai saoshachitsugi*
三方箱目違竿車知継



nogetsugi　芒継

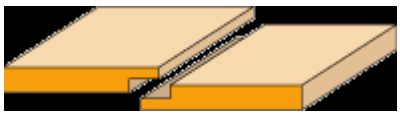
Also called *kayaoi kamatsugi* 茅負鎌継. A joint used to join sections of an eaves support *[*kayaoi*](#) 茅負. It is a rabbeted, blind mortised and tenoned, gooseneck joint with a scarf *[*sogitsugi*](#) 殺継.



a) *noge* 芒 (scarf) **b)** *kama* 鎌 (gooseneck)

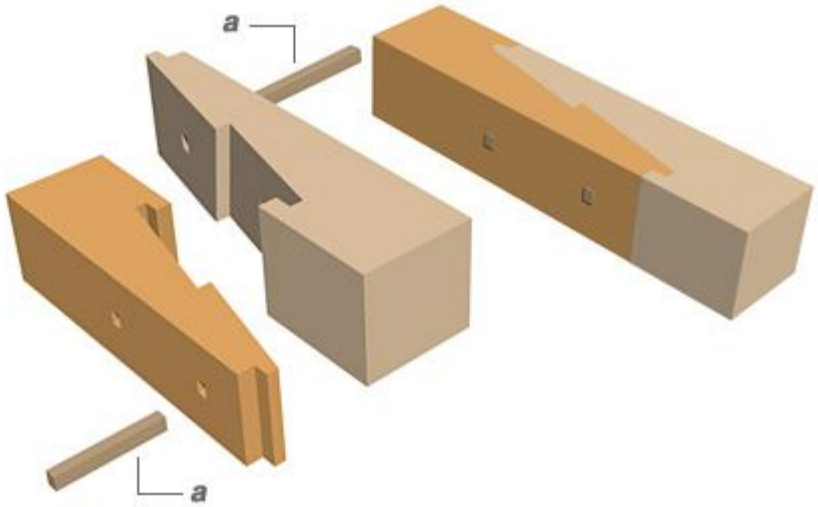
aijakuri　合決

A shiplap joint or halving joint. Written 相决.



okkake daisentsugi　追掛大栓継

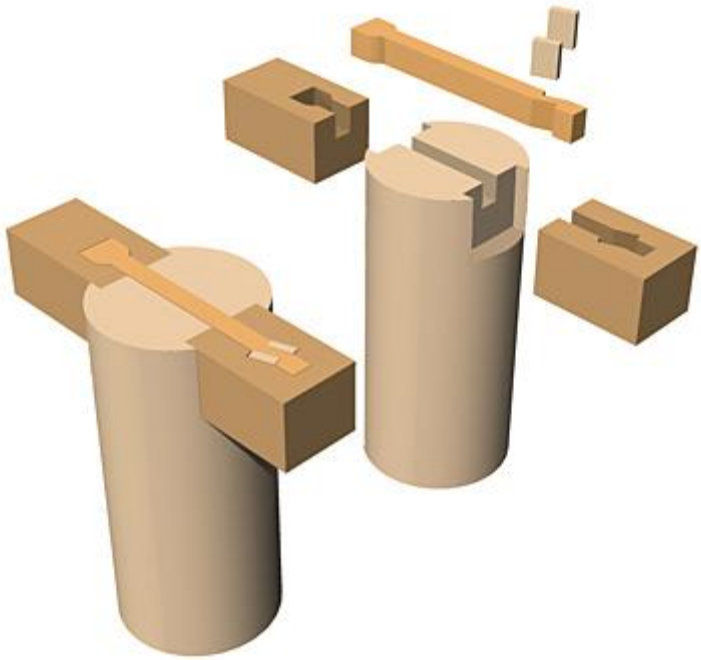
An oblique, housed (dadoed) and rabbeted scarf joint. The upper and lower pieces are exactly the same but reversed. The upper part is fitted into the lower part from the side and two pins *komisen* **込栓** are driven through the two mortises. The result is a very tight and stable joint used to join ground sills and various beams that must withstand great stress and strain. *Okkake tsugi* **追掛継** is identical to *okkake daisentsugi* except that pins are not inserted.



a) *komisen* 込栓

saobiki dokko　竿引独鈷

A long, lapped, rod-type tenon cut in the end of a rainbow beam *[*kouryou* 虹梁](), or the head of a penetrating tie beam *[*kashiranuki* 頭貫](). The joint is extended so that it connects two separate members *[*sao* 竿](). It acts, in this case, like a spline, but is not one. The lapped part of the tenon is about half the height of the beam; a relatively shallow part of the beam itself is designated for insertion into a circular pillar and the mortise is shaped accordingly. The lapped part of the joint reaches the exact center of the pillar. The rod continues approximately two-thirds of its length into the nosing *[*kibana* 木鼻](). The rear part of the nosing is inserted a short distance into the pillar. The nosing is mortised to receive the end of the long rod of the tenon. Diagonal cuts in a half-staggered position are made to receive tapered keys *[*shachi* 車知]() that are inserted to prevent slipping. This type of joinery is common in temple and shrine architecture.



