EARNSHAW STATE COLLEGE

7 T.M.T. (UNIT 1: Galvabond Box)

Procedure

Introduction to material

1. **Galvabond** is a type of mild steel coated with zinc that resists rust and is easy to shape.
2. It is used in **sheet metal fabrication** because it is strong and lightweight.
3. Edges can be **sharp**, so care must be taken when handling.
4. It's 0.4mm thick

Introduction to required tools – part 1

- Rule
- Scratch gauge
- Scribe

Marking out

Goal: Measure and mark the shape of the box on the galvabond sheet using a ruler, scribe, and scratch gauge.

Step 1 – Place your name in the middle of the sheet.

Step 2 - Marking out the perimeter dimension.

Using a scratch gauge process

Name side face up

1. Hold with the thumb on the back surface of the gauge with forefingers in front.

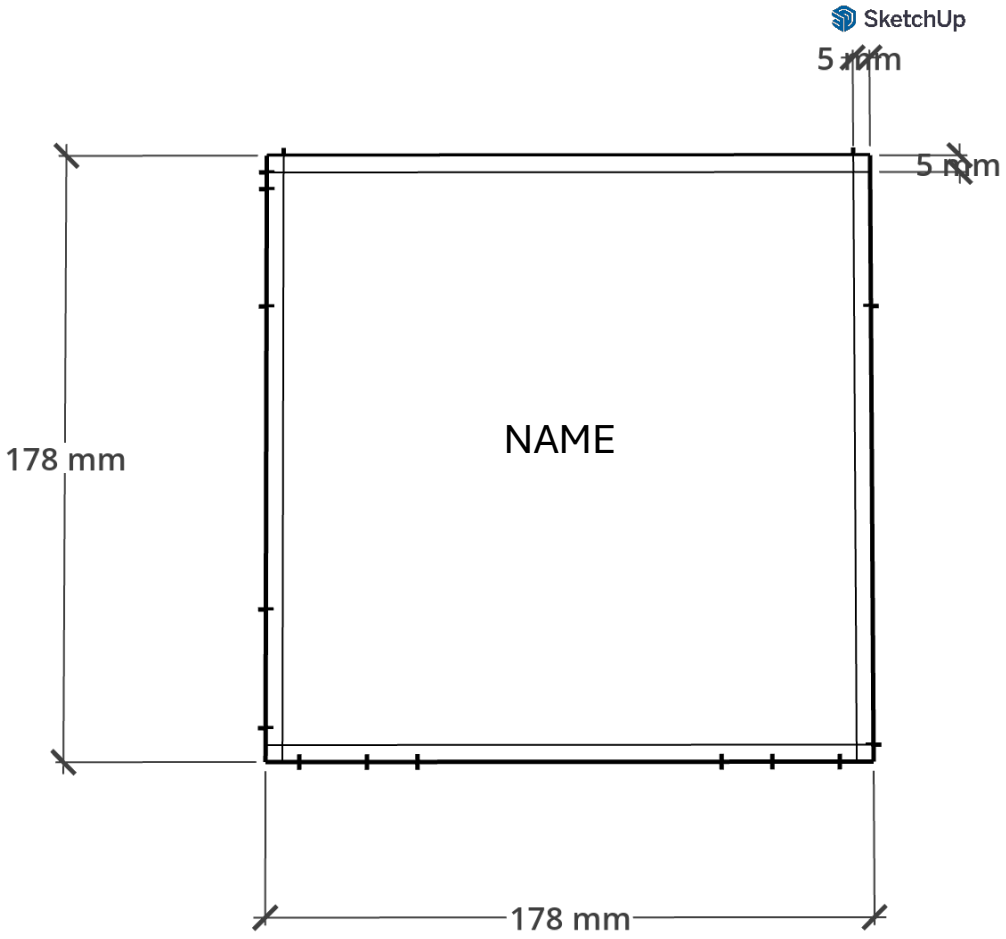
2. Position the sheet so that the side to be marked is hanging over the edge of the bench by about 15-20mm ensuring it is firm enough to resist downward pressure.

3. After choosing the mark depth (5, 10, 15mm etc) in this case 5mm, place the scribe 90 degrees adjacent to the edge to be marked.

