

Timber Tech

Timber Defects.

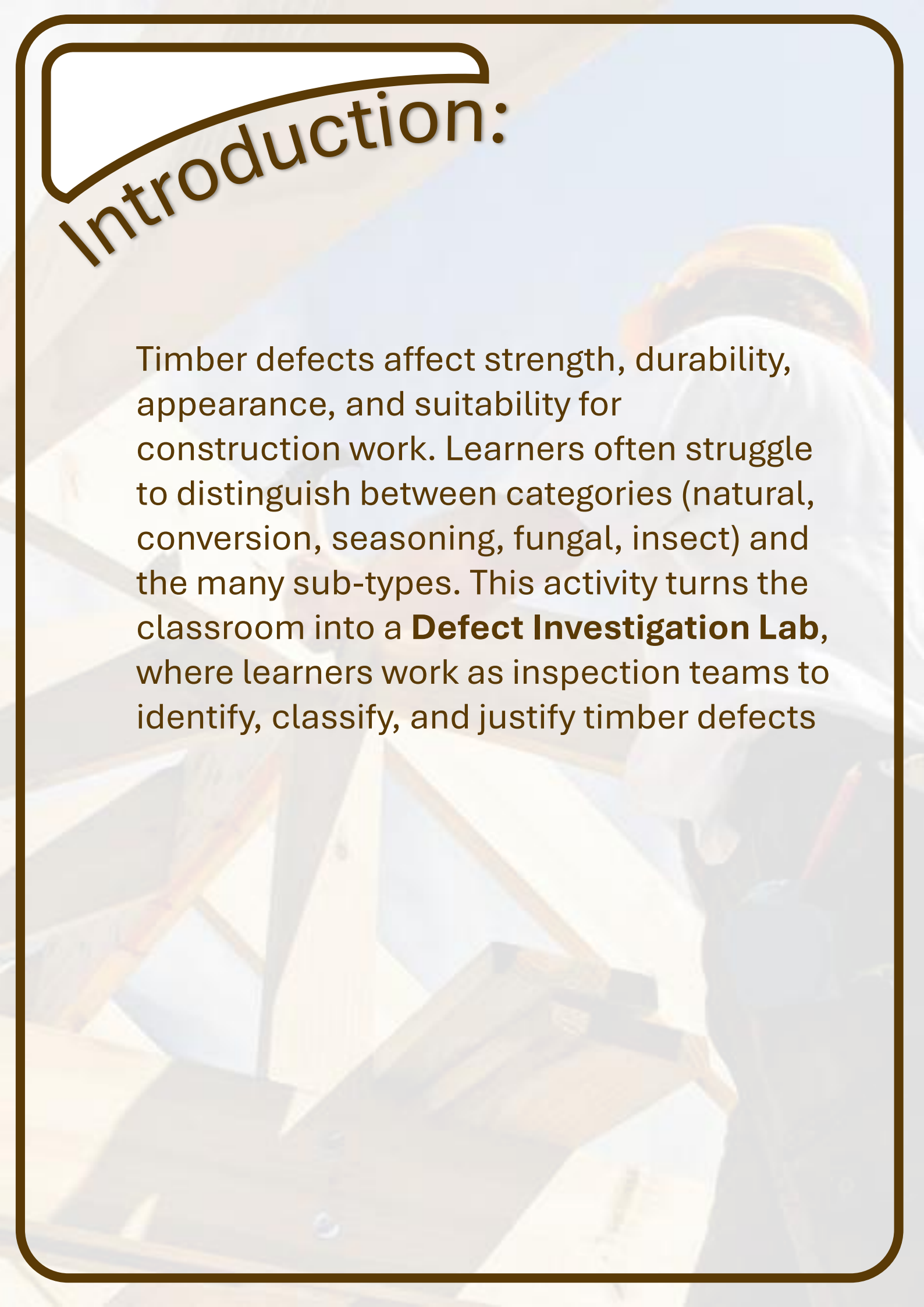


Educon

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Introduction:

Timber defects affect strength, durability, appearance, and suitability for construction work. Learners often struggle to distinguish between categories (natural, conversion, seasoning, fungal, insect) and the many sub-types. This activity turns the classroom into a **Defect Investigation Lab**, where learners work as inspection teams to identify, classify, and justify timber defects

