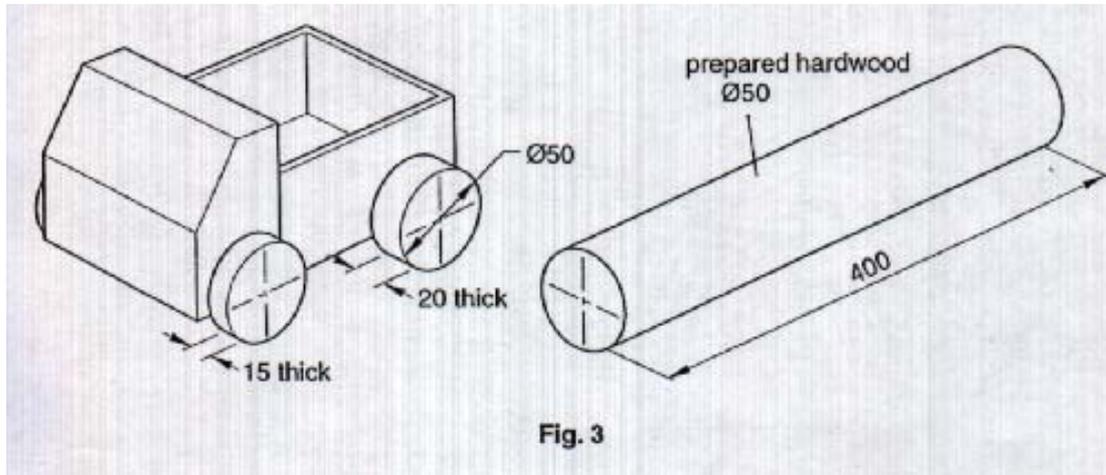


Jigs Model Answer

1998 Paper 2 Question 3

Question

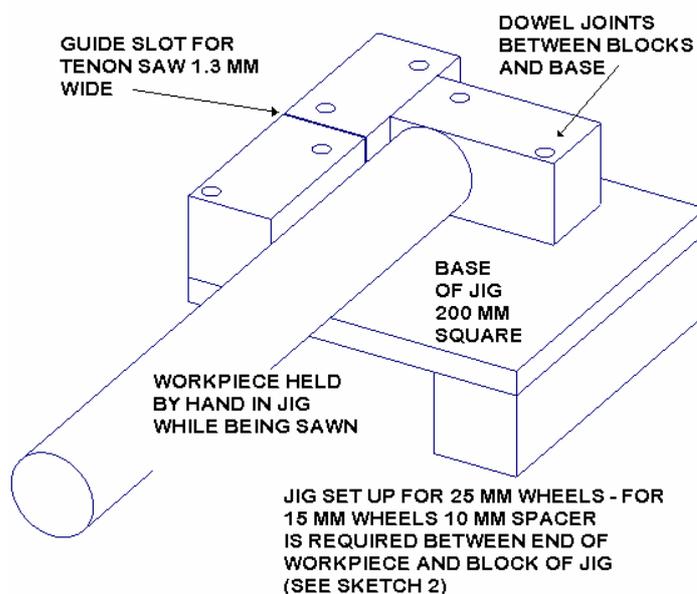
Fig. 3 shows a toy truck, together with a round length of hardwood from which wheels will be cut for four similar trucks.



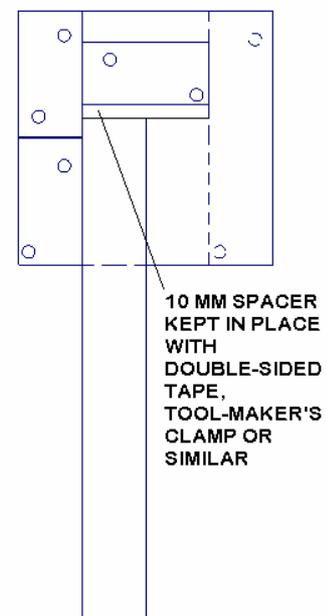
Use notes and sketches to design a jig that will allow the two different thicknesses of truck wheels to be cut accurately from the length of prepared hardwood using a tenon saw.

Answer

NOTE 1: THIS JIG IS BASED ON THE BENCH HOOK. IT CAN BE MADE OF ANY AVAILABLE SCRAP HARD- OR SOFTWOOD



SKETCH 1



SKETCH 2

NOTE 2

TEST CARRIED OUT ON SCRAP WOOD TO FIND OPTIMUM WIDTH OF TENON SAW SLOT. CARE TO BE TAKEN NOT TO DAMAGE SLOT

NOTE 3

CARE TO BE TAKEN WHEN CUTTING HARDWOOD WORKPIECE THAT IT DOES NOT TURN UNDER PRESSURE FROM TENON SAW

Marking scheme

hold length of wood secure [1]
guide for saw blade [1]
adjustable for 15mm or 20mm[1]
easy to use/repetition [1]
quality of communication (technical details must be relevant) [0-2]

Teacher's comments

All the information for this answer is given in the question. The important points in the question are underlined and in italics. We can see how important it is to read every word in the question

hardwood - it is important to notice the workpiece is hardwood because hardwood is quite hard to cut. As there are only four trucks to be made, it is not economical to make an elaborate jig and you will be using the jig to locate the workpiece but will use your hand to hold the workpiece so you need to put a note reminding people to hold the workpiece tight and not to let it slip as the quality would go down if the tenon saw damages the workpiece

four - there will only be four trucks, (16 wheels), made, which means 16 cuts. The blocks at each side of the tenon saw guide slot can therefore be made of softwood. If there were large numbers to be made, you might have to line the slot with plastic or protect it in some other way

notes and sketches - this means at least two notes and at least two sketches. There are six marks, which is six minutes, so you have time to do these

a jig - do not design two jigs when it asks for one

two different thicknesses - the value of the two different thicknesses are given in Fig. 3. So, not only must you read every word in the question but you must also look at every part of the diagrams

cut accurately - the jig must be designed to allow the person making the toy to cut the wheels accurately. The question specifies that a tenon saw must be used, which will not produce a perfect finish, so you do not need to go overboard

tenon saw - in order not to damage the guide slot, it should be the same width as the cut of the tenon saw. If you can't think of anything to put in the NOTE, you could put something like NOTE 2 in this model answer

Method: start off by thinking how the blade, (or in some questions, drill), is going to be guided to the correct part of the workpiece. Then think how you are going to locate the workpiece in the three planes, X, Y and Z. Then consider how you are going to hold and quickly release the workpiece. A fixed wedge and a moveable wedge is good for rectangular parts. You can locate a cylinder in an angle produced by two flat pieces at right angles, (an L shape). You may not be able to hold the cylinder with wedges so, if it is impracticable or dangerous to hold the workpiece by hand, you may need a flat plate at 45 degrees to the L shape held with bolts and wing nuts

Dimensions: are given in the question. You probably won't have time to completely dimension the jig but you should give some indication of the size by saying what size a major component is, in this case, the jig base has been dimensioned. The required accuracy is not given in the question but the absolute dimensions could be +/- 1mm. They wheels must, however, for appearances sake, be not more than half a millimetre different in thickness

Materials: – the jig must not be too expensive as the cost and effort has to be divided between only four trucks. NOTE 1 states that the jig can be made of any scrap wood that is available

Examiner's comments, (from report published by the examination board)

Those candidates who understood the principles of jig design showed some very innovative design solutions. However, these were in the minority. The best designs held the length of wood securely in place while the wheels were sawn to length, the saw blade itself guided into the correct position. An adjustable feature meant that two different lengths of wheel could be sawn. For maximum marks these details needed to be communicated clearly by means of annotated sketches.