4. Start with a straight arm and pull the scratch gauge towards the body. Slight pressure required to make a line.

5. Mark one edge and show teacher.

6. With teacher's approval, mark the remaining three lines.



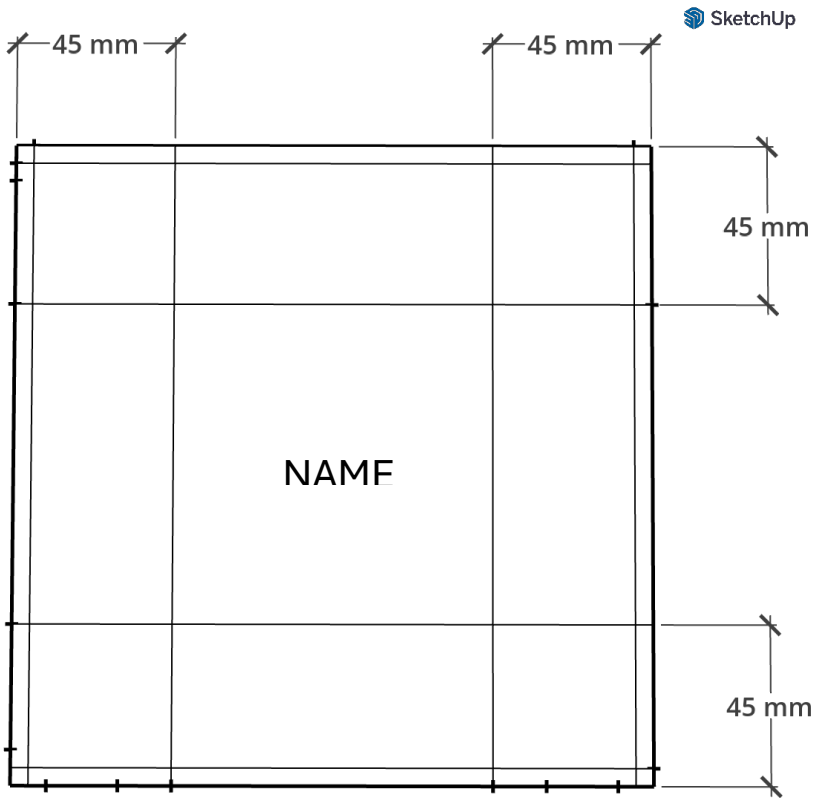
STEP 3 – Marking the fold lines

<u>Using a scribe process</u>

1. Next dimensions will be to the left, right, above and below your NAME.

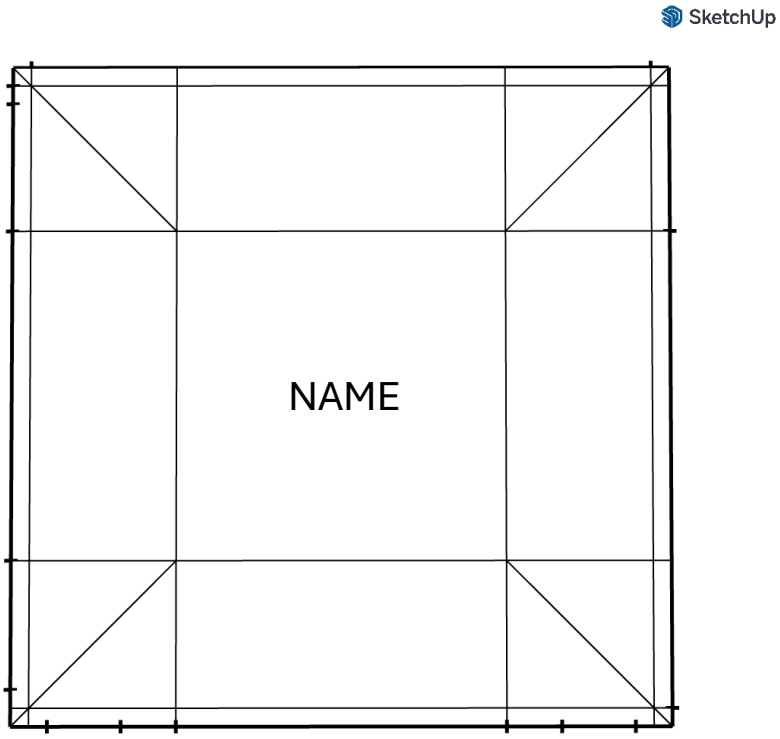
2. Hold the scribe like a pencil/pen

3. Line up the pre-marked dimensions with a ruler and pull the scribe towards the body to complete a straight line. Use arrow heads to assist with accuracy.