samisentsugi　三味線継

A wooden splicing joint used for a beam. The name derives from its resemblance to the Japanese musical instrument called a *shamisen* 三味線. The length of the joint is 3x the height of the beam and the tenon (*[*hozo* ほぞ]()) is normally half that distance

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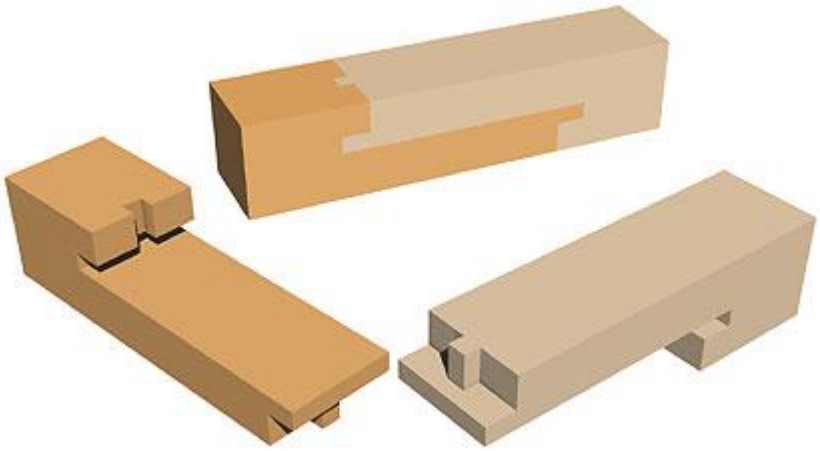


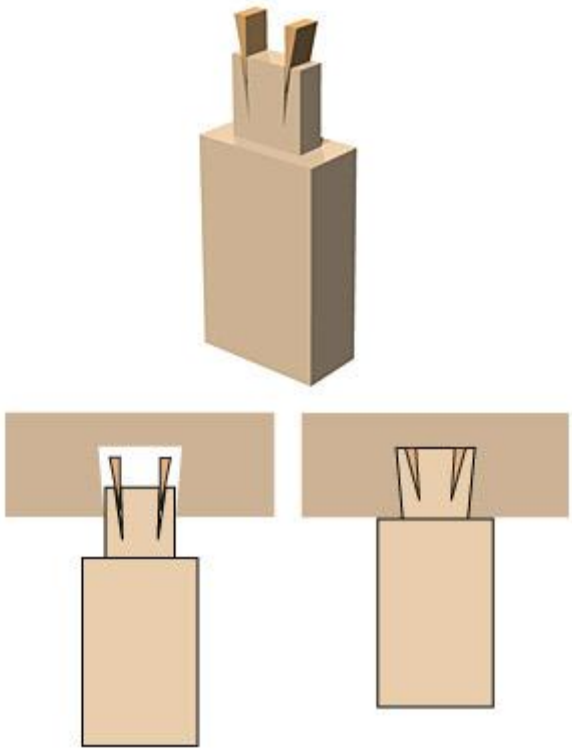
ooire ariotoshi　大入蟻落

Also called *kageire ariotoshi* 陰入蟻落; *ooire arikake* 大入蟻掛. A joint made to connect a purlin (**keta* 桁)at right angle to a ground sill **dodai* 土台. This joint is also employed to join a purlin to the rear surface of a bargeboard **hafu-ita* 破風板. When the bargeboard is very large, it is necessary to use a kind of bridging member called a **hikidokko* 引独鈷. The part inserted into the bargeboard has a dovetail cut. The end placed within the purlin is a haunched tenon with keys **shachisen* 車知栓. The dotted lines on the beams indicate the part inserted into the bargeboard.

jigokuhozo　地獄ほぞ

Lit. hell tenon. So named because once it is inserted, it is impossible to withdraw. A blind tenon joint with wedges **kusabi* 楔 inserted tightly into slots made on its end. It is important first to place the wedges loosely

