

**DESIGN &
TECHNOLOGY
SUMMER 1
KNOWLEDGE
ORGANISERS**



Product Design:

Paper/Card Mechanisms:

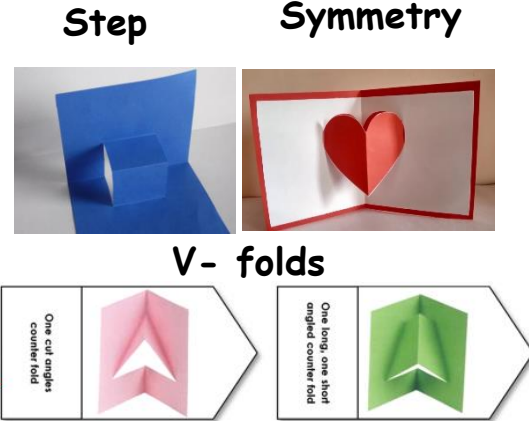
- * Use design influences to plan, create and make designs.
- * Identify hazards using healthy & safety rules in the workshop.
- * Create a moving paper/card mechanism using cuts, folds, hinges.
- * Create a STEP mechanism.
- * Create a V-fold BEAK mechanism.
- * Create a MOUTH mechanism.
- * Modify existing mechanisms.
- * Use symmetry to create a pop up mechanism.

PROFILE: ROBERT SABUDA

Robert Sabuda is an American artist/designer who born on the 8th of March 1965. His specific interest in 3D paper engineering (i.e., [pop-up books](#)) was sparked by a book he received as a child. Initially working as a package designer, worldwide recognition only came his way after he started designing his own pop up children's books.

Take a look and be inspired by Sabuda's-

The Christmas Story,
The Little Mermaid
The Wonderful wizard of Oz
Peter Pan
Beauty and the Beast.



V- folds



Two Basic Pop-Ups
Most pop-ups are made from variations and additions onto the Box and V-fold.
Paula Beardell Krieg
www.bookzoompa.wordpress.com

Step Pop-up

1. Fold a piece of paper in half, making sure that the fold is crisp and sharp.
2. Cut two lines on the fold, like a wide, sideways "eleven."
3. Fold the flap between the cut lines back and forth to make a sharp fold at the base of the "eleven".
4. Push the flap to the inside, between the pages of the folded paper.
5. Open the paper and discover the box pop-up!

V-Fold Pop-up

1. Fold a piece of paper in half, making sure that the fold is crisp and sharp.
2. Cut one line on the fold.
3. Fold a triangle down from the end of the cut line to somewhere on the fold. Make this into a sharp fold by folding the triangle back and forth.
4. Push the triangle to the inside, between the pages of the folded paper.
5. Open the paper to discover the "V" pop-up!

Beak

Keyword	Definition
Influence	Use an existing artist or designer to inspire new ideas and designs.
Symmetry	One-half is the mirror image of the other half.
Asymmetry	One-half is NOT the mirror image of the other half.
Mechanism	Working parts in a device to create motion.
Mock Up	A model or test piece to check how the finished product will look/work.
Paper Engineering	Using paper, scissors and glue to create 3D pictures.
Hinge	A movable joint or mechanism, which swings forwards and backwards.
Modify	Change something, by adding or taking away from the original design.

STAGE 1 **STAGE 2** **STAGE 3**

Mouth

Product Design: Plywood Noteholder

*Plan, create and evaluate product designs suitable for a user.

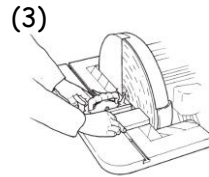
*Identify healthy & safety rules in the workshop.

*Cut plywood shapes with a coping saw (1) and fret saw (2). Use the bench vice. (6)

*Identify different files and their uses when shaping plywood. (4)

*Sand and shape plywood shapes using sand paper (5) and the disc sander (3)

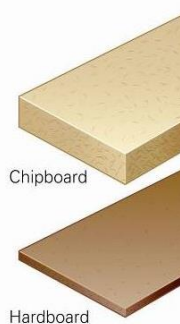
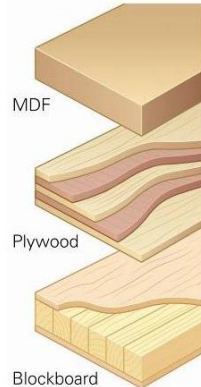
*Prepare, paint and glue plywood shapes.