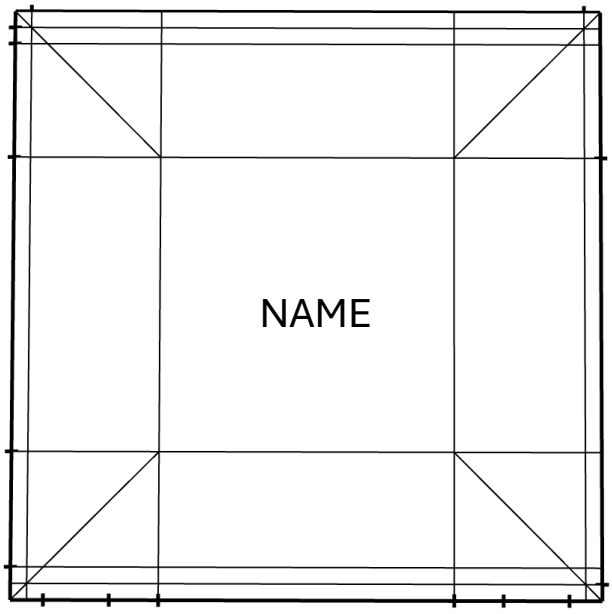


STEP 4 – Mark the 45-degree lines

Using a scribe and ruler, mark the 45-degree lines as shown.

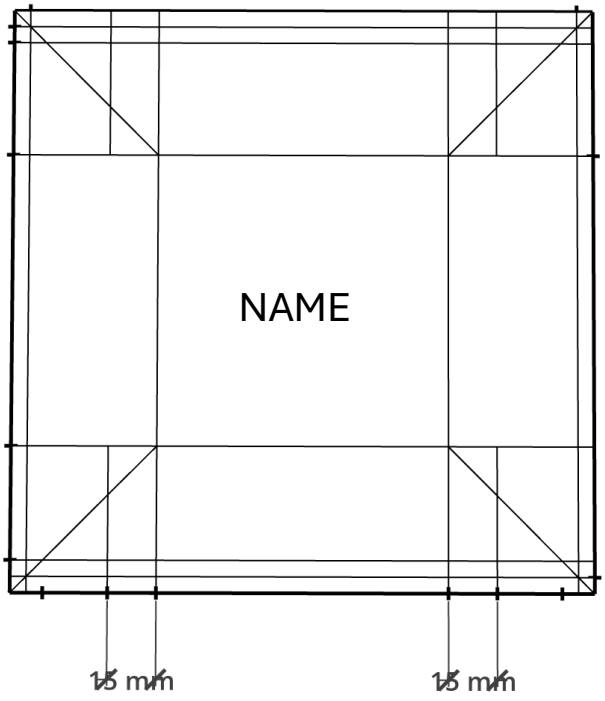


Also mark the 10 mm lines with a scratch gauge above and below your name.



Using the scribe and rule, mark 15mm in from the 45mm line as shown below.

NOTE: the line should not past the horizontal line above and below your NAME.



STEP 5 - Cutting out

Introduction to required tools – part 2

- Tin snips

Using Tin Snips

Goal. To cut neatly to the line with minimal creasing of the material.

POINTS

- Using tin snips is like using a pair of scissors, however tin snips are specially designed for sheet metal cutting.

- Accordingly, they are designed for this purpose and therefore have traits applicable to cutting this material.

