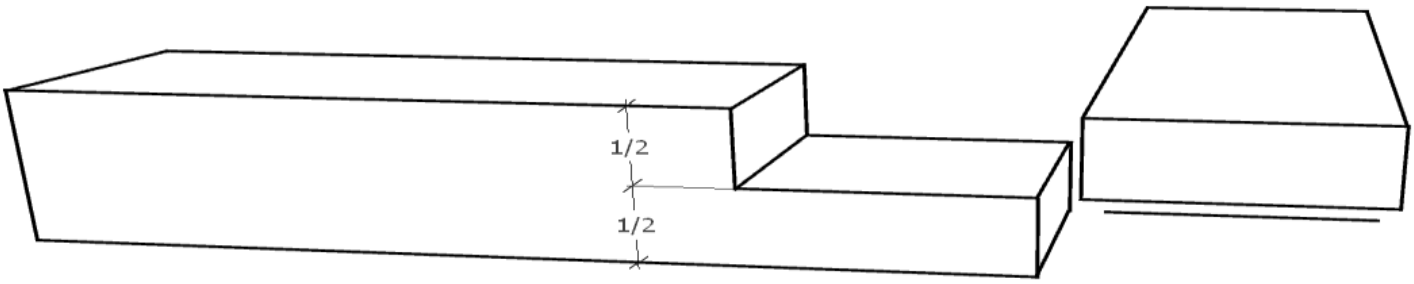
# Learning Unit 3 – Construct framing joints

**LO 3.1 –** Identify types of framing joints

● Types of framing joints

**1. HALF-LAP JOINT**

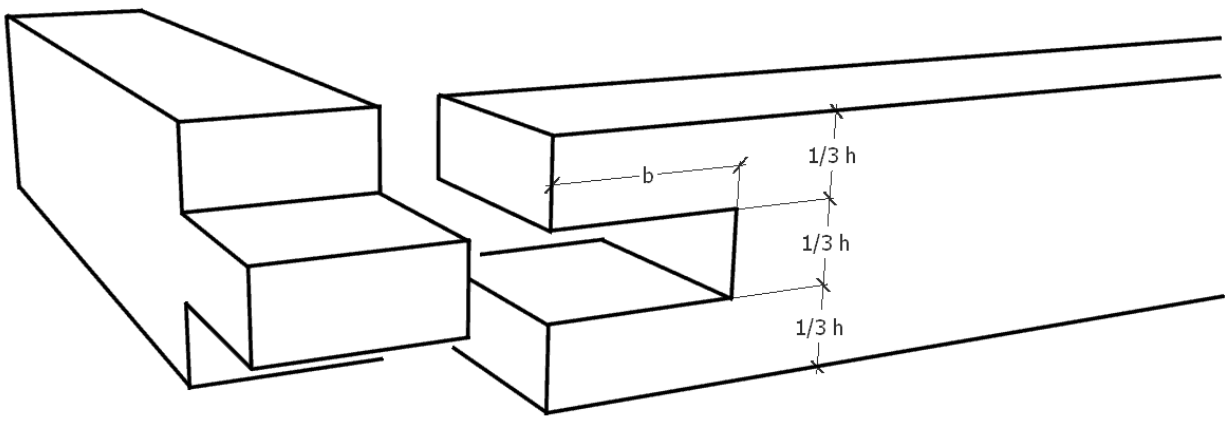



Similar to the halved scarf joint half of the beam width is cleared away. When joining the parts the surfaces are at one level.

The joint becomes stable when reinforcing it with screws or sheet metal parts.

It is the simplest connection and can be done in a short time.

