BCATS

BUILDING, CONSTRUCTION AND ALLIED TRADE SKILLS

Materials

Unit Standard 24355 (v3), **Level 1**

Demonstrate knowledge of construction & manufacturing materials used in BCATS projects

4 CREDITS

BCITO buildingpeople

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Introduction

This handbook introduces you to some of the most common materials used in Building, Construction, and Allied Trades Skills (BCATS) projects.

Knowledge of materials is important because it helps you choose the best ones for your project. The wrong materials can cause your project to not be strong enough to use, look ugly, be unsafe, or not even be able to be completed in the first place. Knowledge can avoid this waste of time, effort and money.

To achieve this unit standard, you need establish job requirements and then select construction and manufacturing materials based on their properties and suitability for the job. Your teacher/tutor will either give you the job specifications or give you the opportunity to design your own.

How you will be assessed

You will complete an Assessment Record Sheet. Your teacher/tutor also needs to verify you understood the job specifications.

You need to show your teacher/tutor that you can:

- read or listen to the instructions for the job and work out what you need to do
- choose the right materials for the job and explain why you chose them
- for each of four different materials (timber, plus three others such as manufactured board, metal, plastic, glass, concrete, mechanical fasteners, adhesives, finishing materials, upholstery fabric/leather), explain:
  - its properties – what it looks like, what it's like to work with, how strong and stable it is
  - what you'll use it for
  - three of its features – for example, design, aesthetics, ergonomics, cost, availability, jointing methods, durability, health and safety requirements
  - how it compares with another material.

You can apply this knowledge when you go on to construct a project.

Glossary of terms

Term	Meaning
Brittle	Material with a tendency to break or fracture.
Compressive strength	The ability of a material to resist a force that when applied will tend to decrease its volume.
Corrosion	The gradual deterioration of a material, e.g. ferrous metals will rust.
Corrosion resistant	The ability of a material to avoid decay in adverse conditions.
Ductility	The capability of a material to be easily hammered, shaped, moulded or drawn into wire.
Electrical conductivity	The ease that electricity can travel through a material.
Electrical insulation	The resistance of a material to electricity.
Ferrous	Metals containing iron.
Hardness	The ability to withstand scratching and indentation.
Heat conductivity	The measure of how heat can travel through a material.
Magnetism	The ability of a material to attract iron.
Malleability	The ability of a material to be reshaped.
Non-ferrous	Metals that do not contain iron.
Non-magnetic	Materials that do not attract iron.
Non–metallic	Materials that contain no metals.
Oxidisation	The gradual deterioration of a material, e.g. non-ferrous metals such as aluminium will oxidise.
Porous	The ability of a material to absorb air, water and other liquids.
Tension	A force tending to produce elongation or extension.
Thermoplastic	The ability of a material to be remoulded over and over again.
Thermosetting plastic	A plastic that undergoes a chemical change when heated and cannot be reshaped.
Toughness	Strength, resistance to fracturing.

Job specifications

A project specification is essential to ensure that there is a clear idea about the finished product.

Job specifications are instructions that describe:

- what the project is
- how the project is to be done, including such things as materials and finishes.

Job specifications are made available before the project begins. They can be:

1. drawn
2. written
3. verbal
4. a combination of all of the above.

Drawn information includes:

- detailed plans, drawings and elevations
- quick sketches or diagrams.

Written information includes:

- handwritten instructions and explanations
- typed instructions and explanations
- emailed or mailed instructions
- cutting lists.

Verbal information includes:

- face-to-face conversations/instructions
- phone conversations/instructions
- verbal messages.

Using the job specifications

To ensure that the project matches exactly the specifications it is important to:

1. Read through the written specifications with the person providing the information and clarify what is required.

2. Check that the working drawings and written specifications provide all the required information.

3. Listen to the oral instructions and check that:
    - they match the written specifications
    - they are easily understood and clearly state what is required
    - it is possible to visualise the finished product
    - the materials to be used are clearly identified and appropriate
    - health and safety requirements have been identified
    - the required equipment has been identified
    - any additional instructions or training requirements have been identified
    - any additional help, information or supervision requirements have been identified
    - the expected duration of the project and the completion date have been determined.

4. Confirm the requirements of the job specifications with the person who provided the information to ensure that all the information needed to complete the task is available.