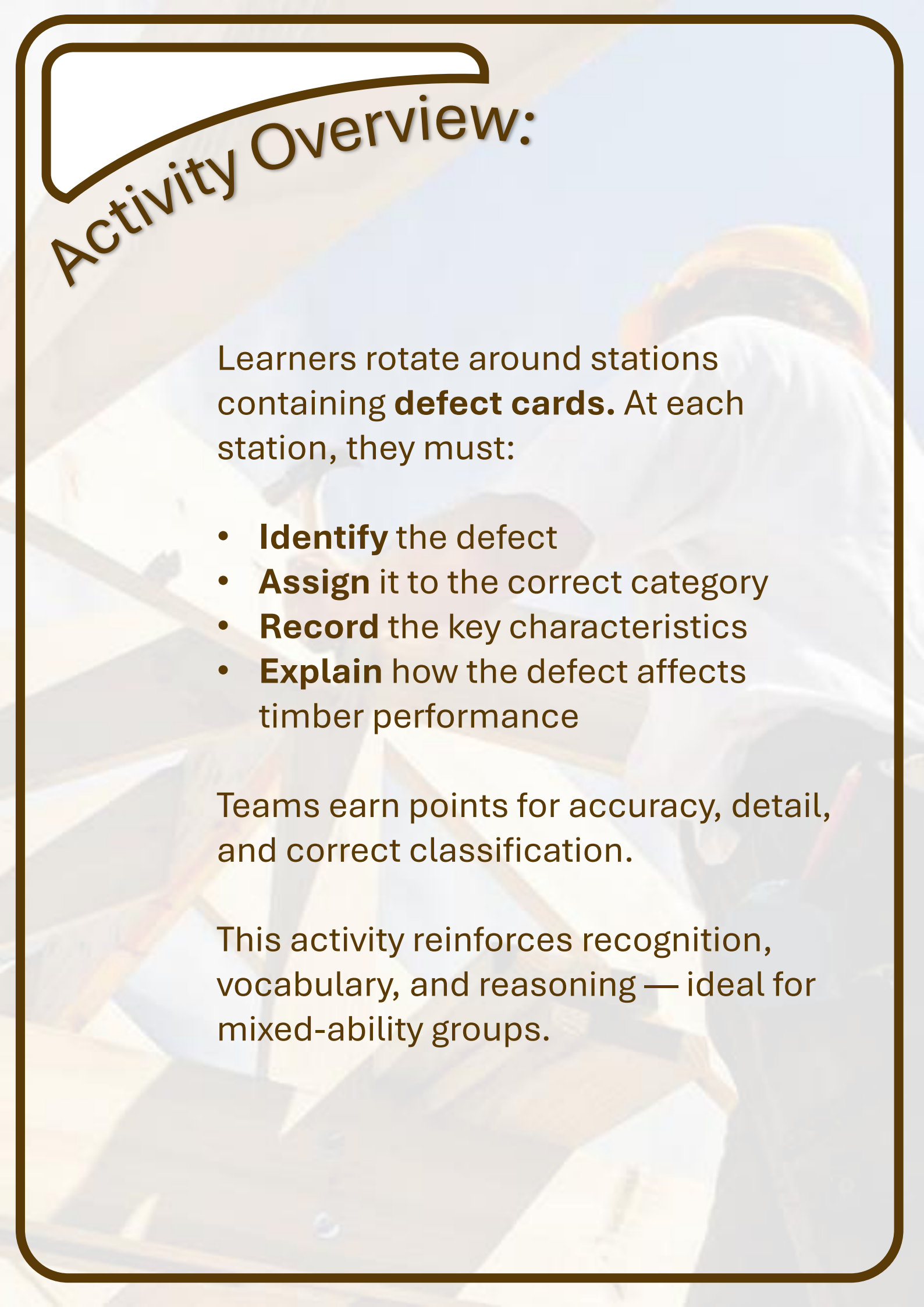
Aim:

To develop learners' ability to **identify, categorise,** and **explain** different timber defects found in natural, processed, and stored timber.

Learning Objectives

By the end of the activity, learners will be able to:

- Define **natural defects** in wood
- Outline **conversion defects**
- Identify **seasoning defects**
- Examine **fungal defects**
- Determine **insect defects**
- Classify defects based on visual clues
- Justify their decisions using correct terminology



Activity Overview:

Learners rotate around stations containing **defect cards**. At each station, they must:

- **Identify** the defect
- **Assign** it to the correct category
- **Record** the key characteristics
- **Explain** how the defect affects timber performance

Teams earn points for accuracy, detail, and correct classification.