**2. BRIDLE JOINT**



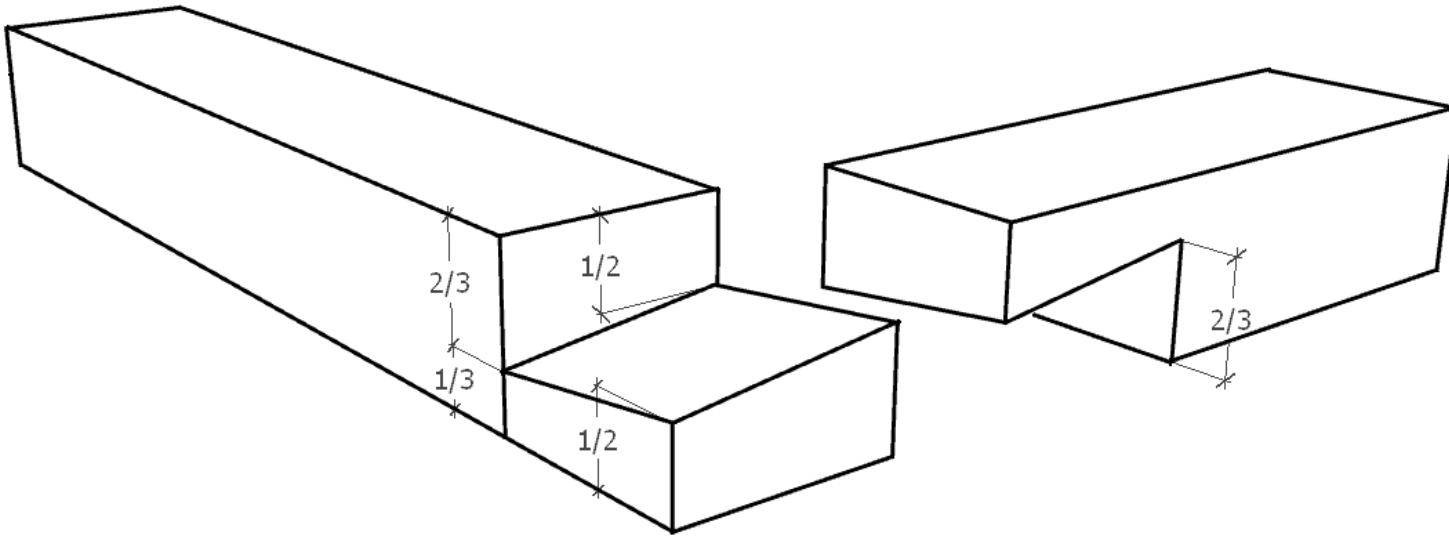

This joint requires time in making since it is more difficult in detail.

First the front end of the first timber is divided into three parts to cut out the tenon.

Then a mortise is cut into the front end of the corresponding second timber.

These joints are very useful for constructing door and window frames.

**3. BEVEL LAP JOINT**



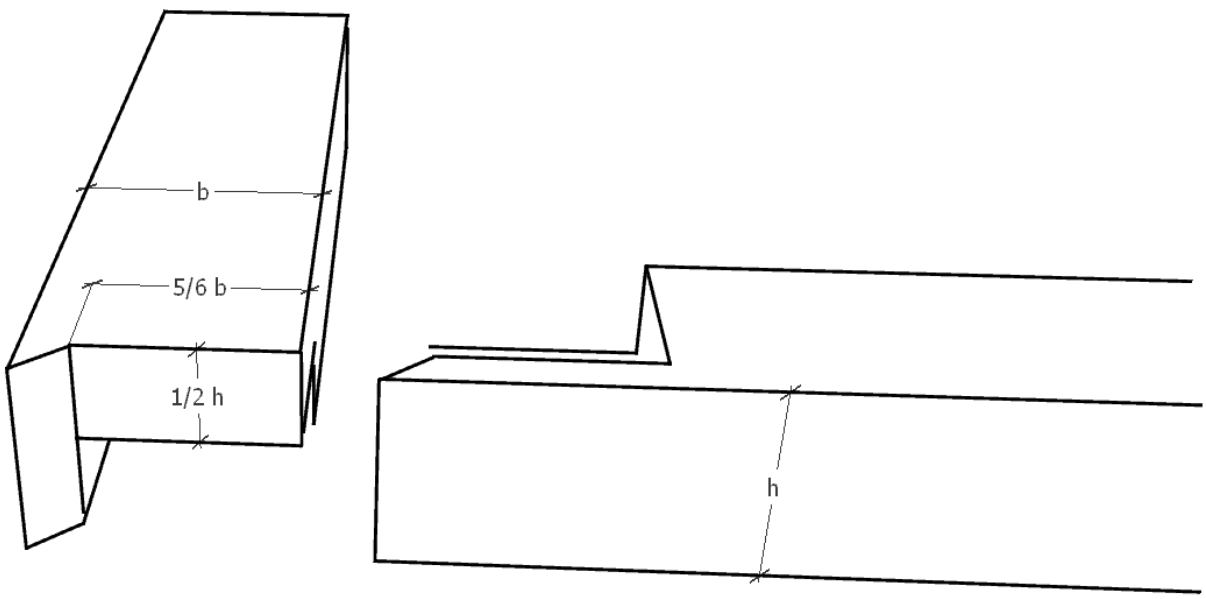

The bevel lap joint is one of the most complex corner joints. Because it has an oblique surface it is not as easy to draft as the half-lap joint.

The main advantage is that not many connectors are needed. By the oblique surface the timbers automatically are held in position.

This corner joint is especially useful for connections which have to carry loads (i.e. carport, truss, canopy and more), but it is time consuming to make them.

In an easier version of this connection only one edge is cut off obliquely.

**4. CONCEALED HALF-LAP JOINT**




In some cases the end-grain should not be visible, either for weather related reasons or for the look itself. A concealed half-lap joint serves this purpose. It is manufacured similar to the half-lap joint, just adding some intermediate steps to hide the end-grain.

