Stage 5 - Industrial Technology Timber – Tambour box program

Students develop their skills and knowledge in the use of power tools and jigs for the fabrication of more complex projects. Students learn about the properties of timber and how they impact design choices in the development of a project, as well as the interpretation of plans and specifications and the modification of existing plans to meet needs.

**Duration**

Sample term: 18 weeks

Detail: 54 hrs, 6 hrs a fortnight

## Outcomes

* **IND5 - 1** identifies, assesses, applies and manages the risks and WHS issues associated with the use of a range of tools, equipment, materials, processes and technologies
* **IND5 - 2** applies design principles in the modification, development and production of projects
* **IND5 - 3** identifies, selects and uses a range of hand and machine tools, equipment and processes to produce quality practical projects
* **IND5 - 4** selects, justifies and uses a range of relevant and associated materials for specific applications
* **IND5 - 5** selects, interprets and applies a range of suitable communication techniques in the development, planning, production and presentation of ideas and projects
* **IND5 - 6** identifies and participates in collaborative work practices in the learning environment
* **IND5 - 7** applies and transfers skills, processes and materials to a variety of contexts and projects
* **IND5 - 8** evaluates products in terms of functional, economic, aesthetic and environmental qualities and quality of construction
* **IND5 - 9** describes, analyses and uses a range of current, new and emerging technologies and their various applications

[Industrial Technology 7–10 Syllabus](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/technologies/industrial-technology-2019) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2019

## Unit overview

Students make a small box with a tambour top that wraps over the back of the project and connects underneath to the bottom of the drawer. When the drawer is opened the tambour section retracts at the same time. Students should have developed skills in using a variety of basic hand tools and machinery in the production of previous projects.

This project seeks to further develop the knowledge and skills of students in using the router along with jigs to create more complex items.

The basic plans are provided for you, including:

* dimensioned drawing of all components
* dimensioned plans for the jigs, including a cutting list
* dimensions and a suggestion for possible handle designs for the tambour section and the drawer front.

As part of this project, students design and make their own handle and integrate it into their tambour box.

## Resources overview

The resources and links listed below are referenced within the program but is not an exhaustive list of resources available. Teachers can add to these resources as needed.

### Physical resources

* Tambour box student and teacher resource package.
* Timber properties and characteristics PowerPoint.
* Adobe illustrator router jig file.
* Occasional computer room access to allow for research.
* Workshop with access to routers, down-cut spiral router bits, router bushes and jigs, as well as all common woodworking equipment.

### Websites

* [Bungendore woodworks](https://www.bwoodworks.com.au/) – [tambour box](https://www.bwoodworks.com.au/shop/tambour-jewellery-box)
* [Kangaroo valley wood crafts](https://kangaroovalleywoodcrafts.com.au/) – [roll top jewellery box](https://kangaroovalleywoodcrafts.com.au/boxes/roll-top-jewellery-box-14)
* [Australian woodwork](https://www.australianwoodwork.com.au/) – [jewellery boxes](https://www.australianwoodwork.com.au/collections/wooden-jewellery-boxes)
* [Equipment safety in schools](https://online.det.nsw.edu.au/esis/teacher/?ssosource=login) (staff only)
* [Wood solutions](https://www.woodsolutions.com.au/articles/timber-finishes-interior) –timber finishes interior

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| Content | Teaching and learning | Evidence of learning | Adjustments and registration |
| **Week one to two** * Explore timber decoration techniques
* Identify and use a variety of joining methods
* Identify and cut a range of timber joints
* Select and use specialist terminology in context
 | **Teacher:*** Introduce the unit 'Tambour Box' and explains the expectations and the requirements of the assessment task including its weighting as part of the 100 and 200 hour courses.
* Demonstrate to students the function of a completed tambour box and identifies the aspects of the design that can be modified.
* Demonstrate to students that this is a real world product by showing similar products for sale on websites such as:
	+ [bungendorewoodworks.com.au/products/tambour-box](http://bungendorewoodworks.com.au/products/tambour-box)
	+ [kangaroovalleywoodcrafts.com.au/boxes/roll-top-jewellery-box](https://kangaroovalleywoodcrafts.com.au/boxes/roll-top-jewellery-box-14)

