



ROUTE C · PLANNING MANUFACTURE

Acrylic by hand

LEARNING INTENTION

Plan and make my EarBuddy from 3 mm acrylic sheet using hand tools and a pillar drill.

SUCCESS CRITERIA · I can...

- ☐ mark out acrylic on its protective film
- ☐ cut, shape and drill acrylic without cracking it
- ☐ finish the edges to a polished shine

Cast acrylic sheet · 3 mm

Type	Thermoplastic (softens when heated)
Properties	Glossy, many bright colours, waterproof; brittle — can crack if forced
Cut with	Coping saw or junior hacksaw (or a laser cutter)
Finish	Files, wet & dry paper, then polish



Tools & equipment

 Steel rule measures in mm	 Pencil / fine marker draws on the film	 Engineer's square marks lines at 90°	 Scriber fine lines on film	 Vice with soft jaws protects the acrylic	 Coping saw cuts curves
 Junior hacksaw straight cuts	 Flat file edges & draw filing	 Half-round file inside curves	 Wet & dry paper used wet, coarse → fine	 Acrylic polish final shine	 Pillar drill drills holes

WORKSHOP SAFETY

- Wear **goggles** when cutting, filing and drilling — acrylic chips fly.
- Hold the sheet **low** in the vice, close to the cut, so it doesn't vibrate and crack.
- Don't over-tighten the vice — acrylic cracks under pressure.
- Pillar drill: guard down, hair tied back, sleeves tucked in, chuck key removed.
- Clamp the acrylic — never hold it by hand when drilling.
- Line bender (if used): the element is **very hot** — only use it with your teacher.

CHECK YOUR UNDERSTANDING

1 Choose two safety rules from above. **Explain** why each one keeps you safe.

How to make it

1 Mark out

- **Keep the protective film on** until the very end — it stops scratches.
- Draw round your template on the film with a pencil or fine marker.
- Use an engineer's square for 90° lines. Mark hole centres with a cross.



2 Cut

- Hold the acrylic low in a vice with **soft jaws** (or card) to protect it.
- **Junior hacksaw** for straight cuts; **coping saw** for curves. Slow, steady strokes.
- Cut on the **waste side**, about 1 mm from the line, and support the offcut so it doesn't snap off.



3 Shape

- **Cross file** to the line, then **draw file** for a flat, straight edge.
- Needle files help in slots and small curves.
- Keep the edge square — check with the engineer's square.



4 Drill

- Clamp the acrylic with **scrap wood underneath**.
- Use a **slow speed** and gentle pressure. A step drill reduces cracking.
- Keep holes at least **5 mm from an edge** or the acrylic may crack.



5 Finish

- Rub the edges with **wet & dry paper**, used wet: coarse first (240), then finer (600, then 1200).
- Polish with **acrylic polish** on a soft cloth until the edges are glossy. Your teacher may use a buffing wheel.
- Peel off the protective film last.



Drilling acrylic with scrap wood underneath



Polished acrylic edges



A finished acrylic EarBuddy

COMMON MISTAKES

- Removing the film too early — the face gets scratched.
- Clamping the acrylic high in the vice — it vibrates and cracks.
- Drilling fast or too close to the edge — it cracks.
- Skipping grades of wet & dry — deep scratches remain.

Extension

Acrylic is a thermoplastic: heat it along a line on a line bender and it can be bent into a stand. Ask your teacher.

My manufacturing plan

SEQUENCE OF OPERATIONS

2 Plan every step in order. Use page 2 to help. For each step, list the tools and a safety point.

#	What I will do	Tools & equipment	Safety
1			
2			
3			
4			
5			
6			
7			
8			
9			

CUTTING LIST

3 What size of material do you need? Add 5 mm to each side of your design.

Part	Material	L	W	T	Qty
Main body	Cast acrylic			3 mm	1

L = length · W = width · T = thickness, all in mm

MY FINISH

4 Which finish will you use and why?

QUALITY TARGETS

Professionals work to a **tolerance** — how far a size is allowed to be from the drawing. Check your work against these targets as you go.

Outline matches the template	±1 mm
Edges flat, square and polished	glossy
No cracks or chips	none
No scratches on the face	clean
Holes in the right place	±0.5 mm

Making log & evaluation

MAKING LOG

5 At the end of each workshop lesson, record your progress.

Lesson	What I did	A problem & how I solved it	Next lesson I will...
9			
10			
11			

MY EARBUDDY

Sketch or stick a photo of your finished EarBuddy.

FINISHED PRODUCT

LESSON 12 · EVALUATION

6 Test your EarBuddy against your specification.

Specification point	Met?	Evidence
	☐ ☐	
	☐ ☐	
	☐ ☐	
	☐ ☐	
	☐ ☐	

Tick first box = met, second box = not met.

REFLECT

What went well in the workshop?

IMPROVE

If you made it again, what would you change and why?

Teacher check: quality targets met ☐ all ☐ most ☐ some

Signed _____