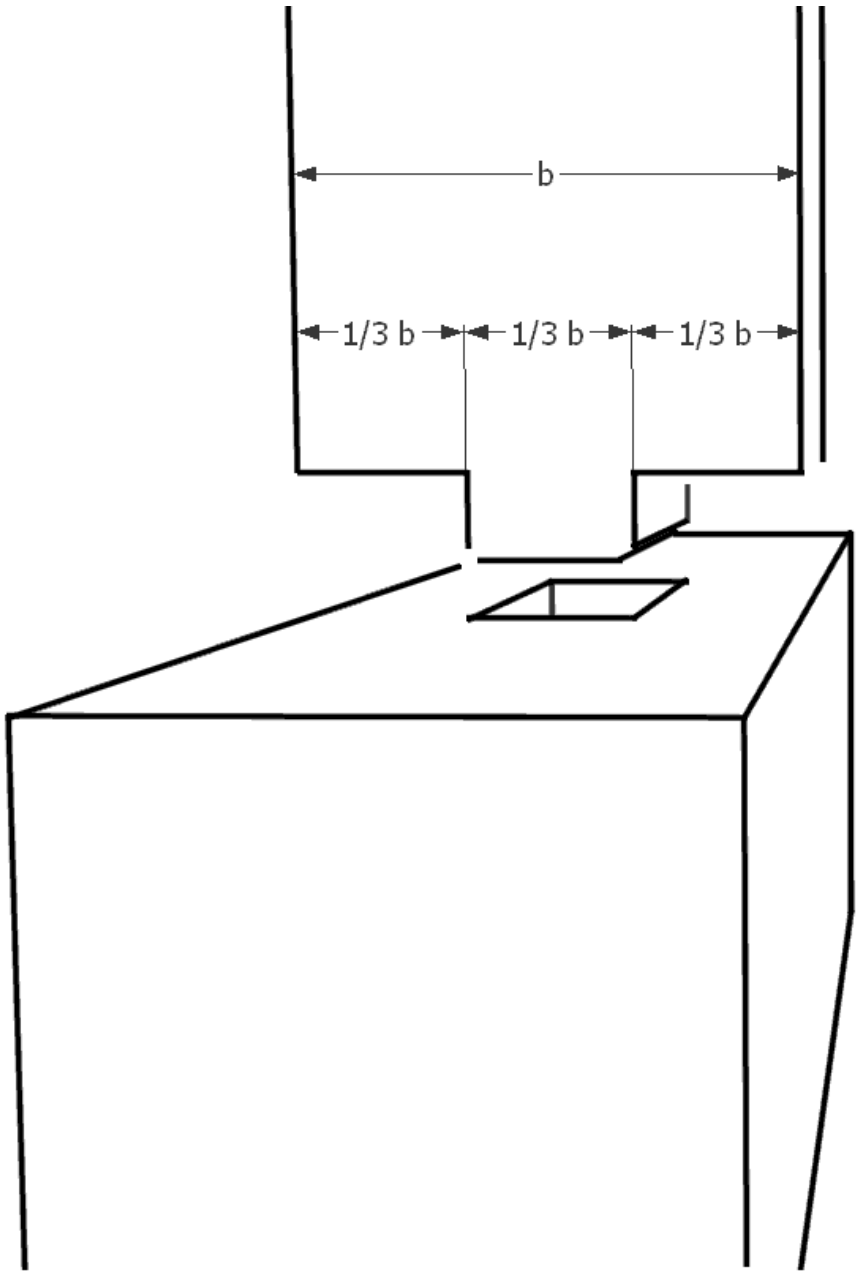
**Did you know?**

Woodworking joints became more and more detailed around the year 3500 B.C. Back then tenon and mortise were used.