The job specifications will identify the materials that are to be used, including:

→ material type – e.g. plaster board

→ material brand – Winstone Gibraltar Board

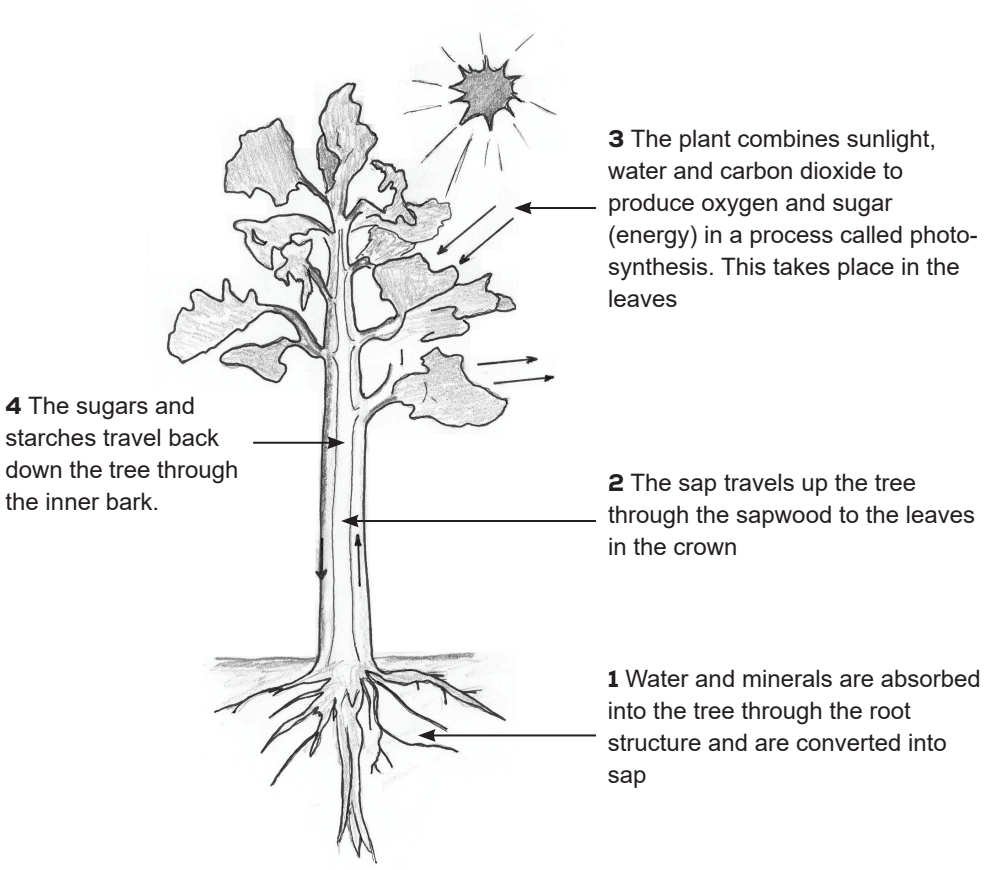
→ material size – 16mm.

Timber

Timber is wood which is milled and prepared for many different uses. Some of these uses are for buildings, tools, utensils, furniture, fences, and boatbuilding.

Trees are a naturally renewable resource. They produce timber through a nourishment and growth process called photosynthesis. This takes place in the leaves and involves:

- light – usually from the sun
- chlorophyll – the green pigment in a leaf, which acts as a catalyst for the reaction that converts:
  - carbon dioxide, which the plant absorbs through its leaves and converts to oxygen, which the plant excretes.
  - water and minerals into the plant's sap, which contains sugars, (which the plant can use) and starch, (which the plant stores).



Parts of a tree

Trees are made up of the following parts.

Pith

This is the centre of the tree and is the dead tissue of the original sapling.

Heartwood

The heartwood lies between the sapwood and the pith and is made up of older inactive layers. Its main function is to help the tree to remain straight and upright. This section of the tree generally produces timber which is more durable and resistant to decay and insect attack.

Sapwood

This is the newly formed wood which surrounds the heartwood. It is usually softer and lighter in colour. It is through the cells of the sapwood that water and minerals are conducted to the leaves. As the tree grows the sapwood ages, becomes inactive and turns into heartwood.

Cambium layer

The cambium consists of a two-celled layer. The inner layer (called bast or phloem) produces new sapwood, while the outer layer (cortex) produces new bark.

Bark

The outer bark serves as protection for the tree against insects and injury and also prevents the cambium layer from drying out.