This activity reinforces recognition, vocabulary, and reasoning — ideal for mixed-ability groups.

How this activity helps learning:

This activity supports learning by:

1. Makes Defects Easier to Recognise

Learners repeatedly see real examples from your PDF (e.g., ring shakes, burrs, dry rot), helping them quickly spot visual clues like cracks, stains, grain twists, or insect holes.

2. Builds Understanding, Not Just Memory

They must **identify**, **categorise**, and **justify** each defect — which develops reasoning, not just recall.

3. Supports Practical, Hands-On Learners

Moving around stations mirrors real inspection work. It keeps learners active, engaged, and focused.

4. Works Well for Mixed-Ability Groups

Teamwork, visual prompts, colour-coding, and sentence starters help SEND and lower-confidence learners, while challenge tasks stretch stronger learners.

5. Strengthens Employability Skills

Learners practise inspection, classification, communication, and decision-making — all essential in carpentry, joinery, and site work.

6. Provides Clear Assessment Evidence

The inspection sheet, discussions, and final review give you solid proof of understanding for each defect category.

Student Instructions:

- You will work in teams of **2–3 inspectors**.
- Move around the room to each **Defect Station**.
- At each station, examine the defect card(s).
- On your worksheet, record:
- The **name** of the defect
- The **category** (Natural, Conversion, Seasoning, Fungal, Insect)
- **How you know** (clues from the image/description)
- **Impact** on timber strength, durability, or appearance
- When the timer ends, rotate to the next station.
- At the end, compare your findings with another team.
- Your team will submit your completed inspection sheet for assessment.

Lecturer Instructions.

Preparation

Print or display defect cards using images and definitions from the PDF (e.g., Burrs, Knots, Ring Shake, Bowing, Dry Rot, Termites, etc.)

Create **10–15 stations**, mixing categories to increase challenge.

Provide each team with an **Inspection Sheet** (I can generate this next if you want).

Set timers for **3–4 minutes per station**.

Delivery

Introduce the five categories of defects.

Explain the investigation challenge.

Assign teams and distribute worksheets.

Start the rotation.

Facilitate discussion, prompt reasoning, and correct misconceptions.

Optional Add-Ons

Use real timber samples if available.

Add QR codes linking to short videos (e.g., dry rot, woodworm).

Include a “mystery defect” round for stretch learners.

Scaffolding Options:

- Provide **category colour-coding** (e.g., Natural = green, Fungal = purple).
- Include **word banks**: “cracks”, “fungus”, “insect holes”, “grain”, “moisture”.
- Offer **multiple-choice categories** for lower-ability learners.
- Use **visual icons** (e.g., bug icon for insect defects).
- Provide **sentence starters**:
- “I think this is a _____ defect because...”
- “This defect affects timber by...”

Differentiation Strategies.

Support

- Pair weaker learners with stronger peers.
- Provide simplified cards with fewer distractors.
- Allow verbal responses instead of written.

Challenge

- Ask learners to **rank defects** by severity.
- Require explanations of **how defects form** (using PDF content).
- Add “real-world application” tasks:
 - *Would this timber be suitable for a floor joist? Why/why not?*

Assessment Opportunities

Formative

- Observation during station rotations
- Questioning at each station
- Peer comparison at the end

Summative

- Completed Inspection Sheet
- Short quiz (I can generate one)
- Exit ticket:
 - “Name one defect from each category and explain its impact.”

Timber Defects

Category Cards



Natural

Timber Defects

Category Cards



Conversion

Timber Defects

Category Cards



Seasoning

Timber Defects

Category Cards



Insect

Timber Defects

Category Cards



Fungi

Timber Defects

Defect Cards



While in its infancy a tree can receive shock or injury, a **burr** is a result of the tree undergoing some form of stress. The grain grows in a deformed manner filled with small knots.



Timber Defects

Defect Cards



A **callus** forms when the tree is damaged and has a wound. The wound is sealed by the **callus** in order for it to begin to heal. It is a soft tissue that surrounds the wound.



Timber Defects

Defect Cards



Sometimes wood is discoloured by an external agency. The external agent like the gasses present in the atmosphere can discolour the wood. This is known as chemical stain.