**Students:*** Discuss the potential methods of construction and brainstorm as a class how they would go about making it using hand tools and how they may be able to simplify the manufacturing of the box by using power tools.
* Begin to record terms in the glossary based on the information discussed
 | * Students demonstrate prior knowledge by being able to hypothesise on the most likely construction methods and joints used.
* Students use specialist terminology in the completion of their glossaries.
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| * Describe the differences between hardwoods and softwoods and justify their selection in a range of projects
* Investigate the properties and working characteristics of solid timber
* Investigate timber conversion and seasoning processes
* Identify differences in appearance and properties of radially and tangentially cut boards
* Contrast the properties and working characteristics of a range of timbers when planning and using timber for specific projects
 | **Teacher:*** Introduces the topic of timber properties and characteristics and expands on the content provided in the booklet by showing students a range timber types using the Timber Properties PowerPoint as well as physical samples of different species as available.
* Demonstrates the potential different conversion methods used when harvesting timber and how this affects their appearance.

**Students:*** Identify two more potential timbers and the associated information required based on the example information provided.
* Justify their choice of timber for the tambour box using the scaffold to frame their response in terms of the properties and cost.
 | * Students are able to articulate the differences between hardwoods and softwoods, and the issues with different methods of conversion and seasoning through verbal questioning.
* Students' selection and justification of alternative timbers demonstrates an understanding of the properties and working characteristics of different timbers.
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| **Weeks three to six*** Use and/or modify existing designs when completing projects
* Produce freehand sketches of project components and/or projects
* Prepare design and production folios to describe the management and processes undertaken in the production of practical projects
 | **Teacher:*** Introduces the next task of designing their handles and edge of tambour.
* Provides examples of websites they may want to use to aid their research, such as:
	+ [australianwoodwork.com.au/collections/wooden-jewellery-boxes](https://www.australianwoodwork.com.au/collections/wooden-jewellery-boxes)
* Outlines what to look for, what information they need to provide and explains how they need to evaluate the designs they find in terms of how they look, the different parts involved in making them, how they are potentially made, and what technology could be used to aid in their manufacture.

**Students:*** Begin to research ideas for their handle designs, looking at existing box designs and the handles they have.
* Begin to develop the initial ideas for the handles including the potential construction technique and methods of attaching them to the drawer.
* Consider the design examples provided in the working drawings and modify them or replace them to suit their handle designs.

**Possible adjustments*** Students requiring support may be given a limited range of options to choose from for the handle and leading edge designs.
* Students requiring extension could decorate the sides of the box using inlay or veneers, or modify the design by using thicker tambour slats with rebated ends.
 | * Students sketches demonstrate how they intend to modify the original design and are recorded in their workbook
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| * Investigate advanced manufacturing techniques to assist in the production of projects
* Compare industrial production processes to those used in the classroom
* Recognise and comply with WHS signage
* Demonstrate safe workshop practices and procedures
* Select and use personal protective equipment (PPE) when working with tools, materials and machines
* Read and interpret plans and/or materials lists to prepare materials for the completion of projects
* Measure and mark out materials accurately from a workshop drawing
* Accurately cut and prepare materials to size
* Identify and use a variety of joining methods
* Recognise the importance of conservation of materials and recycling in the timber industry
 | **Teacher:*** Recaps the potential methods of production identified in Week 1 and explains the actual method students will use to produce the tambour box.
* Explains how the use of technology can speed up the process of production and increase accuracy, including the use of jigs or other CAM equipment.
* Explains the safety precautions necessary for using a laser and the need for extraction to prevent a fire.
* Identifies workplace signage related to the use of the laser, explaining its meaning and how that dictates the lasers use.
* Demonstrates cutting out the template on the laser cutter or by hand depending on resources available (students could potentially machine the grooves on a CNC router).
* Shows students the plans for the jig and discussed possible modifications that could be made/ problems that may arise.
* Provides students with timber already ripped to match the widths in the material list provided.

**Students:*** Use the plans provided the make a number of jigs suitable for the amount of students in the class and the routers available for use with the project.