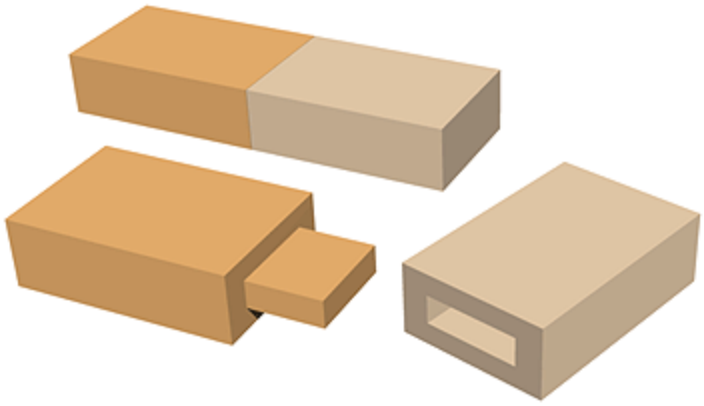
into the slots to inhibit premature horizontal spreading of the tenon. The base of the tenon is large enough to fit the dovetail-like, tapered shape of the mortise *hozoana ほぞ穴. When the tenon with wedges is pounded into the mortise, the wedges cause the tenon to expand to fit the sides of the mortise. Only the wedges extend the depth of the mortise. The tenon itself does not. Wedges may also be placed on each side of the tenon. The *jigokuhozo* joint is used where it is necessary that it be hidden, for example on bracket complexes under the eaves of a building, in furniture and cabinet making, and especially in joinery used in the *shoin* style *shoin-zukuri 書院造.



imotsugi　芋継

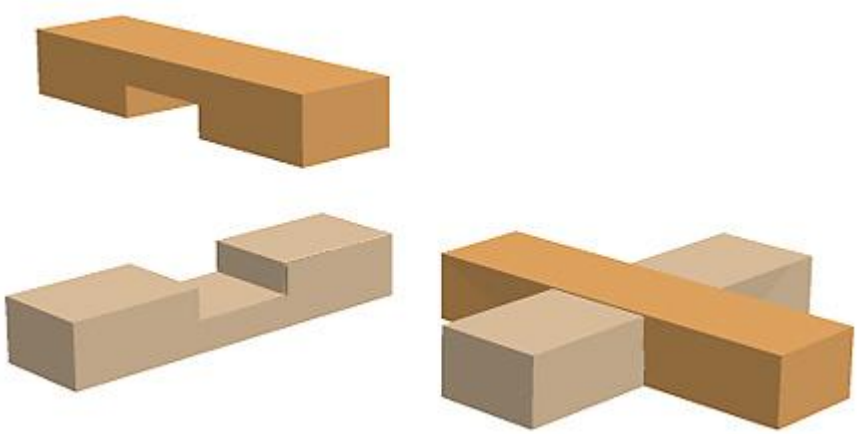
Same meaning as *imomeji* 芋目地.

1　A straight-line, end-to-end blind stub tenon *hozo ほぞ and mortise *hozoana ほぞ穴 joint used in wood construction to attach two members. The butt joint that results is used, for example, in board and batten ceilings, *saobuchi tenjou 棹縁天井. See *tsukitsuke 突付; *hagi 矧.



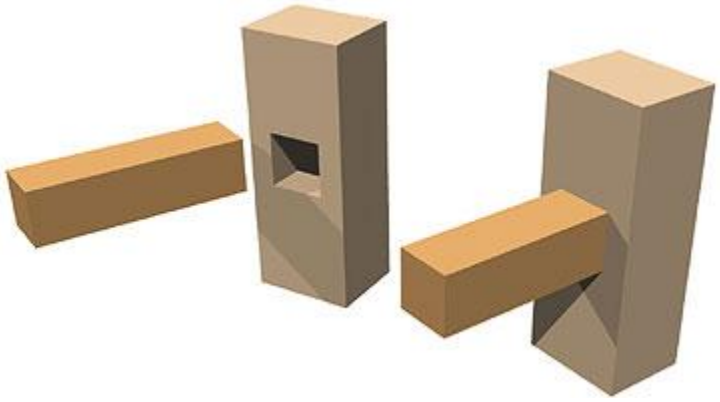
kakiuchi　欠打

A nailed right angled joint made on two crossed structural members by cutting a notch into one timber equal to the width of the timber to be inserted. Both timbers may also be notched, pounded together and nailed to create a tight fit. *Kakiuchi* differs from the cogged joint **kakikomi* 欠込 in the use of nails. （Note that *uchi* 打 or *uchikomu* 打込, means to drive, pound in.)



