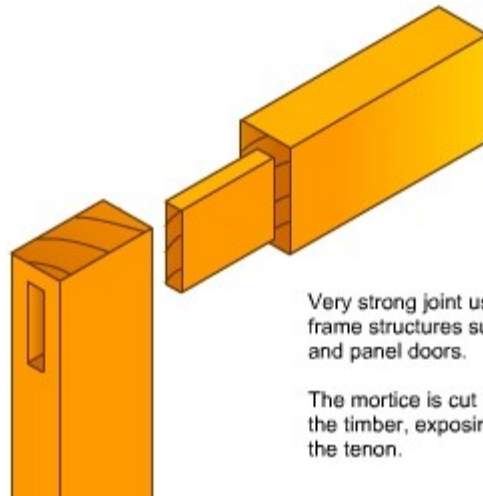


Making a Through Mortice and Tenon Joint



Very strong joint used in many frame structures such as frame and panel doors.

The mortice is cut right through the timber, exposing the end of the tenon.

Fig1.

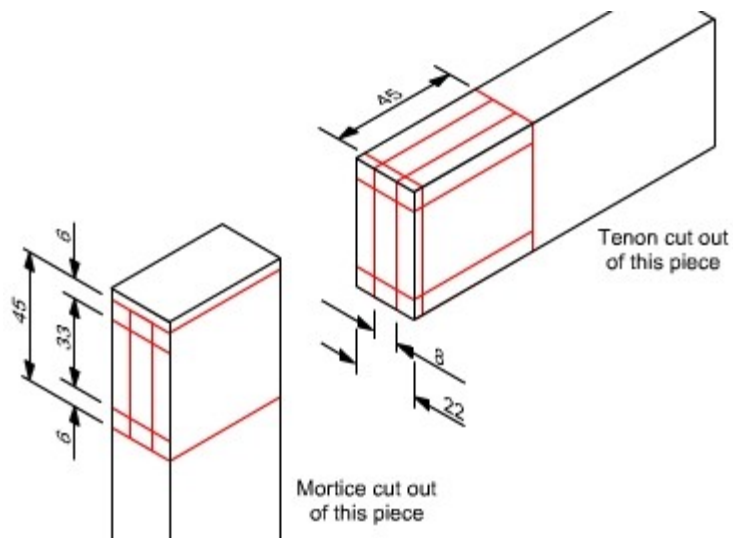


Fig 2.

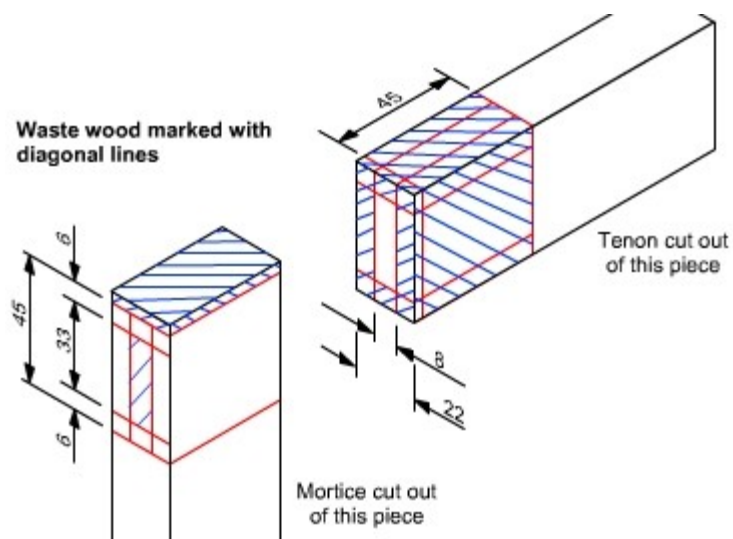


Fig 3.

Learning Objectives

Pupils should learn:

- that gluing to end grain makes a weak joint
- that there are standard wood joints that avoid gluing to end grain only
- that standard wood joints may be adapted for particular purposes, e.g. through mortice and tenon joint, stopped mortice and tenon joint, haunched mortice and tenon joint, bare faced tenon, etc.
- to measure accurately using a steel rule,
- to use a try square, mortice gauge, pencil and marking knife
- to use a tenon saw, mortice chisel and bevel edged chisel
- to glue timber using PVA glue
- to clamp timber using a G-cramp
- how to plane end grain.

Resources

Each pupil will need:

- 2 pieces of softwood 160 x 45 x 22
- work station on a woodwork bench ~ a woodwork vice
- pencil, marking knife, try square, mortice gauge, tenon saw, bench hook, mortice chisel, bevel edged chisel, mallet, G-cramp, small piece of scrap wood for padding under the G-cramp.

Activity

1. Teacher explains why it is important to know how to join timber when we are designing and making wooden products.
2. Teacher uses the Wood Joint Animation on an interactive white board to show the common types of wood joints and to explain why they are used.
3. Teacher puts the student version of this lesson plan onto the whiteboard or prints the page with the animation set on the measurement scene.
4. Teacher gathers students around for a demonstration.
5. Teacher explains when a pencil is used to mark out wood and when a marking knife is used.
6. Teacher explains how to hold a try square properly and demonstrates how to mark around the end of a piece of wood using a try square and a marking knife.
7. Teacher demonstrates how to measure and mark a line 45 mm from the first line on both pieces of timber.
8. Students are given two pieces of timber (2 off 160 x 43 x 22).
9. Students mark around one end of both pieces of timber using a try square and marking knife.
10. Students measure 45mm from the line and mark a line around both pieces of timber using a pencil and a try square.
11. Teacher demonstrates how to set a mortice gauge so that the pins are 8mm apart and 7mm from the stock and how to mark out the width of the tenon joint.
12. Teacher demonstrates how to set a marking gauge to 6mm.
13. Teacher demonstrates how to hold a marking gauge and a mortice gauge and how to use them to mark the tenon.
14. Teacher demonstrates how to mark the waste wood.
15. Students mark out the tenon using a marking gauge and a mortice gauge and mark the waste wood.
16. Teacher demonstrates how to mark lines, (across the grain) where the timber will be sawn, with a marking knife and try square.
17. Teacher demonstrates how a bevel edged chisel may be used to pare along the waste side of the line (across the grain) so that a tenon saw may be located easily next to the line.
18. Teacher demonstrates how to use a tenon saw to saw the tenon:
 1. holding the timber in a vice and sawing along the grain
 2. holding the timber on a bench hook and sawing across the grain
19. Teacher demonstrates how to use a try square, pencil and a mortice gauge to mark out the mortice.
20. Students mark out the mortice.
21. Teacher demonstrates how to clamp work to the bench and how to use a mortice chisel and a mallet to cut a through mortice.
22. Students clamp their timber to the bench and use a mortice chisel and a mallet to cut a through mortice.
23. Students assemble their joint.
24. Teacher demonstrates how:
 1. the pieces should be glued together,
 2. using a mortice and tenon joint that had been prepared and glued earlier, the teacher demonstrates how to saw off the waste wood protruding from the mortice and how to use a smoothing plane to plane the tenon flush with the edge of the timber.

Plenary Session

1. Students compare their work with the teacher's demonstration piece and each others'.
2. They discuss the criteria that could be used to assess the quality of their products.
3. Their work is assessed by their peers and by the teacher. Name cards should be placed in front of each piece of work, then the work should be photographed so that each student will have a visual record of the assignment.