**FRAMING JOINTS**

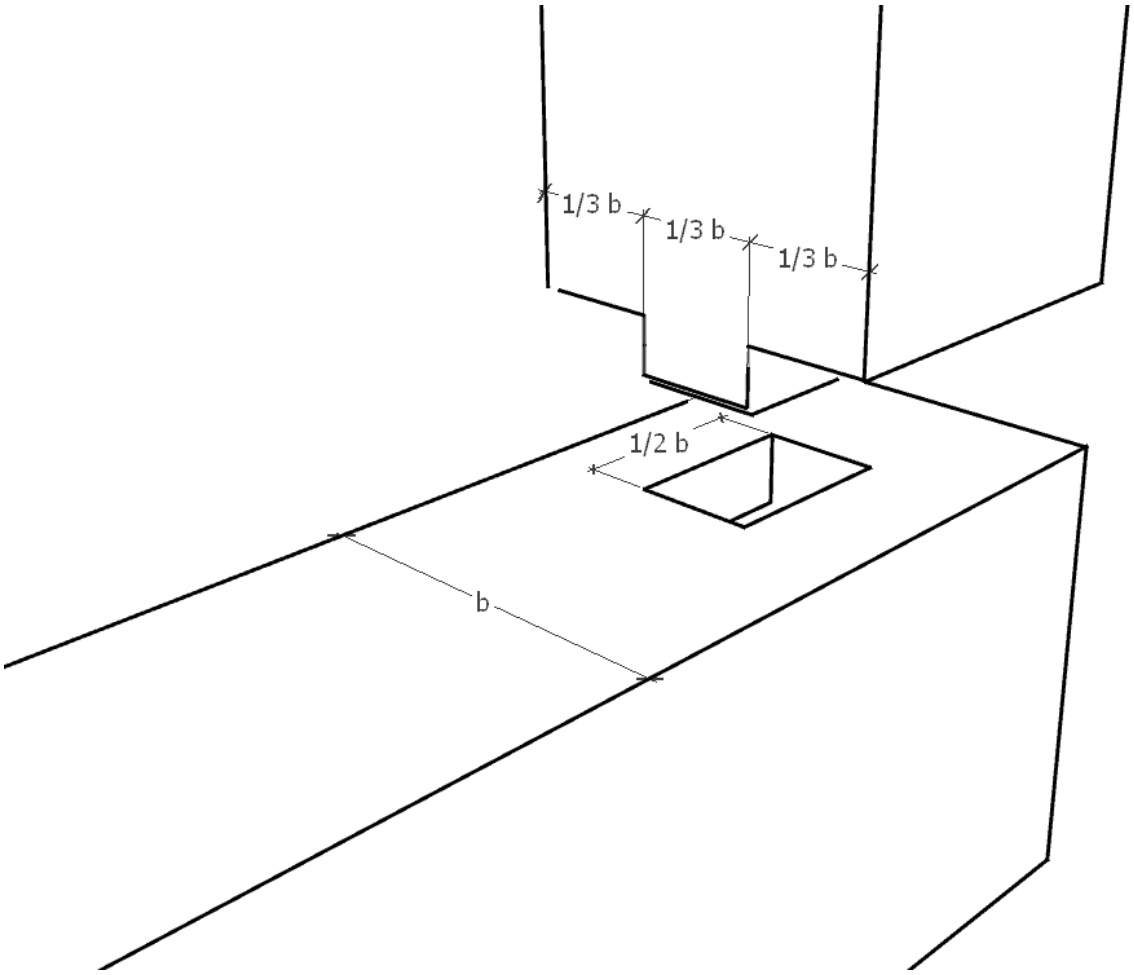
For these so-called junctions two timbers are connected at a right angle. Often tenons and tongue joints are used.

**5. STUB MORTISE AND TENON**




There are different sorts of tenons. A stub tenon is chiseled out over the whole width of the beam.

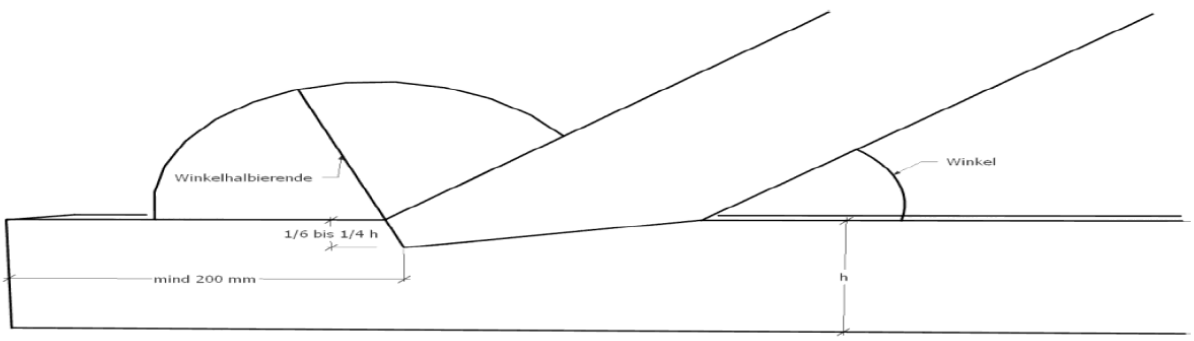
## 6. HAUNCHED TENON




When some beams have to be mounted at an angle haunched tenons are used.

The advantage lies in an easy and fast erecting, lateral shifting is also prevented.

## 7. OBLIQUE THRUST JOINT / FACE STAGGERED JOINT




A wedge-shaped notch is cut into the load bearing beam. In this notch the compression beam is fitted.

Thereby the front face forms the bisector of the obtuse exterior angle.

