

PENANG SANGAM HIGH SCHOOL

P.O.BOX 44, RAKIRAKI

WEEK 13 WORKSHEET



Cross - PVC cross fittings are not quite as common as other fittings, but they are designed for use when joining four pipe sections or dividing flow in different directions. This could be done in plumbing and irrigation systems.

Subject: Basic Technology

Year/Level: 10

Strand	BT10.4 HAND TOOLS AND MATERIALS
Sub Strand	BT10 4.3 WORKING WITH NON – METALS BT10.4.4 WORKING WITH METALS.
Content Learning Outcome	BT10.4.3.1 Identify and make appropriate and safe use of readily available polymers, ceramics and composites. BT10.4.4.1 Identify the common properties of metals and alloys and make appropriate and safe use of metals and alloys.

LESSON NOTES

Working with Non-Metals

Solid non-metals are usually dull, brittle and non-conductors of heat and electricity. Some examples of non-metals are wood, plastic, rubber, glass and ceramics. Some of the non-metals that are discussed in this section are PVC, ceramics and manufactured boards.

Polyvinyl Chloride (PVC)

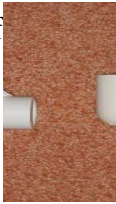
PVC pipe is the most used plastic piping material. PVC piping is used in Drain-waste-vent (DWV), sewers, water service lines, irrigation and various industrial installations. It can be used under ground or above ground in buildings.

A common color scheme (although not universal) is:

- White for Drain-waste-vent (DWV) and low pressure applications.
- White, blue, and dark grey for cold water piping.
- Green for sewer service.
- Dark grey for industrial pressure applications.

Common Fittings

90° ELL - These fittings are designed to turn the flow of pipe at a 90-degree angle.



45° ELBOWS - These are used to re-direct the pipeline and assist in turning corners.



TEE - PVC Tee is used to create simple wall structures and three-point connections in plumbing.

SHEET 2



Threaded Male & Female Connectors - Female adapters are used to add a female threaded pipe connection on a solvent welded pipe. **Male adapters** are used to add a male threaded pipe connection to a solvent weld pipe section.



Connector - This connector is used to join two pipes together normally for extension.



End Cap - Sometimes a PVC pipe system will end with an opening that does not need to be connected to another pipe. End cap simply stops the flow.

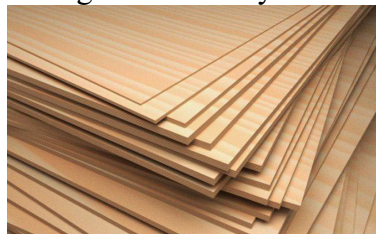


Ceramics - Ceramics are classified as inorganic and non-metallic materials that are essential to our daily lifestyle. As a result, they are used to make pottery, bricks, tiles, cements, and glass.



Manufactured Boards - are the manmade boards. Manufactured boards are valuable materials in their own right, with an important part to play alongside with solid timber, example plywood and core-board.

Plywood - Plywood is the name given to panels or sheets constructed by gluing together three or more layers of this wood called ‘_veneers’ or ‘_plies’ so that the grain of one layer runs at right angles to that of an adjacent layer.



Uses of Plywood

- **Furniture Manufacture:** In carcass construction, it is glued to a framework. It is also used as backing for cabinets, drawer bottoms, radio cabinets, door panels and chair backs and bottoms.

- **Building Works:** In building works it is used for panelling, flush doors and built-in fittings. Exterior grades are used for wall sheathing and concrete form-work.
- **Boat Building:** It is used in crafts and yachts of all sizes. Special waterproof marine grade plywood is manufactured to resist water indefinitely.
- **Aircraft Construction:** The strength of the plywood combined with its light weight makes it ideal for this type of work, light gliders and sail planes.
- **Other Uses:** It is also used in coachwork, railway carriages and boxes.

Core-board - Core board is a manufactured board with a wood fibre or wood chip centre and bonded veneer faces on both sides. It is very strong, lightweight, and easily cut material used for the mounting of photographic prints, as backing in picture framing, in 3D design, and in painting.



Working with Metals

A metal is a material that is typically hard, opaque, shiny, and has good electrical and thermal conductivity. Some examples of metals are aluminium, copper, iron, lead, zinc, tin, silver and gold.

Mechanical Properties

Mechanical Properties refers to the behaviour of material when external forces are applied.

Some of the mechanical properties are:

1. **Hardness** - refers to the ability of a metal to resist scratch, penetration, cutting action, or permanent distortion. E.g steel and aluminium alloys.
2. **Brittleness** - is the ability to break or crack without changing shape. E.g Cast iron, cast aluminium, and very hard steel are brittle metals.
3. **Malleability** - A metal that can be hammered, rolled, or pressed into various shapes without cracking or breaking is said to be malleable. Copper is one example of a malleable metal.
4. **Ductility** - is the property of a metal that permits it to be permanently drawn, bent, or twisted into thin lengths without breaking. This property is essential for metals used in making wire and tubing.
5. **Toughness** - A material that possesses toughness will withstand tearing or shearing and may be stretched or otherwise deformed without breaking. Toughness is a desirable property in aircraft metals.

Finishing of Materials

The visual appeal of the material is one of the attractions of woodworking and metalworking. Painting is one of the common methods used in finishing materials. However, different types of finishing are used on different types of materials.

Wood Finishing

Finishes serve to prevent wood absorbing moisture, protect against decay and enhance appearance.

1. **Staining** - Stain can be used to match different components in construction and to achieve attractive contrasts of tone.
2. **Varnishing** - One of the most popular varnishes used is polyurethane since it is easier to apply and produces clearer result.
3. **Painting** - Paint provides a protective colouring for both indoor and outside softwood.
4. **Lacquers** - Several coats of Lacquers is needed for an effective finish since it is thinner compared to varnish. Spray application is used for best results but not always used.
5. **Wax** - Over some time the wax applied on the material will form deep lustrous colour within the wood surface.
6. **Oil** - Since oil is natural and waterproof, it provides a perfect finish for outdoor furniture.

Metal Finishing

To protect metal from rust, coat it with Vaseline or light grease.

- 1. **Oil Finishing** - Steel can be either dipped in machine oil burnt into the metal or the metal can be heated to dull red and quenched in oil.
- 2. **Painting** - For painting metal, the surface must be thoroughly cleaned and then washed with hot water and detergent. Metal primer is suitable for most metals. For maximum protection an oil-based undercoat and top coat should also be used.
- 3. **Plastic Coating** - The most suitable method is to dip pre-heated metal into a tank of liquefied thermoplastic such as polythene, PVC or nylon. This is done to prevent metal from corrosion and to provide electrical insulation.
- 4. **Electroplating** - Thin layer of metal is deposited on the surface of the metal to be used. Some examples are chromium plating on steel, silver and gold plating on jewellery and simple copper plating.

STUDENT ACTIVITY

- 1. What are two kinds of hardware used in constructing projects?

- 2. Draw and explain atleast **three** common pipe fittings.

- 3. Differentiate between **wood finishing** and **metal finishing**.

THE END