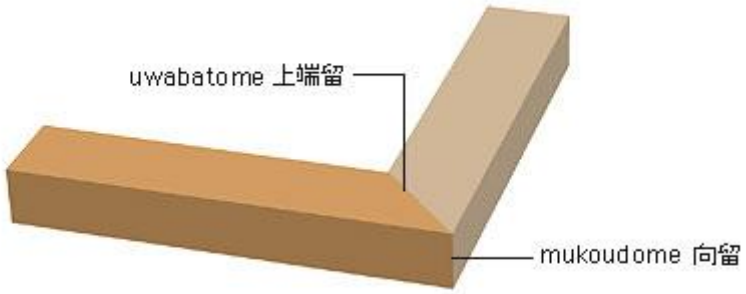
ooire　大入

Also written 追入 or 尾入. A dadoed or housed, angled T-joint, which is used to join beams to posts. A shallow square or rectangle is cut out of a post and the cut end of a transverse beam is inserted into it. Dovetail tenons **arihozo* 蟻ほぞ and rectangular pins may be added for strengthening. There are many variations of *ooire*. One example is the *kashigi ooire hozosashi* かしぎ大入ほぞ差 , an inclined, housed full mortise and tenon joint with a pin **sen* 栓 inserted to hold the tenon securely.



mukoudome　向留

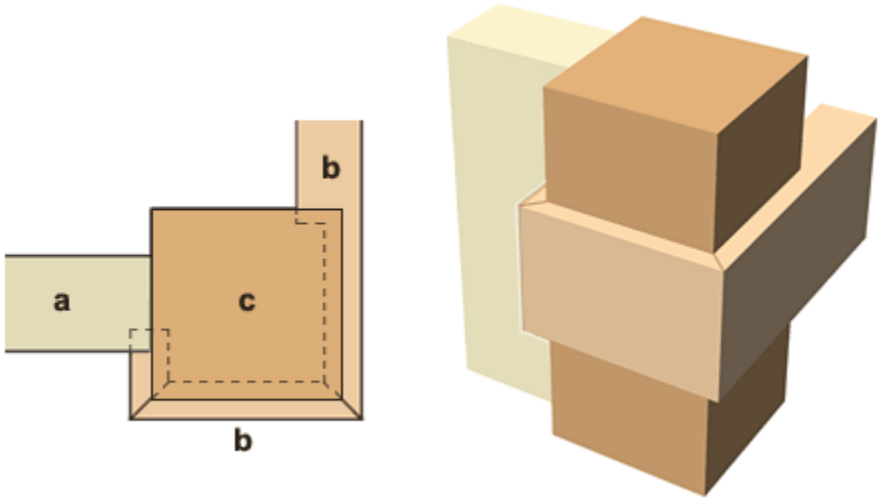
One part of the joint used when eaves supports, *[*kayaoi*](#) 茅負 or flying rafter supports, *[*kioi*](#) 木負 come together at a corner. Because the corners, called *[*shihoukorobi*](#) 四方転, slope at angles other than the usual 90° a simple 45 degrees mitered joint (*[*tome*](#) 留) cannot be employed. The *mukoudome* line is cut along the vertical surface at the corner and is the reverse slope of the medial line of the rafter incline. The *uwabatome* 上端留 line is the reversed slope line that shows at the top where the two parts are joined.



makurasabaki　枕捌

Also called *makurabasami* 枕挟 or *makurabakama* 枕袴. The non-penetrating tie beams, *[*nageshi*](#) 長押, that normally surround a post or pillar on three sides. However, the term *makurasabaki* is employed when the tie beam is mitered at each turn, the parts are held by splines, *[*chigiri*](#) 千切, and it surrounds the pillar but stops when it abuts a beam attached to a pillar. This arrangement is called *makiurasabaki*, 巻裏捌. A method thought to be less than first class consists of the tie beam which wraps around only two sides of the pillar. The single, mitred corner is held by a spline and the continuing part of the tie beam ends at the beginning of the chamfer and is attached by a joint. This gives the impression of being incomplete and is called *katasabaki* 片捌, lit. one-side management. The simplest example occurs when the tie beams stops before the corner chamfer and is attached by a joint. It is called *hinadome* 雛留. The wrap-around methods are used for example at Houryuuji

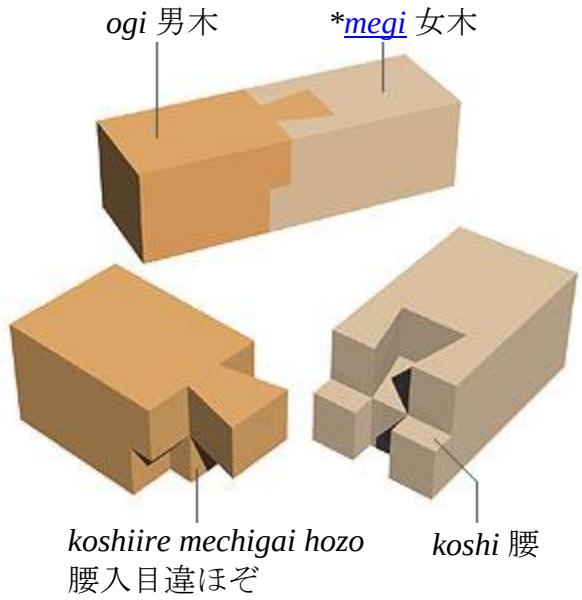
Touin Dempoudou 法隆寺東院伝法堂 early 8c., Nara. The latter two types are used on the rear posts of alcoves, *tokonoma 床の間.