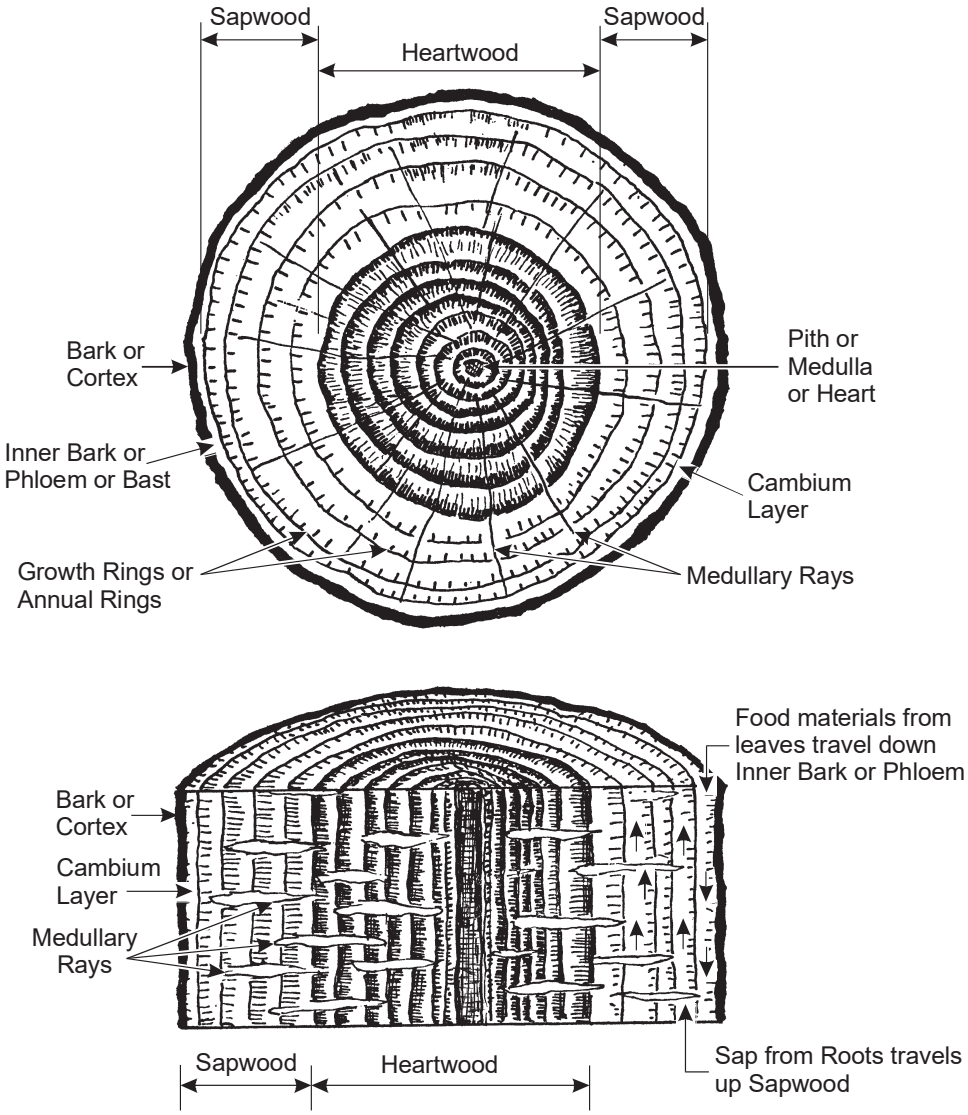
Growth rings

Growth rings are made up of cells representing one season's growth. They are divided into two distinct layers:

1. **Spring (early) wood**. This layer is formed during the spring and early summer when the growth rate is at its greatest. It is lighter in colour, soft and has large thin-walled cells.

2. **Summer (late) wood.** This layer is formed during the summer and early autumn when growth is slower. It is darker in colour and has small hard-walled cells.

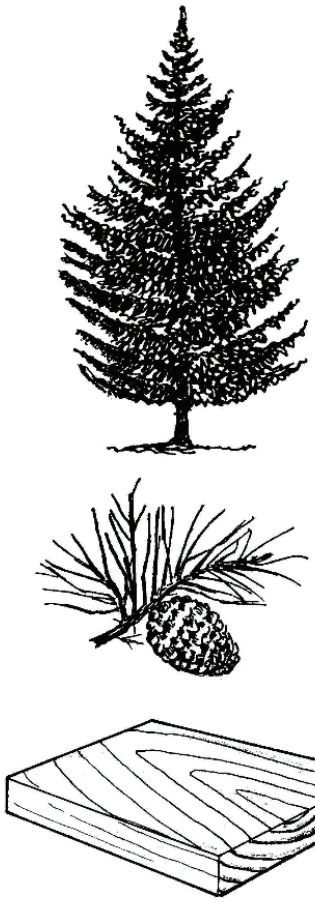
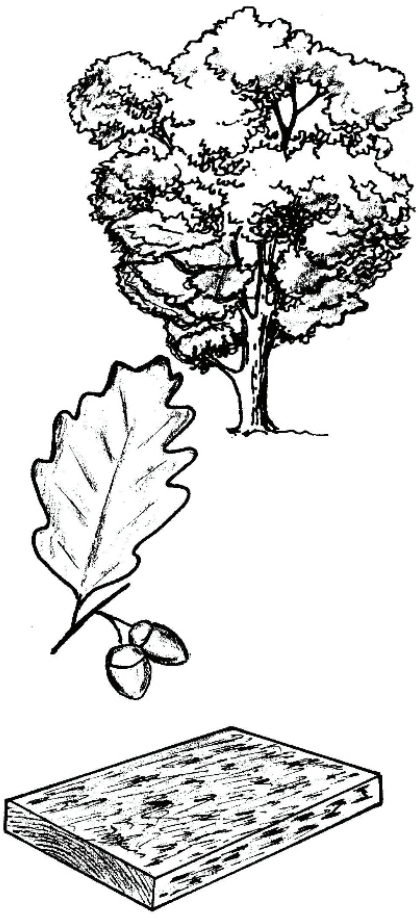
Growth rings vary in width, shape and colour depending on the seasonal conditions affecting growth. In normal conditions these rings are distinct enough to determine the age of the tree.



