Model Making: Tools, Materials and Techniques

2007
20 minutes

Teacher Notes:
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B.Ed

Program Synopsis

This program covers how model making can effectively be used in the visualisation and materials testing of design and manufacturing projects. It looks at various aspects of the model making process, including the range of materials, tools and construction techniques used in making models out of timber.
Introduction

Model making is a very important stage in the design and construction of any manufactured piece. Models provide a visual representation of how a finished piece will look, and, often more importantly, demonstrates how a finished piece will function.

For the model maker, it is important that the selection of materials and construction techniques is appropriate for the finished piece. For example, if the model is being used to test strength as well as visual appearance, then it is likely that the materials and construction techniques used will replicate those of the finished piece. If however, a visual representation is all that is needed, then it is likely that a model will be constructed of cheaper materials than the finished piece.

The program looks at various aspects of model making, including the range of materials, tools and construction techniques possible in making models out of timber.

Program Rationale

This program aims to underline the importance of model making in any design and manufacturing project. It looks at the use of timber for making models of various descriptions, and provides a prospective model maker with a sound guide to the model making process.

Program Timeline

00:00:00 Introduction
00:01:12 Chapter 1 – Construction
00:05:41 Chapter 2 – Hand Tools
00:09:47 Chapter 3 – Power Tools
00:11:18 Chapter 4 – Materials
00:14:37 Chapter 5 – Techniques
00:18:53 Credits
00:19:48 End Program:

Related Programs

• Designing, Manufacturing, Evaluating a Product

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Program Worksheet

Before the Program

1. Define a model – what is it and what is its purpose?

2. Examine a number of different models – compare notes with others about the construction techniques and quality in the model, and whether it serves the purpose you defined in question 1.

3. In what circumstances might different materials be used for making a model than are used for making the finished item it represents?

4. In what circumstances might the same materials be used?
During the Program

1. Why does a builder first make a small scale version of a piece of furniture?

2. Why might a builder opt for manufactured board when making a large scale model?

3. Even if the finished piece is to be made from solid timber, the model is often made from manufactured board. Why?

4. What is a possible difference between the joints used on models being built for visual purposes only, and models being built for testing in real life situations?

5. Complete the sentence:
   Three examples of cheaper joints used in model making are b __________________________ joints; b __________________________ joints; and D __________________________ joints.

6. Complete the sentence:
   An example of a stronger, more expensive joint is the m __________________________ and t __________________________ joint.

7. Identify three examples of hand tools often used in model making.

8. For what purpose is a rasp primarily used?
9. For what purpose is a marking gauge often used in model making?

________________________________________________________________________

________________________________________________________________________

10. Complete the sentence:

With sandpaper, the grade is usually printed on the ________________
of the paper. The ________________ the number, the less particles per
________________________________ inch and the coarser the paper is.

11. On what type of material might a coarser, 100 grade sandpaper be used, compared with a finer, 250 grade paper?

________________________________________________________________________

________________________________________________________________________

12. What evidence of model makers observing safety requirements is there in this program?

________________________________________________________________________

________________________________________________________________________

13. What are some examples of power tools being used for model making that are shown in this program?

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14. What are some examples of softwoods used for model making mentioned in the program?

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15. What are some examples of hardwoods used for model making mentioned in the program?

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16. Which is generally easier to cut – softwood or hardwood?

________________________________________________________________________

________________________________________________________________________

17. What are the features of a tenon saw, and for what is it primarily used?

________________________________________________________________________

________________________________________________________________________
After the Program

1. Prepare a detailed plan, including drawings, of the model you will make prior to the construction of your next project. Identify why you have chosen the materials and construction techniques that you did in making the model, and define the scale of the model you will make.

2. Compare notes on the above with other class members, and offer constructive feedback about the proposed model making processes outlined by different people in the class.
Suggested Student Responses

During the Program

1. Why does a builder first make a small scale version of a piece of furniture?
   To assist in visualizing what the finished piece will look like, and to check that it is functional.

2. Why might a builder opt for manufactured board when making a large scale model?
   Manufactured board is a more economical option for larger models than solid timber.

3. Even if the finished piece is to be made from solid timber, the model is often made from manufactured board. Why?
   It prevents wastage of a more expensive material.

4. What is a possible difference between the joints used on models being built for visual purposes only, and models being built for testing in real life situations?
   In models being built for visual purposes, weaker joints might be used as it makes the model-making process quicker. In models being built for testing in real life situations, the actual joints used in construction must be used.

5. Complete the sentence:
   Three examples of cheaper joints used in model making are butt joints; biscuit joints; and dowel joints.

6. Complete the sentence:
   An example of a stronger, more expensive joint is the mortise and tenon joint.

7. Identify three examples of hand tools often used in model making.
   chisel, plane, saw, rasp, hammer.

8. For what purpose is a rasp primarily used?
   For removing extraneous and unwanted material from a piece, and for shaping.

9. For what purpose is a marking gauge often used in model making?
   A marking gauge is often used for marking out joints on a model.

10. Complete the sentence:
    With sandpaper, the grade is usually printed on the back of the paper. The lower the number, the less particles per square inch, and the coarser the paper is.

11. On what type of material might a coarser, 100 grade sandpaper be used, compared with a finer, 250 grade paper?
    The coarser sandpaper might be used on solid timber, but for manufactured board, finer sandpaper is needed.

12. What evidence of model makers observing safety requirements is there in this program?
    goggles, ear protection, hair under control.

13. What are some examples of power tools being used for model making that are shown in this program?
    orbital sander, jigsaw, circular saw, router, drill, grinder.

14. What are some examples of softwoods used for model making mentioned in the program?
    Douglas Fir (Oregon), pine, Western Red Cedar.

15. What are some examples of hardwoods used for model making mentioned in the program?
    Ash, Alpine Ash, Jarrah, Mahogany.
16. Which is generally easier to cut – softwood or hardwood?  
   **Softwood**

17. What are the features of a tenon saw, and for what is it primarily used?  
   It is a short, rigid-backed saw, used for making smaller cuts required for tenon joints