**Possible adjustments*** If a laser cutter isn't available at a school, then schools in the surrounding areas should be contacted to see if they would be able to share the load and cut out the template if materials are provided to them.
* Schools with CNC milling machines may choose to cut out the template using that method instead.
 | * Students are able explain the correct and safe use of the laser or CNC router through verbal questioning.
* Students are observed during practical activities using the correct PPE and following the safe operating procedures for a range of tools and equipment.
* Students can follow plans to accurately produce a series of jigs and templates whilst minimising waste and using offcuts where available/appropriate.
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| * Calculate quantities and costs of materials and components used in the completion of projects
* Apply project management techniques and follow a planned sequence through to project completion
* Prepare design and production folios to describe the management and processes undertaken in the production of practical projects
 | **Teacher:*** Explains how to complete the materials list and costing task.
* Elaborates on the working drawings and relates them back to the prepared components of the tambour box that students can interact with and compare with the drawing.
* Demonstrates how the dimensions of certain components may need to change depending on the design of the handle.

**Students:*** Interpret the drawings provided to create an accurate cutting list of parts required.
* Use that information along with the price/m information of their chosen timber or the price/m provided by their teacher to calculate the cost of materials for the box.

**Teacher:*** Explains the use of the scaffolds to visually calculate the amount of time available for students to construct their project.
* Reinforces the importance of planning on the successful completion of projects within a timeframe.

**Students:*** Discuss and identify as a class the main steps in the construction of their tambour boxes (aim for 12).
* Use the scaffolds provided to plan out their time for this project, including working out how many hours they will actually have to make it.
* Use the predicted construction time frame to calculate the cost for them to build the box and add that to the material cost for a total cost of production.
 | * Students completed costing and materials lists accurately reflect the project being produced.
* Students are able to formulate a plan of action which accounts for the time they have available in a well-considered manner.
* Students record all activities in their workbooks.
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| * Apply the principles of risk management
* Select and use specialist terminology in context
* Prepare design and production folios to describe the management and processes undertaken in the production of practical projects
 | **Teacher:*** Introduces students to the concept of risk assessment using previous safety tests and so on to reinforce the need for working safely in the workshop environment.
* Explains how we can mitigate risk by applying control measures to limit the danger and the use of PPE as a last resort.

**Students:*** Discuss the potential risks associated with each of the previously identified steps of the project.
* Complete a JSA for the project by performing a risk assessment of the each of the steps in order to minimise or remove the risks.
 | * Students correctly use specialist terminology in the formulation of a JSA which accurately identifies the potential risks and the appropriate control measures.
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| **Weeks seven -15*** Demonstrate safe workshop practices and procedures
* Safely use and maintain hand, power and machine tools
* Measure and mark out materials accurately from a workshop drawing
* Select, use and adjust hand tools in the production of practical projects
* Accurately cut and prepare materials to size
* Select and use specialist terminology in context
* Read and interpret plans and/or materials lists to prepare materials for the completion of projects
 | **Teacher:*** Reinforces the need for PPE and identifies the correct PPE for each item of equipment - check with ESIS at [online.det.nsw.edu.au/esis/teacher](https://online.det.nsw.edu.au/esis/teacher/?ssosource=login) to ensure up to date and accurate information on what can and can't be used by students.
* Identifies the materials the students will have available to them for their project.
* Reinforces the correct and safe use of hand tools by getting students to demonstrate to the class the procedure for marking and cutting out components.

**Students:*** Complete a safety test for each piece of equipment or for hand tools in general to ensure they are cognisant of the correct steps of operation.
* Apply the steps that they identified in the planning of their project, to the record of production so that they have a basis for what needs to go in each of the twelve steps.
* Read the plans provided as well as their cutting lists and begin to gather the materials required to make their box.

**Teacher:*** Records the successful completion of appropriate safety tests for each student as well as the observation of them using the equipment safely.
 | * Students complete a series of appropriate safety tests.
* Students use appropriate specialist terminology in the recording of the construction process in their workbooks.
* Students are observed during practical activities using the correct PPE and following the safe operating procedures for a range of tools and equipment.
* Students are able to follow plans to accurately mark out and cut up components for their box whilst minimising waste and using offcuts where available/appropriate
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| * Demonstrate safe workshop practices and procedures
* Safely use and maintain hand, power and machine tools
* Select and use personal protective equipment (PPE) when working with tools, materials and machines
* Accurately cut and prepare materials to size
* Produce practical projects using machines and portable power tools
* Maintain hand and machine tools
* Incorporate features into projects
* Prepare design and production folios to describe the management and processes undertaken in the production of practical projects
 | **Teacher:*** Reinforces the correct procedure for operation of each power tool or piece of equipment, including the use of the jigs, by demonstrating their safe use as the students reach that step.
* Ensures that students are continuing to follow protocols regarding the correct use of PPE.