Classification of timber

Timber is divided into two classes: softwoods and hardwoods. These are botanical terms relating to the cell structure of the tree. They do not relate to the physical property of the timber.

Some hardwoods, such as balsa wood, are very soft in texture, while some softwoods are quite hard, such as matai.

SOFTWOOD	HARDWOOD
	
Softwoods are usually cone-bearing, evergreen trees with needle-like leaves. The timber is generally lighter, softer and weaker than hardwoods.	Hardwoods are usually fruit-bearing, deciduous trees with broad leaves. The timber is generally harder, denser and stronger than softwoods. The timber is often more difficult to season and treat with preservatives.

Trees are further classified as indigenous, exotic or imported.

Indigenous timber	Native to New Zealand.
Exotic timber	Grown in New Zealand but not native to New Zealand.
Imported timber	Grown in a foreign country and imported into New Zealand.

Indigenous timbers (native)

Trees that are native to New Zealand. This timber is becoming harder to obtain because the trees grow slowly and so the felling and milling of native trees is restricted.

There is a thriving furniture industry based around recycled timbers, notably rimu, kauri and matai.

Native softwoods

Rimu	
Appearance	Warm golden colour. The heartwood has a beautiful grain pattern that has been described as one of the most attractive timbers in the world.
Working quality	The heartwood is a fine-grained, medium-density timber. The sap wood is softer and susceptible to insect attack.
Strength	The bending strength, stiffness and resistance to creep (i.e. gradual increase in deflection) when the timber is under constant load.
Structural stability	Very stable when dry.
Design	Can be worked with a range of wood working tools in art, furniture etc.
Aesthetics	Used almost exclusively for high-quality furniture manufacture.
Cost	New timber is expensive. Most timber used to make furniture is recycled.
Availability	Available in small quantities from sustainably managed native forests and from recycled materials.
Durability	Moderately durable.
Uses	Furniture, benchtops, interior panelling.

Totara	
Appearance	Reddish brown and straight-grained.
Working quality	Easily worked, durable and stable, but becomes brittle when dry. Requires special primers when painting.
Strength	Strong and weather and rot resistant.
Structural stability	Stable, endures all weathers.
Uses	The wood is hard and straight-grained and very resistant to rot. Due to its durability, totara is often used for window sashes and sills, feature joinery, and carving.
Availability	Available in small quantities from sustainably managed native forests.

Kauri	
Appearance	Light brown with a light speckle.
Working quality	It is straight grained, easily worked. Moderately durable and stable.
Uses	Restricted to high quality furniture manufacture, boat building, and joinery. Swamp kauri is prized as a material for high quality woodturning.
Strength	Very hard. Slow growth rate provides a strong timber.

Exotic timbers

Trees that are native to another country but grown in New Zealand. Treated exotic timber is now commonly used for construction.

Exotic softwoods

Radiata pine is the most common commercially grown timber in New Zealand. Plantations cover large areas of both the North and South Islands	
Appearance	Lightly coloured with an even texture and very little heartwood.
Uses	Used for building and construction, furniture, joinery, for veneers for plywood, and in manufactured boards such as particle board and MDF. Suitable for practically all building components if correctly processed.
Working quality	Excellent gluing, nailing and machining properties.
Strength	Moderate to low.
Availability	Grown extensively in New Zealand and readily available.
Durability	Natural durability is low, but readily accepts all levels of chemical treatment to resist fungal and insect infestation.
Health and safety requirements	Need to use appropriate breathing protection when cutting and sanding particleboard and MDF.