a) *kabe* 壁　b) *nageshi 長押　c) *hashira 柱

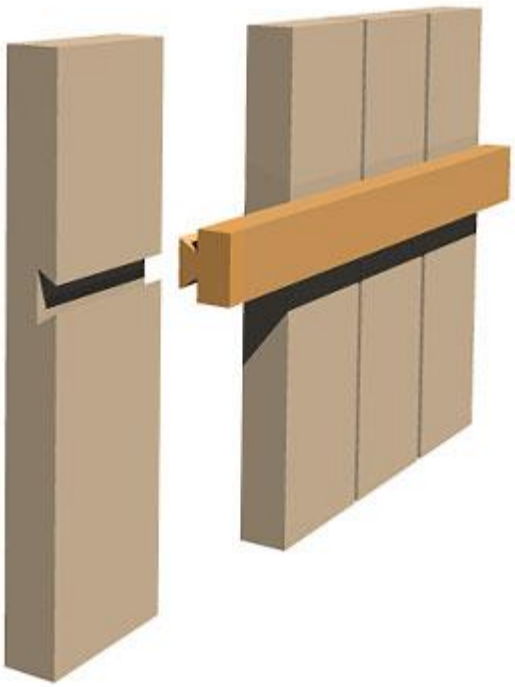
koshiire mechigaitsuki aritsugi　腰入目違付蟻継

A half-lapped, half-blind, tenoned dovetail joint. The indented piece is cut with a bench, lit. hip *koshi* 腰, open in the center to receive the half blind tenon *mechigai* 目違. The dovetail and half blind tenons fit into a dovetail-shaped cavity. Besides having a half blind tenon, the tenoned piece also has extended shoulders which rest on the benches on each side of the opening for the blind tenon and the dovetail. The same principle applies to the half-lapped, half-blind, tenoned gooseneck joint *mechigaihozotsuki kamatsugi 目違ほぞ付鎌継.



suitsuki arizan　吸付蟻桟

Also *arizan* 蟻桟, *suitsukizan* 吸付桟 or *suitsukiari* 吸付蟻. A long, narrow dovetail tenon **hozo* ほぞ with a corresponding long mortise **hozoana* ほぞ穴. The joint is set at right angle across the back side of large ceiling boards, the under side of floor boards, on top doored shelf boards, *tenbukuro* 天袋 etc., to prevent warping or separation. A long *suitsuki arizan* can be cut with a dovetail mortise into which a long dovetail tenon is inserted. It can be used to create a finish on the edge **hashibami* 端喰 of a shelf board and used to make a double ceiling, *nijuu tenjou* 二重天井. To create a double ceiling long dovetail tenon is imbedded halfway into the reverse side of the visible ceiling. Another ceiling made of thinner boards is supported by the flat bottom part of the dovetail tenon. The upper invisible part of the double ceiling is called *notenjou* 野天井.



arikubi　蟻首

Lit. dovetail neck.

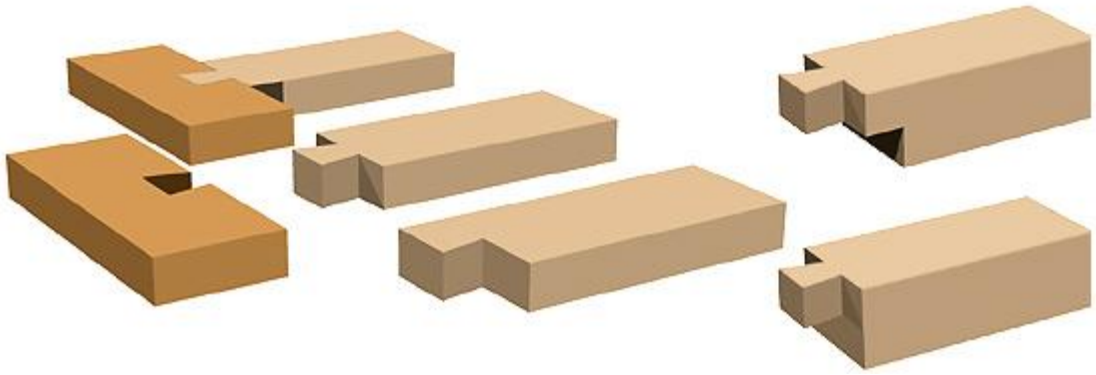
1 The rear part of a dovetail joint which is in line with the surface of the beam from which it is cut.