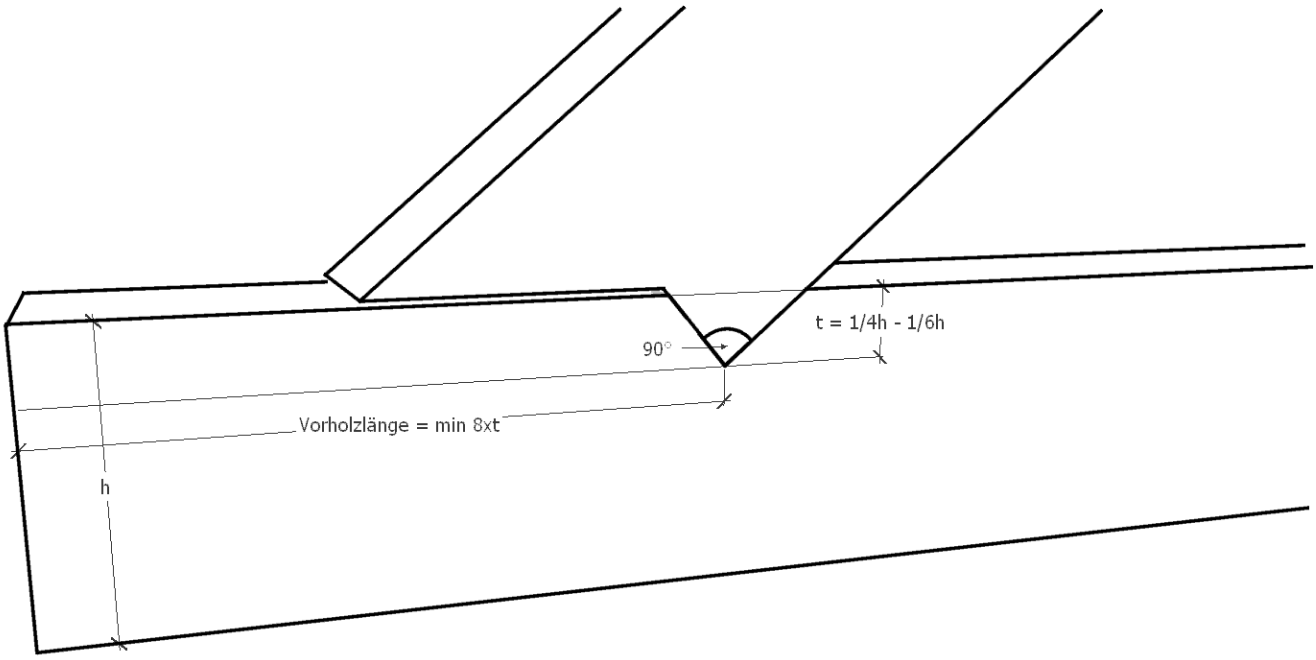
Usually an additional screw bolt is used to prevent lateral shifting. This bolt should be at the same angle as the front face of the compression beam. The minimum shear plane has to be 20 cm.

Construction wise the oblique thrust joint is not very recommendable. Why?

To guarantee 20 cm of shear plane a lot of timber is wasted.

For more help regarding the oblique thrust joint refer to this article.

**8. NOTCHED HOUSING**

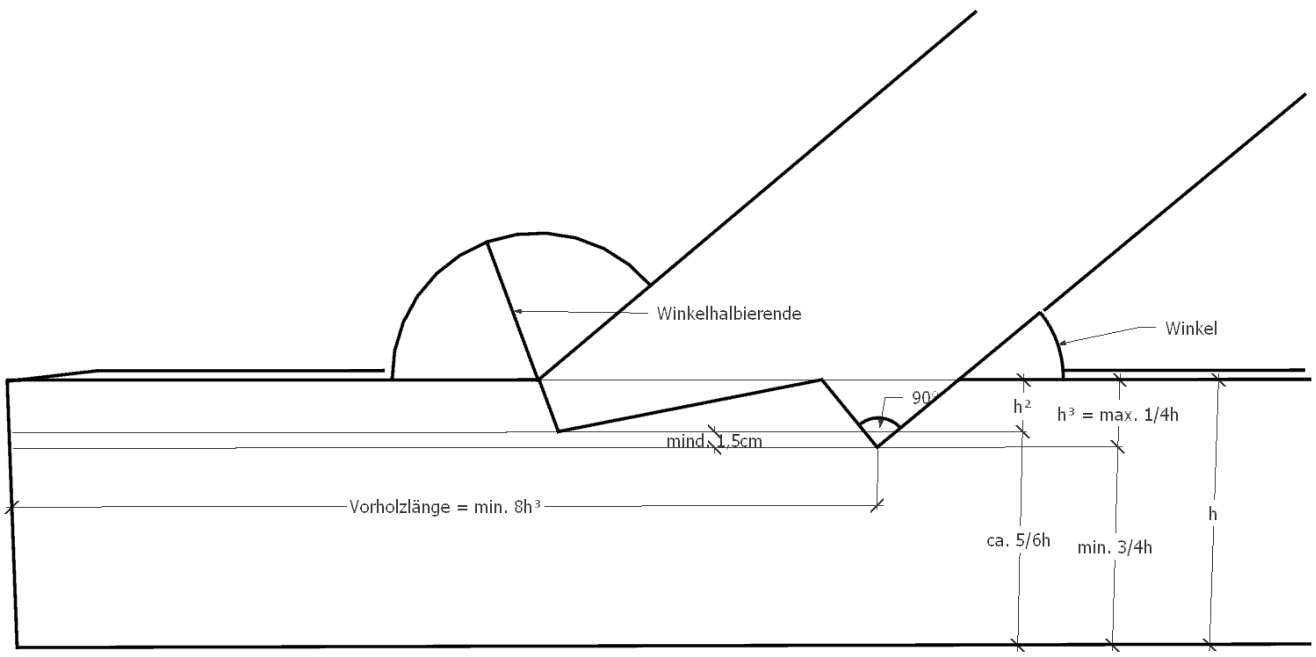



A notched housing should have a debth of 1/4 to 1/6 of the beam height. The beam projection requires a length of 8 times the debth of the notch or at least 20 cm.