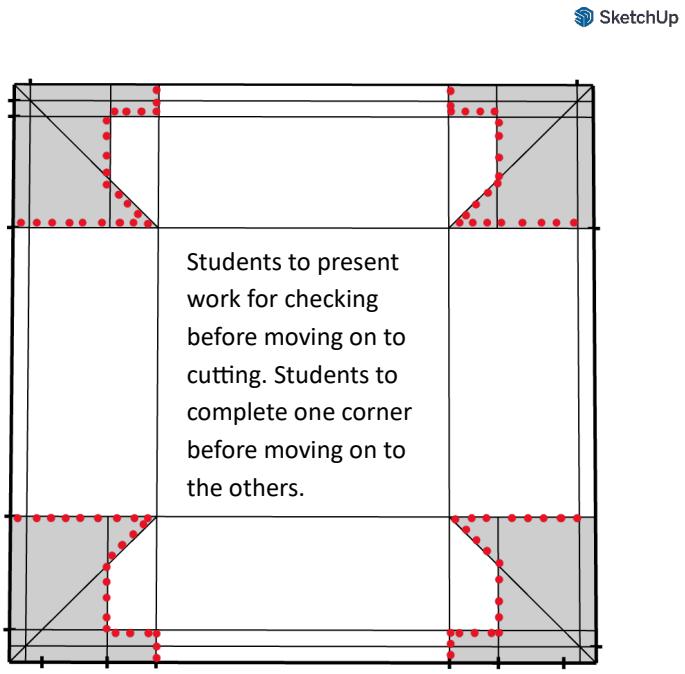
- For instance, the snips must have a firm friction cutting action to ensure a neat cut. Failure to adjust the blade tension accordingly will result in the sheet metal binding in the blades and creasing the material, potential 'jamming' in the blades. It will also ensure a 'rough' cut and a ragged edge.

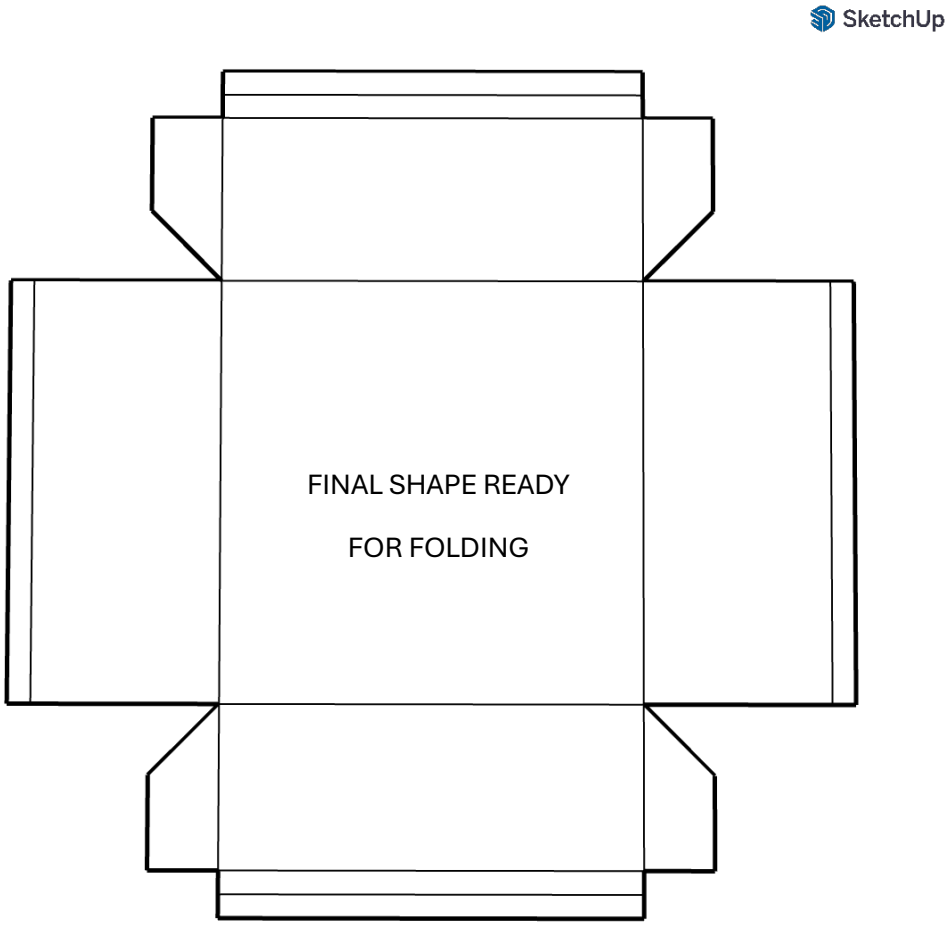
  HOW TO CHECK THE JAW ADJUSTMENT
  The tin snips should have a firm action. If it is too loose, to adjust simply tighten the pivot screw holding the blades together. This may require a small spanner. After tightening, test by opening and closing the snips to test the action. It should be firm. Note, it may require retightening after several passes as the screw may loosen due to use. Adjust when the jaws are open.