Measurements:

- mm = millimetre
- cm = centimetre

- MRS SILLY**
1. Always listen carefully to the teacher and follow instructions.
 2. Please do not run in the workshop, and be patient.
 3. Please do not shout in the workshop.
 4. **NO EATING or DRINKING** in the workshop at any time.
 5. Stack stools away safely **DO NOT** sit down during practical lessons.
 6. Please do not leave bags on the floor, put them on pegs outside the room.
 7. Know where the emergency stop buttons are positioned in the workshop.
 8. Always read the signs next to every machine before you use it.
 9. Always wear an apron for practical work, tuck your tie into your shirt and remove any loose jewellery. Hang your blazer up!
 10. Use safety goggles on machines that require it or with glues.
 11. Tie long hair back so it can't get caught in anything.
 12. Wear good strong shoes.
 13. Do not use a machine if you have not been shown how to operate it safely by the teacher.
 14. Report any damage to machines/equipment as this could cause an accident.
 15. Always use guards on the machines that have them.
 16. Bring a respiratory mask to use if you have Asthma, when needed.
 17. **IF YOU DO NOT UNDERSTAND ANYTHING ASK**
 18. Tidy up after yourself, put rubbish in the bins or RECYCLE!!!



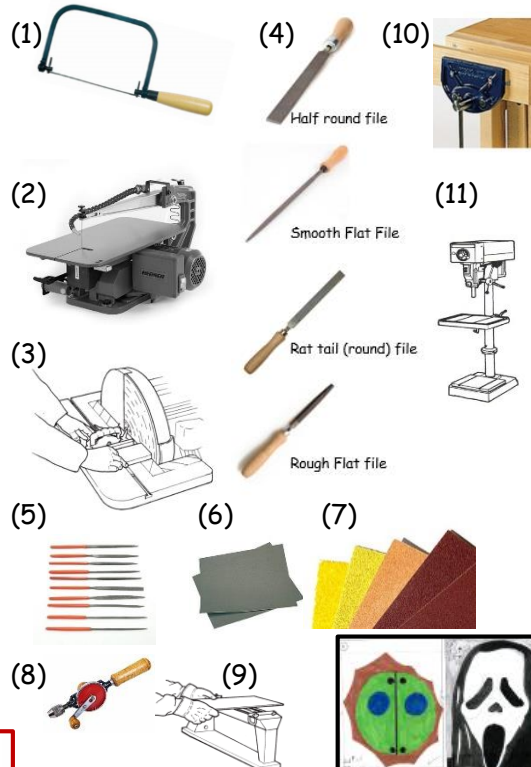
Keyword	Definition
User	The person who will use the product.
Design	A visual way to show what a product will look like
Annotation	Labels added to design work to express thinking, i.e measurements
Filing	An abrading technique used to remove larger amounts of material.
Wood Grain	The pattern within natural wood which occurs as the tree grows.
Cutting (wasting)	To remove large pieces of material and shape it.
Sanding	Smoothing and shaping the edge of a material.
Quality control	Checks for quality of finish and safety of a product.
Evaluation	Critical analysis or judgement of something



Plywood- A manmade board glued together in thin layers of natural wood in opposite directions of the wood grain.

Product Design: Acrylic Products

- *Use **design influences** to plan, create and evaluate product designs.
- *Identify healthy & safety rules in the workshop.
- *Cut out acrylic shapes with a coping saw (1) and fret saw (2).
- *Use the bench vice. (10)
- *Identify different files (4), including needle files (5) and their uses when shaping acrylic.
- *Sand and shape acrylic shapes using sand paper (7) (wet & dry) (6) and the disc sander (3).
- *Cut and apply self adhesive vinyl.
- *Explain advantages and disadvantages of materials and equipment.
- *Drill holes using hand drill (8) and pillar drill (11)
- *Heat and reshape thermoplastics using the strip heater/line bender. (9)



Measurements:

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Area = width x length

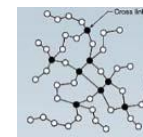
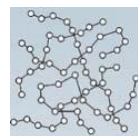
- MR. SILLY**
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 7. Know where the emergency stop buttons are positioned in the workshop.
 8. Always read the signs next to every machine before you use it.
 9. Always wear an apron for practical work, tuck your tie into your shirt and remove any loose jewellery. Hang your blazer up!
 10. Use safety goggles on machines that require it or with glasses.
 11. Tie long hair back so it can't get caught in anything.
 12. Wear good strong shoes.
 13. Do not use a machine if you have not been shown how to operate it safely by the teacher.
 14. Report any damage to machines/equipment as this could cause an accident.
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Thermoplastics - These plastics can be re-heated and re-shaped in various ways. They become mouldable after reheating as they do not undergo major chemical change. Reheating and shaping can be repeated. The bond between the molecules is weak and becomes weaker when reheated. These types of plastics can be recycled.

Thermosetting Plastics - Once heated and moulded, these plastics cannot be reheated and remoulded. The molecules of these plastics are cross linked in three dimensions and they cannot be reshaped or recycled.

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Design	A visual way to show what a product will look like
Annotation	Labels added to design work to express thinking, i.e measurements
Cross Filing	An abrading technique used to remove larger amounts of material.
Draw Filing	An abrading technique used to remove smaller amounts of material
Cutting (wasting)	To remove large pieces of material and shape it.
Sanding	Smoothing and shaping the edge of a material.
Wet and dry paper	Used to abrade plastic and metal (finer than emery paper)
Polishing & buffing	A technique used to remove all fine marks in preparation for buffing (make it shiny).