Timber Defects

Defect Cards



Coarse grain happens when a tree grows rapidly, by doing this the annual rings are widened which also weakens the wood and gives it a coarse texture.



Timber Defects

Defect Cards



Dead wood is wood that is light red in colour and comes from a tree that though still standing, is dead or has dead parts.



Timber Defects

Defect Cards



Druxiness appears as white spots on the tree which can be concealed by healthy wood. The white spots allow access for fungi to grow.



Timber Defects

Defect Cards



Foxiness is a discoloration in the timber around the pith. It is identifiable by a red or yellow tinge or spots or red or yellow stains. The discoloration is due to poor ventilation during the storage of the timber.



Timber Defects

Defect Cards



Live Knots. Fixed into the wood and cannot be separated, free from cracks or decay and this kind of knot can be used in wood used for engineering purposes.



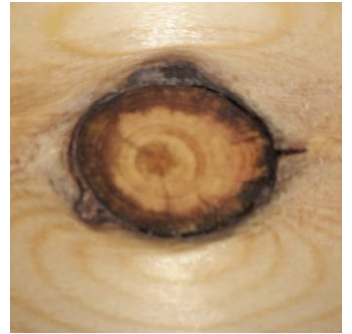
Timber Defects

Defect Cards



Dead Knots.

Annual rings are not intergrown with surrounding wood, it is not safe to use wood containing dead knots for engineering purposes.



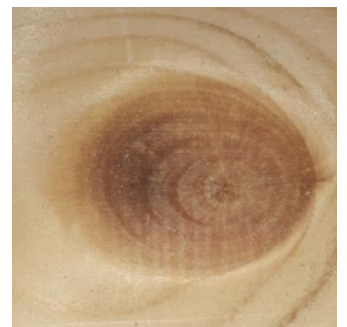
Timber Defects

Defect Cards



Sound Knots.

Knots showing no signs of decay and are classified as light or dark knots.



Timber Defects

Defect Cards



Unsound Knots.

Knots in which not more than a third of the cross section is rotten.

Timber Defects

Defect Cards



Rotten Knots.

Knots in which more than a third is rotten.

Timber Defects

Defect Cards



Resin Pocket.

During the tree's growth a tree may be damaged, cavities can form in between the rings of the tree that fill with a resin. This resin is produced by all trees.



Timber Defects

Defect Cards



A rind gall

produces a peculiar swelling in the body of the tree. They will form where branches have either been improperly removed or have fell away.



Timber Defects

Defect Cards



A **ring shake** is a timber defect where the wood splits along one of its annual growth rings, creating a circular or curved crack inside the trunk.



Timber Defects

Defect Cards



A **heart shake** is a split that radiates outward from the centre (heartwood) of the tree, often forming star-like cracks through the core.

Timber Defects

Defect Cards



A **water stain** defect appears as discoloured patches or streaks on the wood surface, often grey, blue, or dark brown.



Timber Defects

Defect Cards



A **star shake** is a type of timber defect where multiple cracks radiate outward from the centre of the tree trunk, forming a star-like pattern.



Timber Defects

Defect Cards



A **twisted fibre** defect occurs when the wood grain spirals around the trunk instead of running straight along its length.

Timber Defects

Defect Cards



Wind cracks are splits that form in a tree's trunk due to strong, uneven wind pressure acting on the stem over time.

Timber Defects

Defect Cards



Chip marks occur when small sections of wood are torn or ripped from the surface during machining, typically while planing or sawing.



Timber Defects

Defect Cards



Diagonal grain is a defect where the wood fibres run at an angle instead of straight along the board. It usually happens when the log is sawn incorrectly or the cut passes through the growth rings at an angle. This slanted grain weakens the timber and can affect both its appearance and how well it machines.



Timber Defects

Defect Cards



Torn grain is a conversion defect that occurs when the cutting blade tears out fibres instead of slicing them cleanly, leaving rough, uneven patches on the timber's surface.

Timber Defects

Defect Cards



Waney Edge Explained

A waney edge refers to the natural, uneven edge of a plank where the bark and original contour of the tree are left intact.



Timber Defects

Defect Cards



Bowing is a **conversion defect** that occurs when a piece of timber curves along its **length**, creating a gentle, outward bend from end to end.