- Caution must be taken to not over-cut the sheet metal and go past the intended stop point. The risk of over-cutting can compromise the shape when moving on to the bending and folding phase. It is critical to apply appropriate care and attention to these cuts.

Provide demonstrations of the above points show casing the difference between a good and bad cut as well as what creasing looks like in the material.

Mark the lines to be cut with dotted lines.





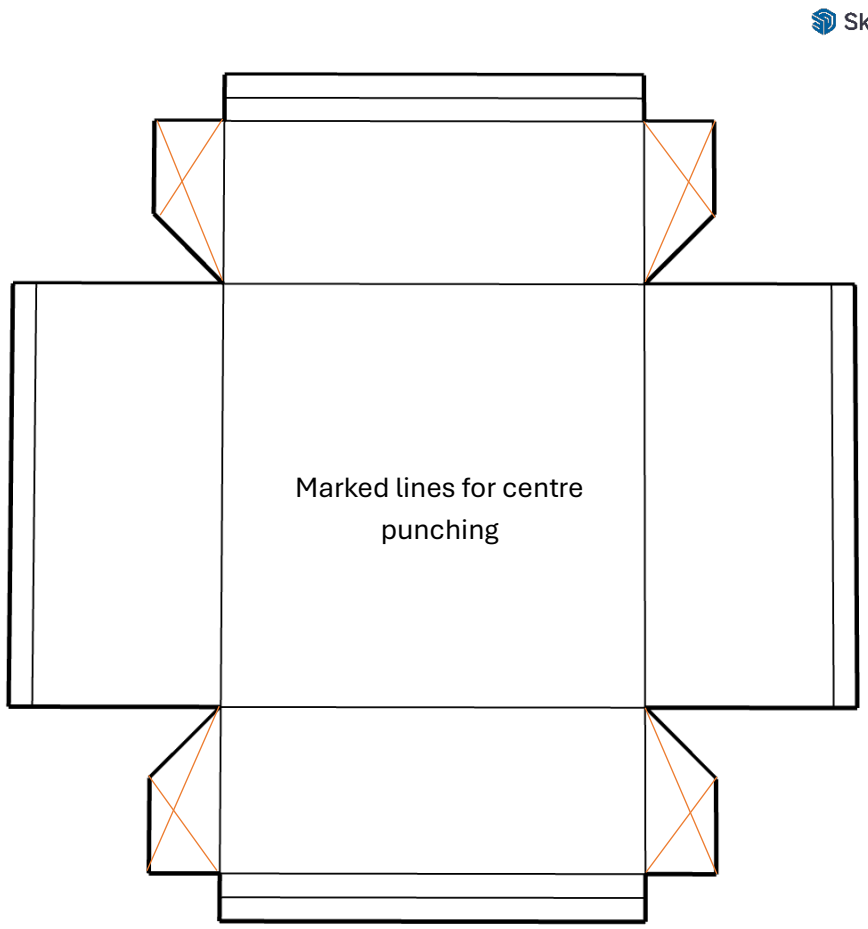
STEP 6 - Drill holes on the lap seam

- Battery dill & 3.5mm drill bit
- Rule
- Scriber
- Centre punch
- Hammer
- Hardwood timber strap

Marking the hole position and drilling the holes

1. Using a rule and a scriber, draw diagonal lines on the lap seam as per the diagram.

   Mark one then student shows teacher. If approved, mark the other three.



2. Locate the intersecting point of the lines.

3. Place the sheet metal on the end of the bench for a firm backstop.

4. Using a centre punch, line up where lines intersect with the centre punch. With the weight of the hammer, let the hammer drop on the centre punch causing a divot. This divot will stop the drill bit from ‘wandering’ and keep it in place to drill a straight line.

Punch one, then show teacher. If approved, mark out the remaining three seams.