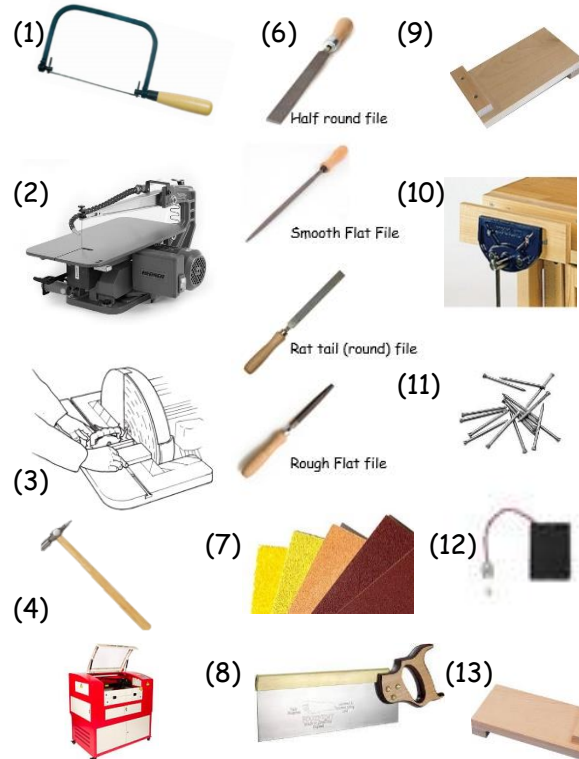


Acrylic. (Known also as PERSPEX) Hard thermoplastic in the form of sheets and comes in a range of colours. It can be translucent (e.g. smoked), transparent or opaque. Easy to cut shape. Polishes well. This material is used to make baths, safety glasses, signs.

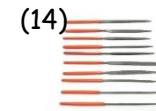
Self-adhesive vinyl is a flexible thin material that can be used to make eye-catching signs and logos.

Product Design: Plywood LED Mood light

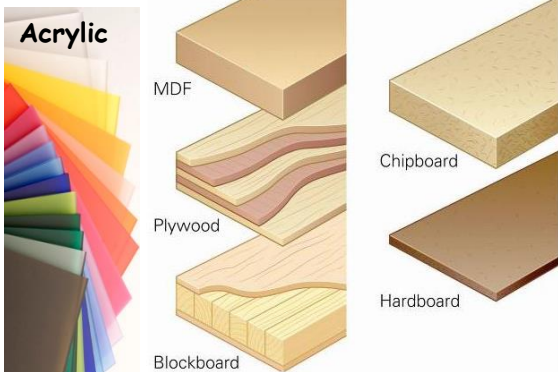
- *Plan, create and evaluate product designs with combined materials using inspirational designs.
- *Identify hazards using healthy & safety rules in the workshop.
- *Measure and mark out plywood materials to size for cutting.
- *Cut plywood shapes with either a coping saw (1) and fret saw (2). Use the bench vice. (10) Or with a tenon saw (8) and Bench hook (13)
- *Cut acrylic shapes on a laser cutter. (4)
- *Identify different files (6), including needle files (14) and their uses when shaping plywood.
- *Sand and shape plywood shapes using sand paper (7) and the disc sander (3)
- *Join plywood and plastics and resistant materials using PVA glue and panel pins (11) with a pein hammer (4).
- *Prepare, paint and glue plywood shapes.
- * Assemble and fit electronic components including a Light Emitting Diode (LED) (12)
- *Explain advantages and disadvantages of equipment when using **new materials**.



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Keyword	Definition
User	The person who will use the product.
Hazard	A risk to safety that could cause an accident.
3D	A three-dimensional object is solid rather than flat. It can be measured in height, length, and width.
CAM	Computer aided manufacture - outline drawn on computer and cut on a computer controlled machine. Eg. Sticker cutter.
CAD	Computer aided design - used to design product parts eg. 2D design or 3D modelling.
Laser cutter	A CAM machine, which uses a laser light beam to cut through materials drawn in CAD software.
Joining	Using joints, fixtures and fittings or adhesive to join materials together.
Drilling	A technique used to create a hole in a material.
Wasting	To remove large pieces of material and shape it.
Evaluation	Critical analysis or judgement of something.
Quality control	Checks for quality of finish and safety of a product.



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Manufactured Boards - Manmade boards are commonly used in the construction industry, for interior fittings and furniture. They are more stable than natural woods and are less likely to warp and twist out of shape. The three main types are; plywoods (laminated boards), particle boards and fibreboards. They are all manmade in factories / mills. They are usually composed of natural woods and resin, which binds them together.