Douglas fir (NZ Oregon)	
Appearance	A heartwood species, with a rich, red colour, highly textured due to the pronounced early wood/late wood contrast.
Uses	Widely used in the construction industry for light and heavy framing, piling and plywood, such as roof trusses, wall frames, large beams and concrete formwork.
Working quality	Used for structural applications.
Strength	Strong.
Structural stability	Stable structural timber even in subtropical climates.
Durability	Difficult to treat with preservatives so is unsuitable for many applications. Suitable for internal use providing it is out of ground contact and protected from the weather and damp conditions.

Cyprus is a group of timbers that includes macrocarpa and Lawson's cypruss	
Working quality	The wood is prone to splitting when nailed.
Strength	Medium to low density.
Structural stability	Excellent stability.
Uses	Internal and exterior joinery, built-in furniture, exterior weather boards, framing, decking and boat building.
Durability	Natural durability.

Exotic hardwoods

A number of exotic hardwoods such as eucalyptus, walnut and oak trees are commercially grown in New Zealand but only in limited quantities.

Imported Timbers

Imported timber is grown in another country and brought into New Zealand in a finished state. Imported timbers include mahoganies, walnut, oak, jarrah and kwila.

The following examples show how these timbers apply to the New Zealand market:

- The boat building industries, in particular the super yacht manufacturers, often import high-quality timbers to meet requirements for particular jobs.
- Increasing amounts of furniture are being constructed in India and Asia and imported into New Zealand.
- Kwila is commonly used for decking and outdoor furniture.
- Flooring timbers and veneers are often imported from Australia and America.
- Packing cases and pallets, used in the importation of goods from overseas, are often constructed out of quality timbers. It is worth noting that only 5% of the world's mahoganies are used for quality furniture.

Ethical considerations

Some imported timbers comes from endangered tropical rain forests. Think carefully before selecting any of these timbers instead of other options.

Measurement and costing

Timber is measured and ordered in the original green, rough sawn size by its:

- cross section in millimetres and
- lineal measurement of length in metres to one decimal place.

  Example: 4.800m of 75mm x 50mm

  - Each size and grade usually has a quoted price per lineal metre.
  - Timber, such as fence posts or rails, has a quoted price per item.
  - Timber can be purchased in packet lots or as individual pieces.

Timber grades

Grades are used to describe the quality of timber.

Board grades – native	Board grades – exotic
Clear	Finishing
Dressing A	Factory
Dressing B	Dressing
	Merchantable

Ordering timber

When ordering timber it is important to include all information relevant to the job requirements. This should include:

- nominal size (this may not be the finished size)
- finish (eg rough sawn or dressed)
- grade
- species
- treatment
- number
- lengths of pieces.

Timber

When ordering timber, the following abbreviations are often used.

Abbreviation	Description	Abbreviation	Description
R/S	Rough sawn	MG	Machine gauged
D4	Dressed 4 sides	DG	Dressing grade
KD	Kiln dried	DRY	Air dried
GREEN	Timber not dry	FJ	Finger jointed
PKT	Packet (approx 450-500m)	T&G	Tongue and groove
SL	Selected lengths	RAD	Radiata pine
BN	Bull nose	RP	Red pine
H1,H3 H4,H5	Treatment level	BT	Boron treated
RAND	Random (a total meterage of timber made up of varying lengths)	EX	"Out of" (e.g. ex 200x40DG=180x35 or ex 100x50MG=94x47)
NZO	New Zealand Oregon		

Below are some typical timber orders in their abbreviated form:

RAD 100 x 50 No.1 R/S GREEN RAND 100m

(Radiata pine, 100 x 50mm, number 1 grade, rough sawn, not dry, random lengths to 100m)

RAD ex 200 x 40 DG H1 D4 DRY SL 3/3.600

(Radiata pine, out of 200 x 40mm, dressing grade, treatment H1, dressed 4 sides, air dried, selected lengths 3/3.600)

RP ex 100 x 25 BN skirting RAND 38m

(Red pine, out of 100 x 25mm, bull nose, skirting, random lengths to 38m)

NZO 94 x 47 No.1 MG GREEN SL 21/2.400

(New Zealand Oregon 94 x 47mm, number 1 grade, machine gauge, not dry, selected lengths 21/2.400)

Manufactured boards

Plywood

Plywood is made from thin sheets of wood veneer glued together under heat and pressure. The veneers are cross-banded with the grain direction of each alternative layer at right angles to the previous layer. This creates a very strong and stable wood-based material that provides equal strength in all directions. This makes plywood more resistant to cracking, shrinkage, twisting and warping.

Plywood comes in a range of types and thicknesses. Common types of plywood are interior plywood, construction, exterior and marine plywood.

Partical board

Particle board is a low density fibre board manufactured from wood particles such as wood chips, shavings or sawdust. These are held together by a synthetic resin. Particle board is made of larger pieces of wood than medium density fibreboard and hardboard. It is used for flooring, cabinet carcases, vanities and cupboards, wall and ceiling linings.