Drilling the holes (demonstration)

1. Set-up a backstop timber block in the vice.

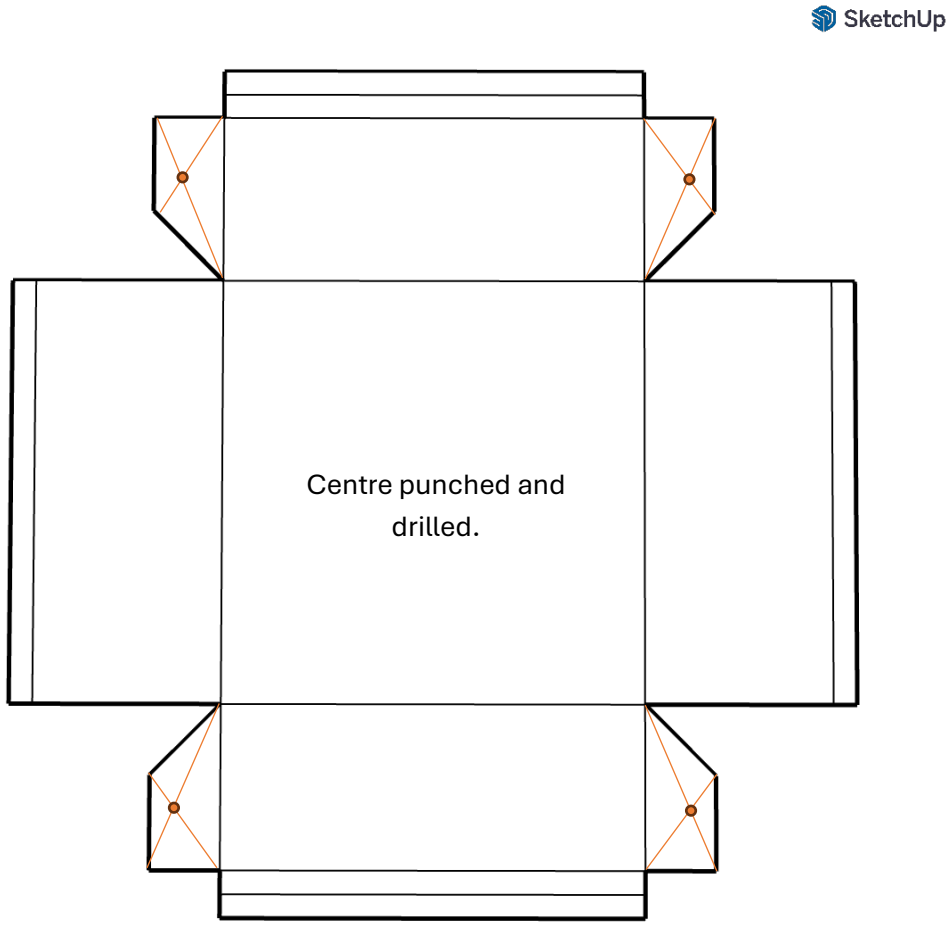
2. Go through the function of the drill (drill speed, forward/reverse, how to insert a drill bit etc).

3. Select the correct drill speed. Lay the sheet metal flat on the timber that is secured in the vice.

   IMPORTANT: Hold the piece firmly before drilling. Ensure no other student is working within proximity to the area when drilling.

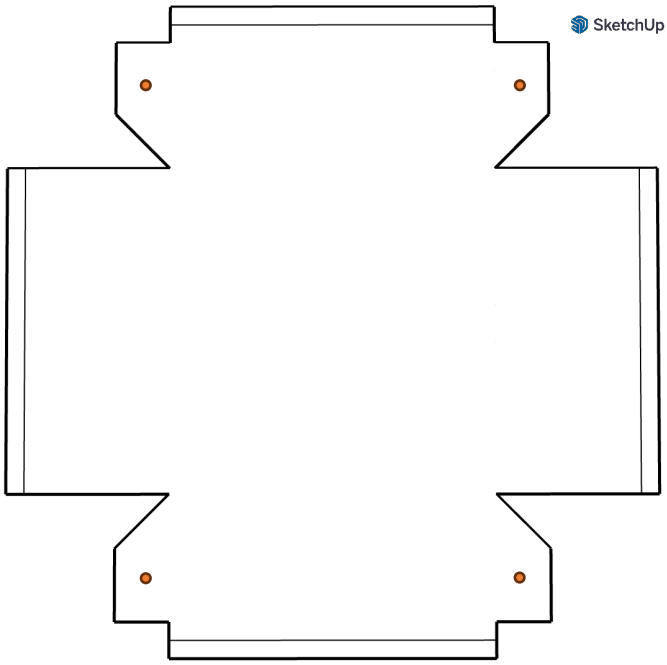
4. Using the battery drill, making sure the piece is held firmly with the non-drilling hand, commence drilling using a downward pressure.