2 The narrowest part of a dovetail spline **chigiritsugi* 千切継.

arikubi spline **chigiritsugi* 千切継 :
dovetail neck narrow west part

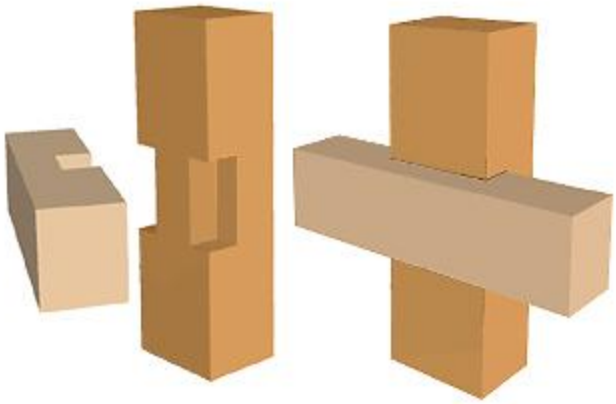
arihozo　蟻ほぞ

Lit. dovetail tenon. Also **arikake* 蟻掛. A tenon shaped like a dove's tail with each side cut obliquely so that it is wider at the outer end than at the inner. When the tenon is inserted into the mortise from the top, it is sometimes called *otoshiari* 落蟻 or **ariotoshi* 蟻落. *Arihozo* is used for either a splicing or a right angle joint.



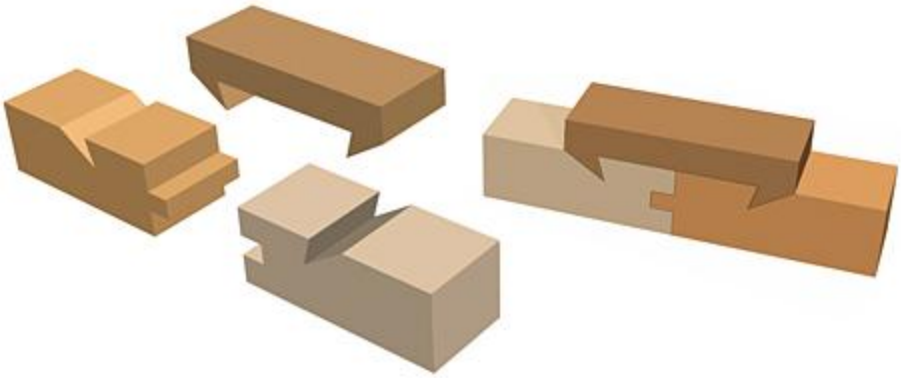
agokaki　腮欠

Lit. chin gap. One of many types of cogging joints. The joint is used to attach a horizontal timber to the face of a square post or pillar. Cuts are made on two corners on the same side of the post leaving an uncut center section. The horizontal beam has one notch cut out so that it can be pounded in until it is tight against the flat center part between the two notched corners. This beam can hug the pillar as the uncut parts fit into the corner gaps. If the entire width from corner to corner is cut out, and the horizontal beam is inserted into that cut, it is called *kirikaki* 切欠, or cogging.



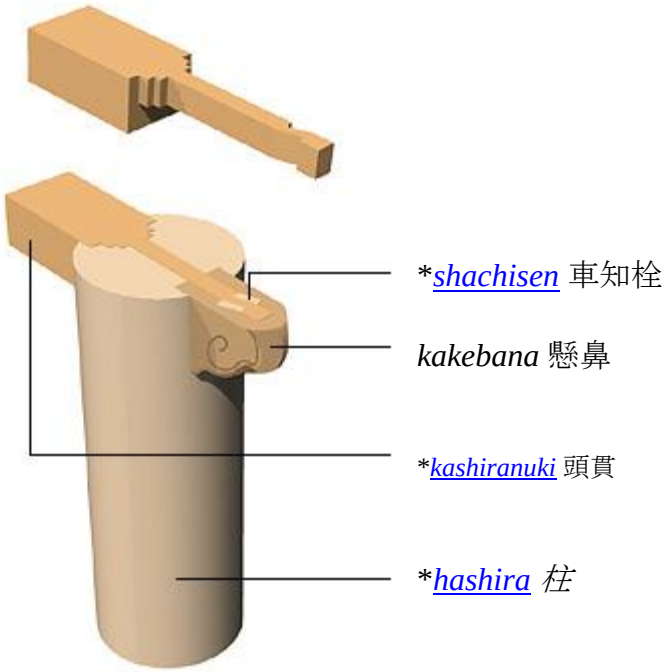
tsukami　掴

Also *hirakasugai* 平鎹. Wood or metal cleats used to secure and strengthen the junction of the two sides of bargeboard, where they are joined at the peak. They may also be connected by a *daimochi shachi* 台持車知. The joining is always done on the inner side. The same method is applied to join the floor boards of the alcove, *tokonoma 床の間, and the frame. The joint is called *tsukamiari* 掴蟻 or *arisan* 蟻桟.