**Students:*** Demonstrate safe use of equipment while accurately measuring and marking out their components on the timber provided.
* Demonstrate the safe use and maintenance of the router by setting up and using the jig to route the curved groove on the two internal faces of the sides of the box, then cleaning it off and packing away.
 | * Students are observed during practical activities using the correct PPE and following the safe operating procedures for a range of tools and equipment.
* Students use appropriate specialist terminology in the recording of the construction process in their workbooks.
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| * Demonstrate safe workshop practices and procedures
* Safely use and maintain hand, power and machine tools
* Select and use personal protective equipment (PPE) when working with tools, materials and machines
* Develop and produce practical projects allowing for the characteristics and properties of materials, systems, components, tools and equipment available (ACTDEK046)
* Apply project management techniques and follow a planned sequence through to project completion
* Produce practical projects using machines and portable power tools
* Maintain hand and machine tools
* Identify and use a variety of joining methods
* Select and use specialist terminology in context
* Read and interpret plans and/or materials lists to prepare materials for the completion of projects
* Prepare design and production folios to describe the management and processes undertaken in the production of practical projects
 | **Teacher:*** Demonstrates the process for shaping the box sides using a range of equipment. This can be done with a scroll saw and sander or the opportunity exists to create a pattern piece from MDF and route the outside shape of the end to match using a pattern routing bit.
* Demonstrates the method for laying out and cutting the biscuit slots for the base and shelf.
* Demonstrates how to form the 'quad mould' to run along the back of the shelf, either by using a roundover bit and routing the edge on a wider piece of timber (possibly enough for two students) which is then ripped by the teacher, or as a hand planing exercise (if routers are already in use elsewhere) on a wider piece of timber and then ripped by the teacher.

**Students:*** Set up the equipment and shape the sides of the box using the method demonstrated by the teacher while ensuring correct procedure and use of PPE.
* Set up the biscuit joiner and successfully cut the slots for the biscuit in the shelf, base and sides using the equipment safely.
* Form the quad mould using the method demonstrated by the teacher and glue to the back of the upper face of the shelf, holding in place with masking tape.
* Dry fit and then glue up the main carcase for the box ensuring all components are square.
* Clean up and pack away all equipment returning them to their correct locations.

**Possible adjustments:*** If students are going to apply decorative techniques to their sides they will need to do it prior to them being glued to the base and shelf.
* Students may wish to add inlay, laser engraving, pyrography or other techniques to the face, they may also wish to route the edges of the sides with a small roundover bit or other shape, however, they will need to consider clearances and the position of the drawer when deciding how they want it to look
 | * Students are observed during practical activities using the correct PPE and following the safe operating procedures for a range of tools and equipment.
* Students use appropriate specialist terminology in the recording of the construction process in their workbooks.
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| * Demonstrate safe workshop practices and procedures
* Safely use and maintain hand, power and machine tools
* Select and use personal protective equipment (PPE) when working with tools, materials and machines
* Develop and produce practical projects allowing for the characteristics and properties of materials, systems, components, tools and equipment available (ACTDEK046)
* Use and/or modify existing designs when completing projects
* Apply project management techniques and follow a planned sequence through to project completion
* Measure and mark out materials accurately from a workshop drawing
* Select, use and adjust hand tools in the production of practical projects
* Accurately cut and prepare materials to size
* Identify and use a variety of joining methods
* Select and use specialist terminology in context
* Read and interpret plans and/or materials lists to prepare materials for the completion of projects
* Prepare design and production folios to describe the management and processes undertaken in the production of practical projects
 | **Teacher:*** Demonstrates the method for the construction of the tambour including making a jig to hold the slats tightly together for gluing.
* Explains why we use a hot iron to 'set' the glue holding the fabric in place and allow clean-up of any excess glue in between the slats of the tambour.
* Explains the safety precautions necessary when using an X-ACTO knife/scalpel and demonstrates its use with a safety ruler to trim the fabric back to allow the tambour to run in the grooves that they have routed in their box sides.