5. Repeat for the other three holes.



STEP 7 - Folding/bending

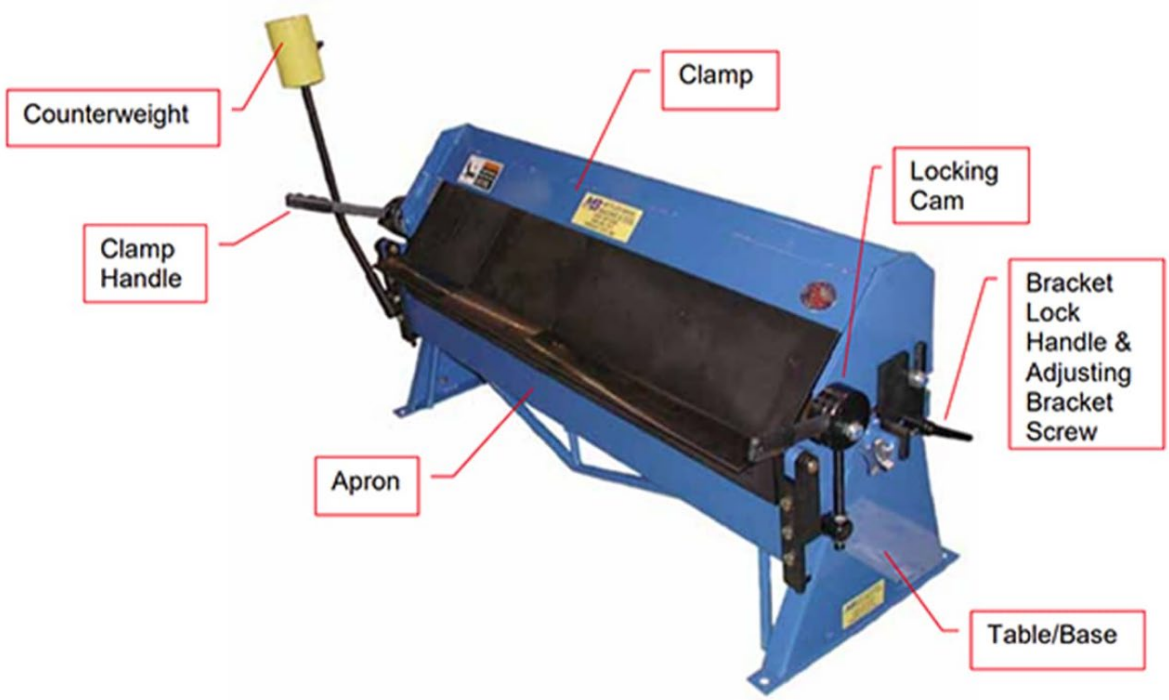
1. On the pan brake, viewing the line indicates that the bend will always pull the material upwards. Due to the folded seems required to be on the outside of the box, 5 mm scratch gauge mark is required on the reverse side of the name side.



Over to the pan brake. Demonstrate how the pan brake is used.

Purpose of the pan break:

- to fold over edges and remove potential sharp edges that can cause injury.
- It strengthens the sides
- It improve appearance
- In certain circumstances, can help with form and function



1. Use the clamp handle to open the gap between the fingers and the apron.

2. Choose an edge to start with. Sheet metal is inserted into the gap, ensuring the line is aligned with the folded edge on the pan brake.
3. Ensuring human fingers are well away from the pan brake fingers, close the clamp handle placing firm downward pressure on the sheet metal.

4. While maintaining downward pressure on the clamp handle with one hand, pull the apron upwards all the way to make a 45-degree bend in the sheet metal.

5. Return the apron back to its starting position and release the hand clamp lifting the pan brake fingers off the material. Remove the material from the pan brake.