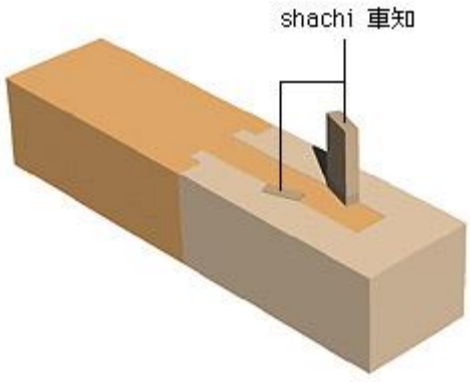
kakebana　懸鼻

Also read *kakehana*, and written 掛鼻. A decorative nosing *kibana 木鼻 attached to the corner ends of various horizontal beams or to the corner end of a bracket arm by means of a joint *saobikidokko 竿引独鈷. Other types of nosing are carved out of the extended end of a single horizontal beam. Nosing appeared in the Kamakura period (1185-1333) with the introduction of new architectural styles called the *daibutsu* style *daibutsuyou 大仏様 and Zen style *zenshuuyou 禅宗様. The styles became popular and influenced the traditional Japanese style *wayou 和様. Soon after the introduction of the new styles it was common to find nosings on *wayou* building



shachi　車知

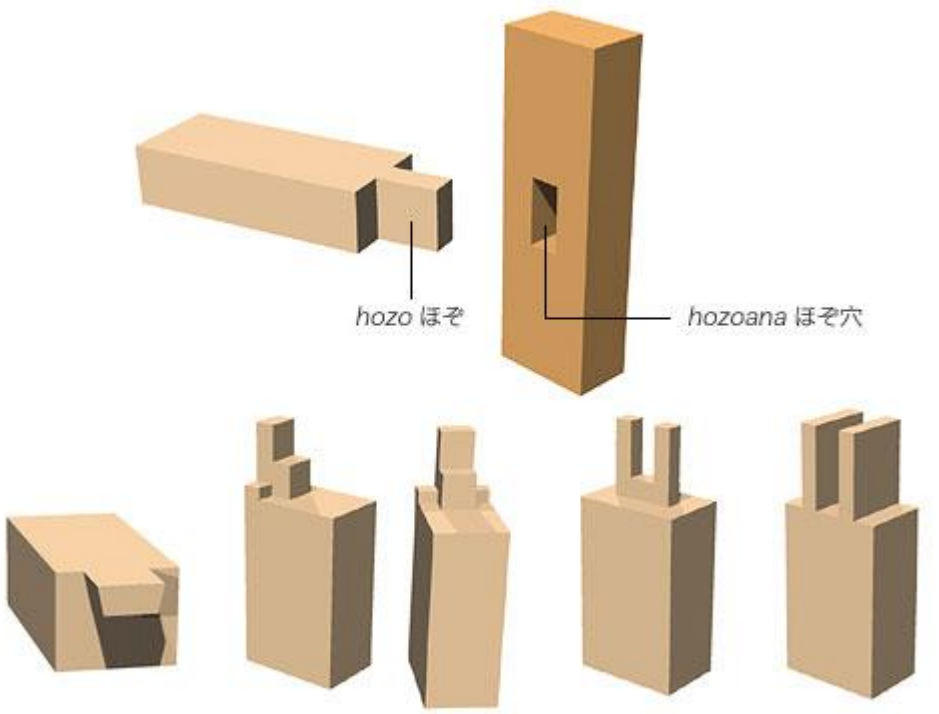
An abbreviation of *shachisen* 車知栓. A draw pin, key or cotter made of hard wood, usually zelkova or oak. The pin is long and thin, with a square or circular cross-section. It is driven into the upper and lower parts of a joint, either diagonally or at right angles, to prevent slippage. Often used to secure joints such as the *saotsugi* 竿継.



hozo　ほぞ

Old pronunciation was *hoso*. A tenon. Protuberances of differing shape and size made on the end of wood, stone or metal contruction materials for insertion into cavities or mortises **hozoana* ほぞ穴 of corresponding shape and size cut into other members to which the tenons are to be joined. The tenon is often referred to as the male member *ogi* 男木.

Tenons have many different names depending on their shape. These include the single rectangular tenon *[hirahozo](#) 平ほぞ, the double tenons *[nimaihozo](#) 二枚ほぞ and quadruple tenons *[yonmaihozo](#) 四枚ほぞ , haunched tenon *[konehozo](#) 小根ほぞ, stacked tenon *[juuhozo](#) 重ほぞ, the three-pronged tenon *[wanagi hozo](#) 輪なぎほぞ, dovetail *[arihozo](#) 蟻ほぞ, the trapezoidal-shaped *ougihozo* 扇ほぞ (used where corner pillars and ground sills are joined), the fox tenon *[jigokuhozo](#) 地獄ほぞ, collar tenon *eriwahozo* 襟輪ほぞ and ladle tenon *[shakushihozo](#) 杓子ほぞ . A small square or rectangular-shaped tenon placed on top of a trapezoidal tenon is called *ougijuuhozo* 扇重ほぞ. In the case of a standing Buddha, square-shaped, upstanding ridges are carved on the soles of his feet, and these fit into cavities in the pedestal underneath. These are known as *ashihozo* 足ほぞ or foot tenon.