**Students:*** Build jigs to hold their slats during the gluing process using the method demonstrated.
* Cut their fabric roughly to size and glue in place ensuring they keep exposed skin away from the hot iron.
* Flex their tambour and use a damp cloth to clean any glue seepage from between the slats.
* Trim the cloth to fit allowing 10mm clearance on either side and peel away the unwanted material to ensure it runs smoothly in the carcase.

**Teacher:*** Demonstrates the method for the construction of the drawer, identifying the different components and the modifications to dimensions necessary depending on the type of handle designed by the students.
* Demonstrates the use of jigs to cut the rebates and housing joints on the drawer sides using a trimmer router with a spiral bit.
* Provides students with the plans and cutting list to produce the jigs.
* Demonstrates the method for chiselling the stopped rebate in the drawer front or alternative joint type used here.

**Students:*** Use the plans provided the make a number of jigs suitable for the amount of students in the class and the routers available for use with the project.
* Demonstrate safe use of equipment while accurately measuring and marking out their components on the timber provided.
* Demonstrate the safe use and maintenance of the router by setting up and using the jig to route the rebates and housing joints in the drawer sides, then cleaning it off and packing away.

**Possible adjustments:*** If students are going to use the lathe to turn a knob for the drawer then the two lathe related content dot points should be added to the content column.
* Advanced students may be given the opportunity to do dovetails or other decorative joints for attaching the drawer fronts to the sides.
* Students who are struggling with cutting the stopped rebate can either do a full rebate, which would be visible on the drawer front or a butt joint which wouldn't, but would be considerably weaker and may require dovetail nailing through the front to provide reinforcement.
 | * Students are observed during practical activities using the correct PPE and following the safe operating procedures for a range of tools and equipment.
* Students use appropriate specialist terminology in the recording of the construction process in their workbooks.
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| **Weeks 16&17*** Demonstrate safe workshop practices and procedures
* Select and use personal protective equipment (PPE) when working with tools, materials and machines
* Identify reasons for preparing surfaces and applying timber finishes
* Describe a range of timber finishes and their applications
* Apply a range of processes and techniques for finishing timber
* Investigate historical technologies related to the timber industry
 | **Teacher:*** Identifies the reasons for applying finishes to timber products.
* Introduces students to a range of different finishes available and explains the application method for each.
* Demonstrates how to achieve a high quality finish on the tambour box project and how to ensure that all components move freely once finished.

**Students:*** Finalise the construction of the tambour box and start preparing it to receive the finish as directed by the teacher by removing all traces of glue seepage and sanding all surfaces to make them smooth.
* Apply multiple coats of finish to a high standard and assemble project ensuring all components function appropriately and smoothly.
 | * Students are observed selecting and using the correct PPE while preparing the components of their box for finishing and applying their chosen finish.
* Students use appropriate specialist terminology in the recording of the construction process in their workbooks.
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| **Week 18*** Evaluate the impact of design and work practices/processes on the quality of finished projects
* Investigate issues relating to the sustainability of resources in the timber industry
 | **Teacher:*** Guides the students on peer evaluation of each other’s work, demonstrating the process involved and giving the students explicit instructions on the type of feedback they can give.
* Leads a student discussion on other timbers which could be used in this project, including the use of both sustainable and non-sustainable timbers and their impact on the project and the environment.

**Students:*** Consider the potential effects of using alternative timbers from different sources on both their project and the environment.
* Perform a peer evaluation of each other’s work.
* Perform a self-evaluation using the scaffolding provided in their workbooks.
 | * Students are able to articulate the potential impacts on their project and the environment of the use of sustainable and non-sustainable timbers during class discussion.
* Students effectively evaluate the success of their own and other students projects using the criteria and scaffolds provided.
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## Evaluation

Evaluation of learning activities should be an ongoing process that happens throughout the delivery of this unit. Teachers should document their evaluation of learning activities throughout the program. The space provided below is to evaluate the overall unit of work.

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