Comparison of particle board with natural timber:

Advantages	Disadvantages
Cheaper, denser and more uniform than solid wood.	Will swell and distort if wet.
Used when appearance and strength are less important than cost.	Will crumble and fall apart if waterlogged.
Lightest type of manufactured fibre boards.	Dressing edges is difficult. Edges need to be covered or protected if exposed.

Medium-Density Fibreboard (MDF)

Medium-Density Fibreboard (MDF) is a board manufactured in a process similar to all types of fibreboard. The wood component of MDF is broken down into its fibres and the fibres are mixed with wax and resin before being formed into sheets under high temperature and pressure.

MDF is heavier than particle board and used extensively on interior applications, such as cabinet carcass construction, furniture, and wall linings.

Comparison of MDF with natural timber:

Advantages	Disadvantages
Less expensive.	Heavier.
Generally easier to work.	Must be painted.
Is consistent in its strength, and is consistent in its size (width, length).	When wet, it swells and breaks.
	Over time, will warp or expand if not sealed.
	Contains a substance called urea formaldehyde, which may cause irritation to the eyes and lungs when the board is cut or sanded.

Hardboard

Hardboard is a high-density fibre board similar to MDF but much harder and denser. It can be used as a base for Formica and vinyl, and in a wide range of applications where a thin, hard-wearing surface is required, such as in construction, furniture, appliances and cars. It is also used as the final layer in many skateboard ramps and half-pipes.

Tempered hardboard

Tempered hardboard is made by adding oil when the board is formed under high temperature and pressure. This gives it more water resistance, hardness, rigidity and tensile strength.

Fibre cement sheet

Fibre cement sheet is available in a wide range of shapes and sizes. It is used a lot in the building industry with applications ranging from weatherboards to wall, shower and soffit linings, bracing panels, and fire and acoustic-rated walls.

Cutting fibre cement sheets

Fibre cement sheets as n exterior cladding

Plaster board

Plaster board is produced as a flat sheet with a plaster inner core covered with heavy paper. It is available in sheets and is used to cover the framing and provide a finish to the inside walls and ceilings. Plaster board is used on almost all building sites.

Plaster board is fixed to the wall frame or structure with adhesive and nails, or specially designed screws.

While usually used as flat sheets to provide a flat wall or ceiling finish, plasterboard can be curved to form architectural detail

Metals

Mild steel

- Strong and versatile general-purpose material.
- Low cost.
- Poor corrosion resistance - moisture will cause the metal to rust.
- Becomes malleable when heated, so it can be forged.
- It is easily worked and welded.
- Available in a wide range of forms including:
  - sheet metal
  - bright and black bar including flat, round, square, hexagonal forms
  - angle, channel and tee sections.
- Used for general construction work and furniture making.
- Often used where large amounts of steel are required for construction work, such as structural steel, columns, rolled steel joists (RSJ) and roof trusses.

Stainless steel

- A hard, tough and corrosion-resistant material.
- Does not stain or rust.
- Is difficult to cut or file.
- Available in a wide range of forms including:
  - sheet
  - plate
  - bar
  - wire
  - tubing.
- Is widely used where a strong, hard-wearing material is required, such as in kitchens and bathrooms, furniture, hardware, industrial equipment, and marine and aerospace components (parts).

Copper

A reddish coloured metal with excellent heat and electrical conductivity.

- → Is corrosion-resistant, easy to work and shape.
- → Can be easily joined using solder or by brazing.
- → Is available in:
  - wire
  - sheet
  - tubing
  - pre-formed fittings.
- → Widely used in construction for electrical and plumbing applications, e.g. water pipes and electrical wiring. High quality spouting and flashings are often made out of copper.

Brass

An alloy made up of 65% copper and 35% zinc.

- → Is corrosion-resistant, harder than copper, casts well, is easily joined and is a good conductor of heat and electricity.
- → Is used for castings and forgings, such as common tap fittings.

Aluminum

- → A lightweight, soft metal with a high strength to weight ratio.
- → Is corrosion-resistant and a good conductor of heat and electricity.
- → Is difficult to join and should not be used in contact with other metals.
- → Is available in a wide range of forms including:
  - sheet
  - plate
  - bar
  - extruded sections.
- → It is commonly used in boat building, joinery and construction and for hardware, such as ladders.

Plastics

There are many types of plastic available. Most have been developed for specific purposes.

Thermoplastics

Polythene

Polythene is low density, tough plastic with good chemical resistance and electrical insulation.

Available in:

- sheet
- film
- bar
- pipes.