Furthermore a gap of 3-5 mm has to be included.

The notched housing saves a few centimeters of the beam and is therefore more recommendable than the oblique thrust joint.

**9. OBLIQUE THRUST JOINT WITH NOTCHED HOUSING**




Even more stability is gained with this combination of the oblique thrust and the notched housing.

It is important to keep in mind that the notched housing has to be at least one cm deeper than the oblique thrust. Otherwise both shearing planes would clash.

Further important oblique framing joints are covered in this article.

**10.CROSS JOINTS AND HALVING JOINTS**

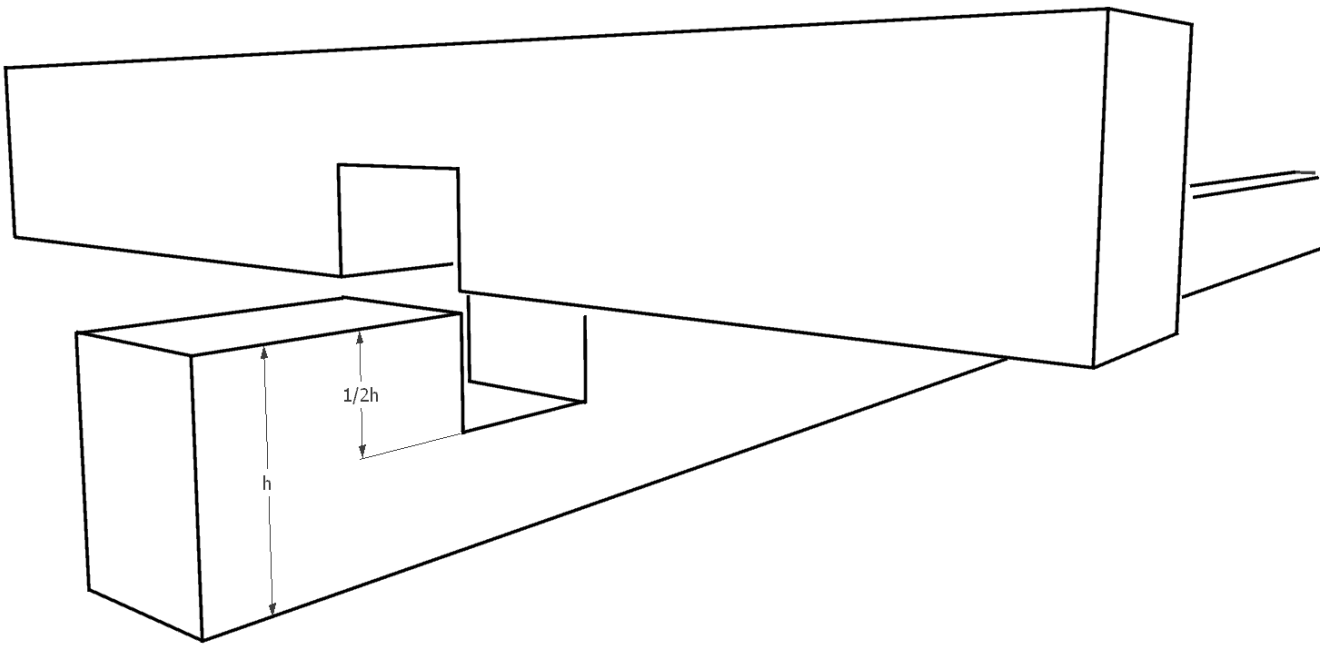
Cross and halving joints are used when two intersecting beams have to be secured.

Examples are tier of beams with binders or window frames with a number of glass panes which need to be seperated.

**Product recommendation**

Cross joints are best made with a japanese saw. Here you can find a list of the most popular japanese saws.

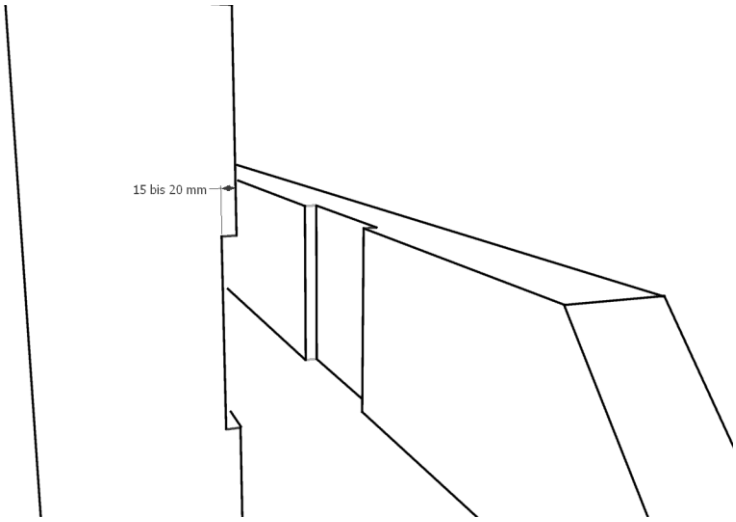
**11. HALVED CROSSING JOINT**




Any joint in which two pieces of wood are fixed across one another is called a cross joint. When cross-section weakening does not play a role both timbers can be notched up to half of their width.