Timber Defects

Defect Cards



Cupping is a **conversion defect** where a timber board curves **across its width**, creating a shallow “U” shape as the edges lift higher than the centre.



Timber Defects

Defect Cards



Crook is a **conversion defect** where a timber board bends **along its edge**, creating a sideways curve when viewed from above.



Timber Defects

Defect Cards



Twisting is a **conversion defect** where a timber board rotates along its **length**, causing each end to turn in opposite directions so the piece no longer sits flat.



Timber Defects

Defect Cards



Case hardening is a **conversion defect** that occurs when the outer layers of a timber board dry **much faster** than the inner core, creating internal tension.



Timber Defects

Defect Cards



Splitting is a **conversion defect** where timber separates along the grain, creating cracks that run in from the ends of the board.



Timber Defects

Defect Cards



Shakes are a **conversion defect** where timber develops **separations or cracks along the grain**, often forming before or during the conversion process.



Timber Defects

Defect Cards



Checks are a **conversion defect** where small, fine cracks form on the **surface of timber**, usually running along the grain.



Timber Defects

Defect Cards



Dry rot is a **fungal defect** caused by the fungus *Serpula lacrymans*, which attacks timber with a moisture content typically above 20%.



Timber Defects

Defect Cards



Wet rot is a **fungal defect** caused by fungi such as *Coniophora puteana* and *Poria vaillantii*, which thrive in timber with a **Consistently high moisture content**, usually above 30%.



Timber Defects

Defect Cards



Blue stain is a **fungal defect** caused by staining fungi that penetrate the sapwood and leave it discoloured with **blue, grey, or black streaks**.

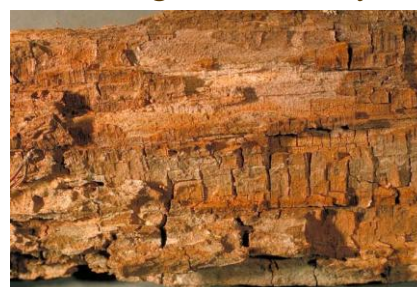


Timber Defects

Defect Cards



Brown rot is a **fungal defect** that breaks down the **cellulose** in timber, leaving the wood dry, crumbly, and weakened.



Timber Defects

Defect Cards



Heart rot is a **fungal defect** that attacks the **heartwood** at the centre of a tree, gradually breaking it down from the inside out.



Timber Defects

Defect Cards



White rot is a **fungal defect** that breaks down both the **cellulose and lignin** in timber, leaving the wood soft, fibrous, and noticeably lighter in colour.



Timber Defects

Defect Cards



The house longhorn beetle (*Hylotrupes bajulus*)** is a wood-boring insect commonly found in softwood timbers used for roof structures and joinery.

Timber Defects

Defect Cards



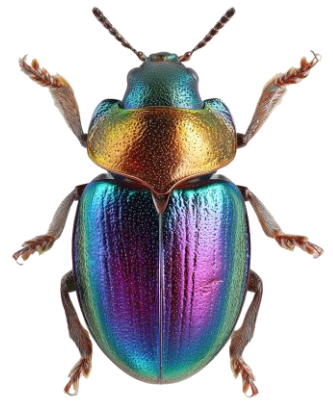
Ambrosia beetles are tiny wood-boring insects that cultivate and feed on a specialised fungus they carry into the trees they infest.

Timber Defects

Defect Cards



Furniture beetle, often called **woodworm**, is a small brown beetle whose larvae bore tiny round holes through softwood timbers and furniture.



Timber Defects

Defect Cards



A **wood wasp**, or **horntail**, is a large, harmless insect whose larvae bore into softwood like pine and spruce.



Timber Defects

Defect Cards



Marine borers are wood-eating marine organisms—such as shipworms and gribbles—that tunnel into submerged timber like piers, jetties, and wooden hulls.



Timber Defects

Defect Cards



Termites are social insects that live in large colonies and feed primarily on cellulose found in wood and plant material.



Timber Defects

Conversion Defect Cards



Natural

Timber Defects

Conversion Defect Cards



Conversion

Timber Defects

Conversion Defect Cards



Seasoning

Timber Defects

Conversion Defect Cards



Insect

Thank You.

We would like to say thank you for using this learning material, we hope you found it useful.



If you have any questions regarding this or any other learning material produced by James, or have any suggestions about improvements or ideas please email James Rix at:

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