Polythene commonly referred to as a “waterproofing” membrane. It is a “Damp proof” (DPM) membrane, not a waterproof membrane.

Polystyrene

Polystyrene is expanded plastic foam. It is a lightweight buoyant material that provides good sound/heat insulation. It is available in pre-formed sheets.

Polystyrene is commonly used for packaging material, for bouyancy in boats, and as an insulation material for construction.

Nylon

Nylon is hard, tough material that is resistant to wear and machines well.

Available in:

- bar
- mouldings
- wire/thread.

Commonly used for brushes, bearings and machined items such as gear wheels.

Thermosetting plastics

Formica

Formica is available in sheet form in a wide range of colours and surface finishes, rigid and smooth.

It is commonly used for hardwearing surfaces such as benchtops.

Epoxy resins

The uses for epoxy-based materials are extensive and include:

- coatings
- adhesives
- composite materials, such as those using carbon fibre and fibreglass reinforcements. (Polyester, vinyl ester and other thermosetting resins are also used for glass-reinforced plastic.)

Surf board fin repaired with epoxy resin

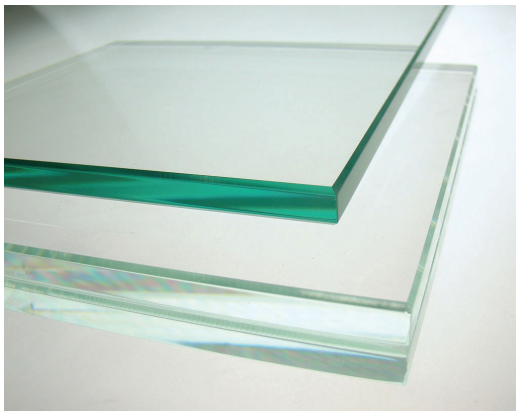
Epoxy resins are a two-pack system available in liquid or powder form. One pack is the resin and the other a hardener that needs to be mixed together.

Other materials

Glass

Glass is a hard and transparent material that is used extensively in a wide range of situations. For example, basic sheet glass, which is commonly used in windows, can be upgraded to meet more stringent or decorative requirements including:

- safety glass
- rolled plate
- polished plate
- float, laminated
- self-cleaning
- sound proof
- tinted or stained glasses
- textured surfaces
- lead lighting.



A variety of types of sheet glass

Normal glass is very brittle and can easily be broken, so specialist equipment must be used when drilling holes in it or polishing or bevelling its edges.

Safety glass must always be used in situations where people could be injured if the glass is broken.

Toughened, or 'tempered' glass, is much harder to break than normal glass and is often used for architectural features such as glass walls.

Ongoing developments in glass formulations and processing technologies are continually increasing where and how glass can be used.

Fibre glass

Fibre glass is a composite material made up of a glass fibres reinforced with a polyester or epoxy resin. Fibreglass is used extensively in the manufacturing and construction industries. Some common places you can find fiberglass are aircraft, windows, roofing, insulation, boats and bathtubs.

Concrete

Concrete is one of the most frequently used building materials. It is used extensively for a wide range of residential and commercial construction work. Aside from footpaths, driveways and roads, it is used in floors and walls; foundations and footings, for posts, fences and block walls; and even boat hulls.

Concrete is made up of aggregate (generally gravel and sand), cement and water, which are mixed together into a plastic mass. (In the concrete industry, 'plastic' means that the concrete is soft and able to be worked or moulded into different shapes.) The water reacts with the cement, setting off a chemical reaction that then hardens the cement, which in turn bonds the other components together to eventually create a hard rock-like material.

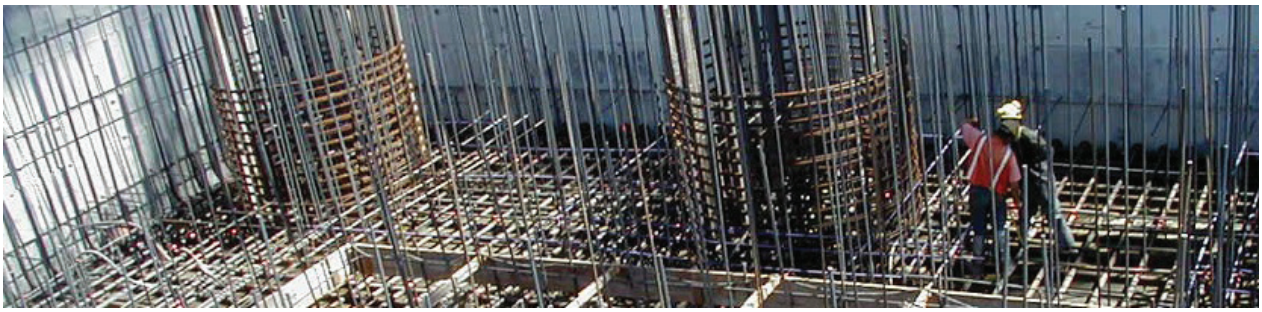
Reinforcing steel

Concrete is an extremely versatile construction material. However, while it has a high compressive strength, it is very weak in tension.