In case of a load-bearing component like a post this would not be allowed.

**12. DOUBLE NOTCHED JOINT**




For creating a double notched joint both timbers are cut with notches to receive each other.

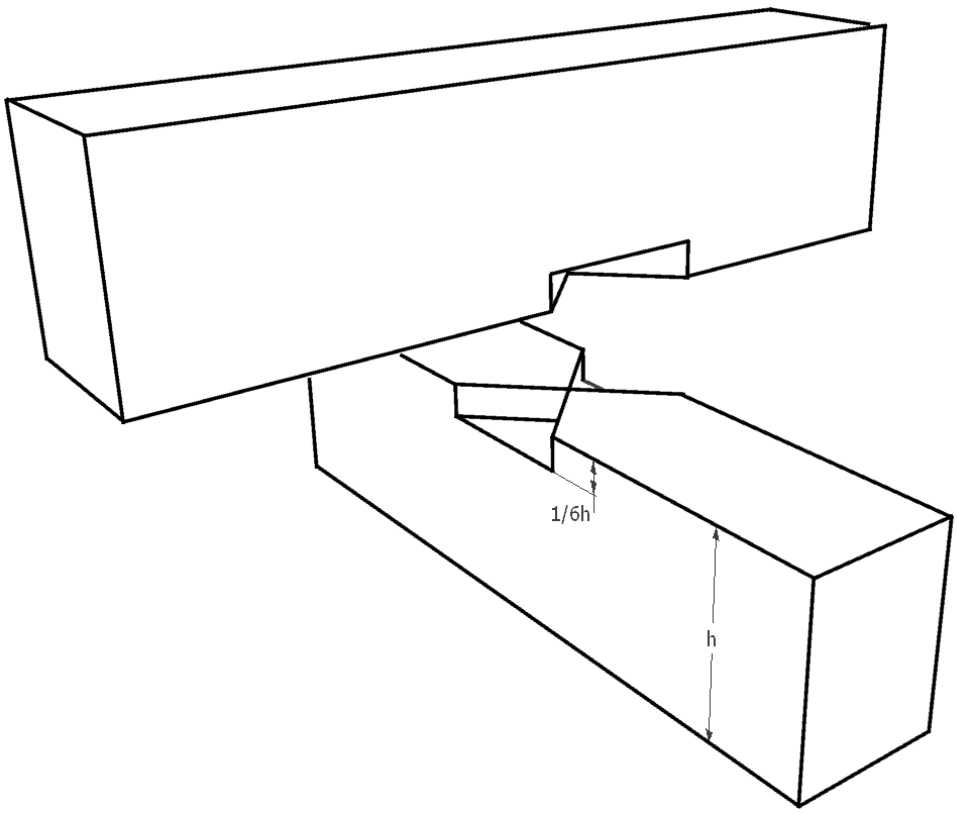
The post is cut only as deep as necessary so it can still fulfill its static requirements.

Notches of 1,5 cm to 2 cm are sufficient for this joint. In addition both parts are secured with a screw bolt or a wood screw.

**Did you know?**

As of the 15th century CE these joints became more and more complex, thanks to the toolmakers. With continually improving axes, hatches and saw blades countless woodworking joints were made.

**13. CROSSED TENON JOINT**

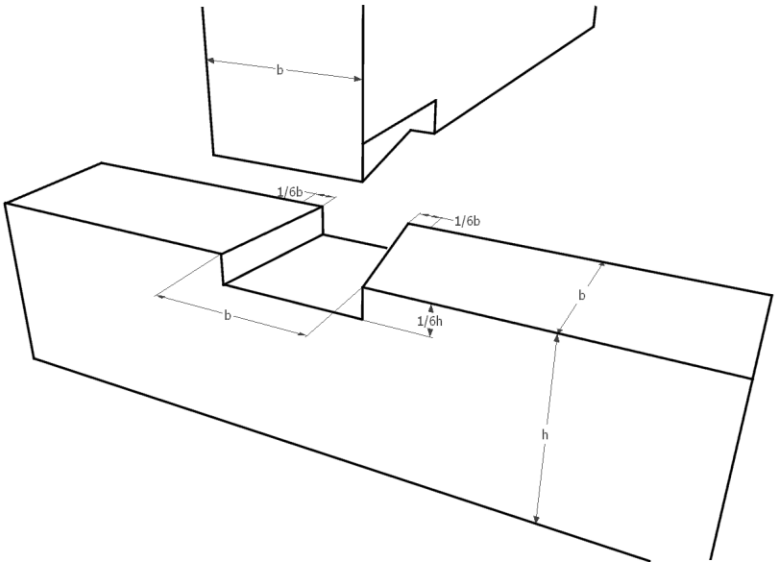



Drafting this joint is easy: By joining the particular timbers and the connecting of the four corners a cross is formed.

1/6 of the height of both parts is removed to create two parts that fit into each other.