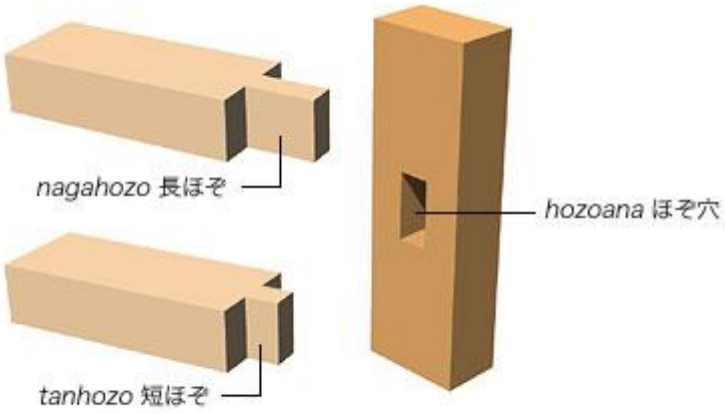
ougihozo 扇ほぞ | *eriwahozo* 襟輪ほぞ | *nijuuhozo* 二重ほぞ | *[nimaihozo](#) 二枚ほぞ

otoshikama　落鎌

Also called *sagekama* 下鎌. A commonly used half-blind, gooseneck tenon and mortise *[kama](#) 鎌, corner joint. The gooseneck-shaped tenon *[hozo](#) ほぞ is inserted from above at right angle into an identically shaped mortise *[hozoana](#) ほぞ穴. It is commonly used to join beams, *[nuki](#) 貫, and posts *[hashira](#) 柱, and also to connect the upper-most horizontal member of the frame and the vertical stile of a plank-door. One example is a plank-door with narrow horizontal lath stretching from one side to the other at close intervals *[mairado](#) 舞良戸.

hirahozo　平ほぞ

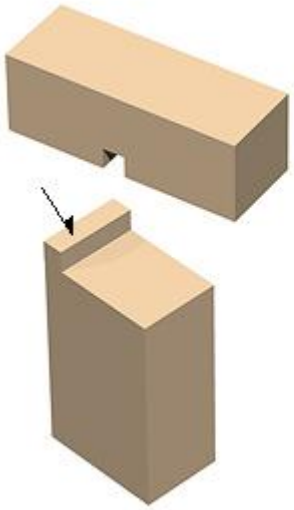
A true, square or rectangular tenon cut from a single block of wood. The top of the uncut part of the block forms the square shoulders around the base of the tenon. A short tenon is called *tanhozo* 短ほぞ, and a long one is called *nagahozo* 長ほぞ. These simple tenons fit into mortises, **hozoana* ほぞ穴, cut in the corners of ground sills, wall plates, non-supporting beams and other structural beams. The long tenon is used at the corner of the ground sill to control shifting. An even better control for shifting is a rabbeted mortise and tenon, called **konehozo* 小根ほぞ.



eriwa　襟輪

Also called *iriwa* 入輪. Lit. a collar ring. A collar tenon. It has a step-like piece called a collar, cut on each side about two-thirds of the distance from the tenon to the edge of the beam. The mortise into which the collar tenon will be attached at right angles is cut from the inner side of a beam. The matching mortise is called *eriwa-ana* 襟輪穴 (also *iriwa-ana* 入輪穴). Since the two parts are joined together at right angles, this belongs to the

broad category of joinery called *[*shiguchi* 仕口](#). This type of tenon is sometimes combined with haunched tenon, *[*konehozo* 小根ほぞ](#), which has a smaller tenon on the tip of a larger one, used especially when joining wooden parts of mud sills (*[*dodai* 土台](#)) in a grid pattern. There are many types of collar joints. One further example is the *eriwa konehozosashi* 襟輪小根ほぞ差, or collared haunch mortise.



eriwa konehozosashi
襟輪小根ほぞ差

*[*kai-no-kuchitsugi*](#)
貝の口継

chigiritsugi　千切継

Also written 衽継 or 膝継. Spline joints using small pieces of wood, tenons inserted into the slots, mortises, cut in corresponding shapes on the timbers to be joined. The spline derives its basic shape from combining the narrow ends of two dovetails. There are various types, for example, the bow-tie spline *kinekata* 杵形 and the dumbbell spline *areigata* 亜鈴形. If the splines join timbers parallel to the grain, the spline is usually lengthened.