Steel has very high compressive and tensile strength.

The combination of steel and concrete as a composite construction material combines the high tensile strength of the reinforcing steel and the compressive strength of concrete.

Steel rods, bars and heavy wire sheets are the most commonly used methods of reinforcing. The correct placement of reinforcing is critical to the performance of the reinforced concrete.



Reinforcing steel rods, bars and mesh wire sheets

Surface finishes

Surface finishes are a design element that must be appropriate to the specific project and how it is going to be used. There is a wide range of surface finish materials that can be applied with a brush or roller, or sprayed on.

Paint finish coats ready for application

Paint

Paints cover and add colour to an object or surface by covering it in a pigmented coating. Paints are available in gloss, satin and matt finishes.

There are three main coats of paint that are normally required to complete a quality job.

→ **Primer** is a preparatory coating put on materials before painting. Priming ensures better adhesion of paint to the surface. It increases paint durability and provides additional protection for the material being painted.

→ **Undercoat** has opacity to cover any blemishes. It provides a base for the finish coat.

→ **Finish Coat** provides the final hardwearing surface with gloss and colour pigments. A finish coat will not cover blemishes and will not stick to a surface for long without an undercoat.

The two main types of paint are enamel (oil-based) and acrylic (water-based).

→ **Acrylic paint.** This is a fast-drying paint that can be diluted with water. It becomes water-resistant when dry. Acrylic-based paints are regularly used for house painting and interior decorating. Brushes are washed in water.

→ **Oil-based paints.** These are slower drying but produce a harder-wearing paint finish. Brushes are washed in mineral turpentine.

Varnish

Varnishes provide a protective coating without changing the colour. They are paints without pigment. Like paints they are available in gloss, satin and matt finishes.

- **Acrylic varnish.** Quick drying and non-toxic. Brushes can be rinsed out in water.
- **Polyurethane.** Commonly used for a wide range of applications. Coats can be applied by brush, roller or spray painted depending on the job and the availability of equipment. Once fully hardened, the surface should provide a hardwearing, resilient surface. Clean brushes in mineral turpentine.
- **Sanding sealer.** A clear-finish primer formulated for application over bare wood. It is designed to "raise the grain", which is then sanded to provide a smooth surface under oil-based polyurethane topcoats. Its quick-dry feature allows you to seal and topcoat your project in one day. Clean brushes in mineral turpentine.
- **Lacquer.** A fast-drying solvent-based paint or varnish that produces an especially hard, durable finish. Clean brushes in mineral turpentine.

Oil

Oils provide a quick and easy finish to most timber surfaces. There is a wide range of oil types. Which one to select depends on the finish you want. The main problem with oils is that they take a lot longer to dry than varnish and can fade over time. An advantage is they don't produce toxic fumes. Examples of oils are:

- **Danish oil.** This is a blended oil that is excellent on pine. It gives a natural low-lustre finish.
- **Lemon oil.** This provides a suitable finish for teak and matt finished woods where a wax finish is not desired. It has the aroma of fresh lemons.
- **Linseed oil:** A natural product available in natural and boiled form. A traditional wood finish, although it does tend to go gummy if applied too heavily. As linseed oil dries it generates heat. Rags used to apply linseed oil can spontaneously combust if left scrunched up. Lay them flat on concrete to dry completely, well away from anything else that could catch fire.
- **Teak oil.** A quick-drying penetrating seal for teak and similar woods. It leaves a slight sheen when dry.
- **Tung oil.** This oil gives a superior finish to that of linseed oil, and is water-resistant. It can be easily applied using a rag.
- **Vegetable oil**. Commonly used on surfaces that are in contact with food, e.g. salad bowls. The oil is non-toxic and will not taint the food.

Clean brushes in mineral turpentine.

Polish

Polishes help to seal the timber and provide a harder wearing surface than a stand alone oil finish. As with oil finishes, there is a wide variety of polishes available. The two most common are:

- **French polish.** This is made from pure shellac and alcohol. It provides a high-quality finish for furniture. Applying French polish uses a traditional polishing method that often needs 20 to 30 coats.
- **Wax polish.** A good-quality wax polish, with added beeswax, will provide a hard, protective coating with a natural sheen. Wax polishes are available in a number of forms including liquid, paste, a special brushing wax, coloured waxes and staining waxes.

Painstaking and careful application of one of many coats for a strong and glossy french polish finish