The draft might not require a lot of time, but the execution does. Everything has to be done by hand since the recesses are difficult to reach with mechanical equipment.

## 14. DOVETAIL LAP JOINT

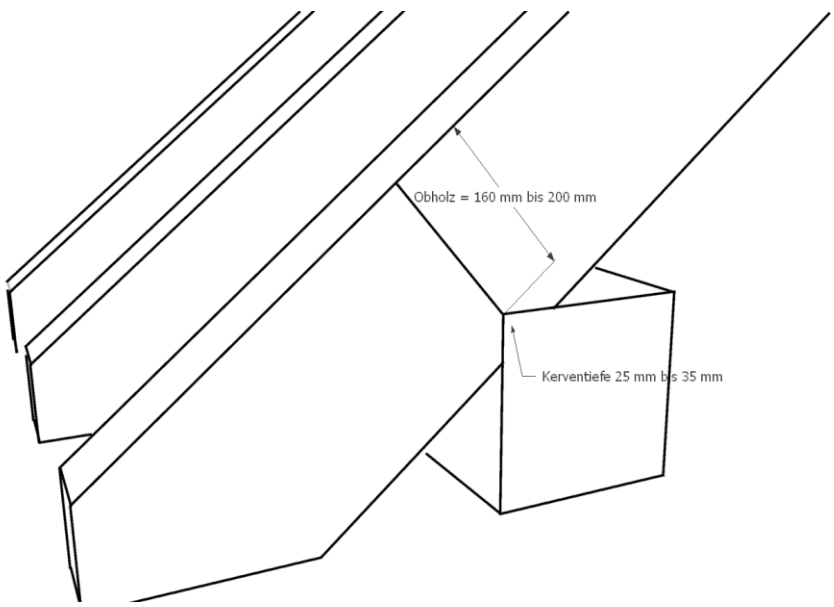



The dovetail lap joint is a very practical cross joint.

The main advantages are a simple erecting and a high resilience regarding tensile forces.

In comparison to other notched joints drafting is quite easy.

## 15. BIRDSMOUTH




The well-known birdsmouth joint is used when a rafter meets a purlin.

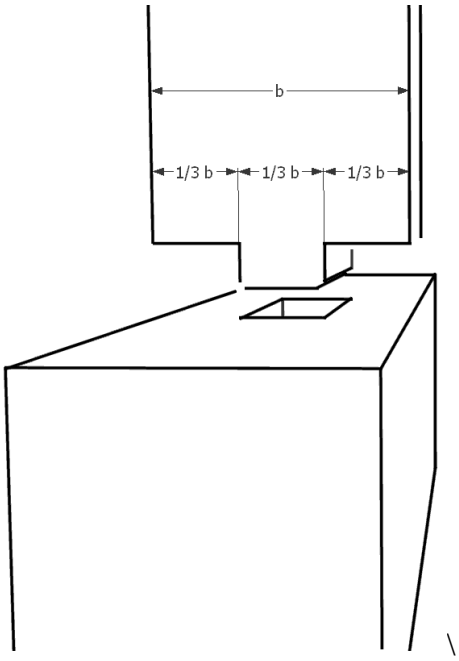
It prevents the shifting of the rafter and helps significantly during the erecting process.

Usually the rafters are fixed with wood screws, rafter anchors or nails.

**LO 3.2 – Construct framing joints**

**● Procedures of constructing framing joints:**

**Read sketch**




**- Prepare timber to the required size:** by marking**,** ripping, planning, squaring and cutting

**- Identify the tools required**: tools used to make lengthening joint are divided into two groups Which are hand tools and wood working machines

**Hand tools**: ex: pencil, tape measures, saw clamp, try square, planer, chalk line, screw drivers, tenon saw, back saw, hand drill, bevel, work bench, bit, axe…etc

**Wood working machine**: ex: surface planer machine, thicknesses machine, panel saw, mitre saw, morticing machine, tenoning machine, spindle moulding machine etc….

**- Identify sides and edges Cutting joints to size:** there are two sides and two edges that used to work in lengthening joints real side and off side start with real side and real edge.

**LO 3.3 – Assemble part of framing joint**

**● types of assembly used in framing joint**

**- assembling test**: non-permanent) is the assembly made by joiner or carpenter without adhesive or another kind of materials for fastener.

**- final assembling: (permanent)** Traditional construction features permanent fixing with glue and also a mechanical fastening such as screws, pins or nails. When a more decorative finish is required, glue is used in combination with a more sophisticated joint.

- Joints can be designed to hold without the use of glue or fasteners; a pinned mortise and tenon is an example of this.

- Glue is highly effective for joining timber when both surfaces of the joint are edge grain. A properly glued joint may be as strong or stronger than a single piece of wood. However, glue is notably less effective on end-grain surfaces. Animal glue is soluble in water, producing joints that can be disassembled using steam to soften the glue.
- Various mechanical fasteners may be used, the simplest being nails and screws. Glue and fasteners can be used together

**Reference(s):**

https://en.wikipedia.org/wiki/Woodworking_joints
http://wiki.dtonline.org/index.php/Widening_Joint
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