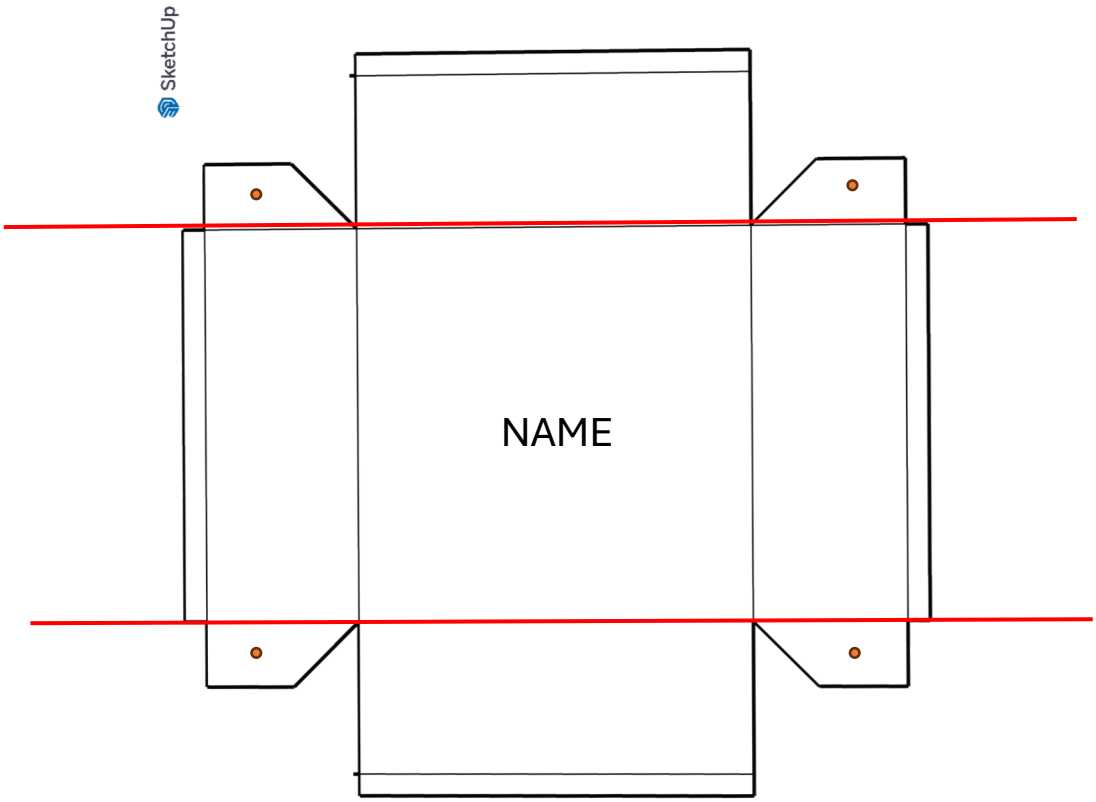
STUDENTS BEND ONE AND SHOW TEACHER

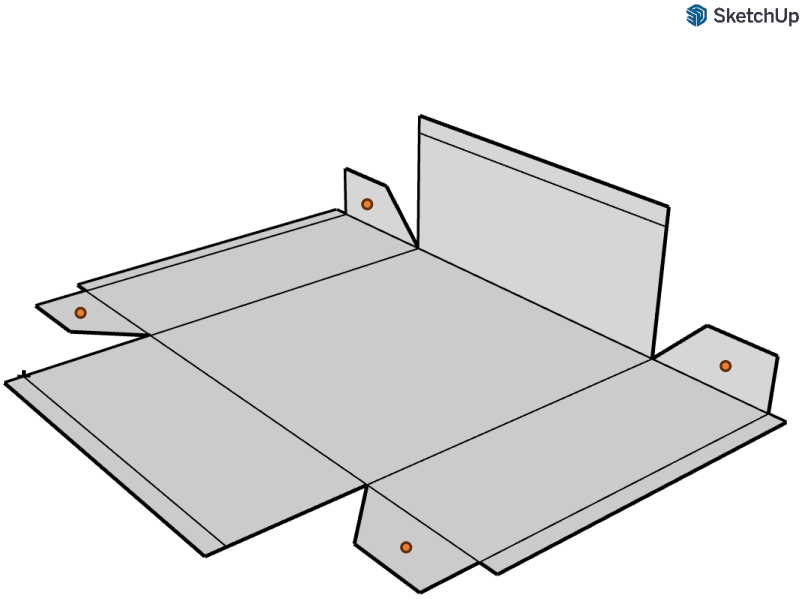
6. Using a dresser and a metal shaping stake, place the folded edge adjacent to the body and start tapping down the leading edge with the dresser, making your way along the seam until folded completely. Use the fingernail test to ensure it is folded completely.

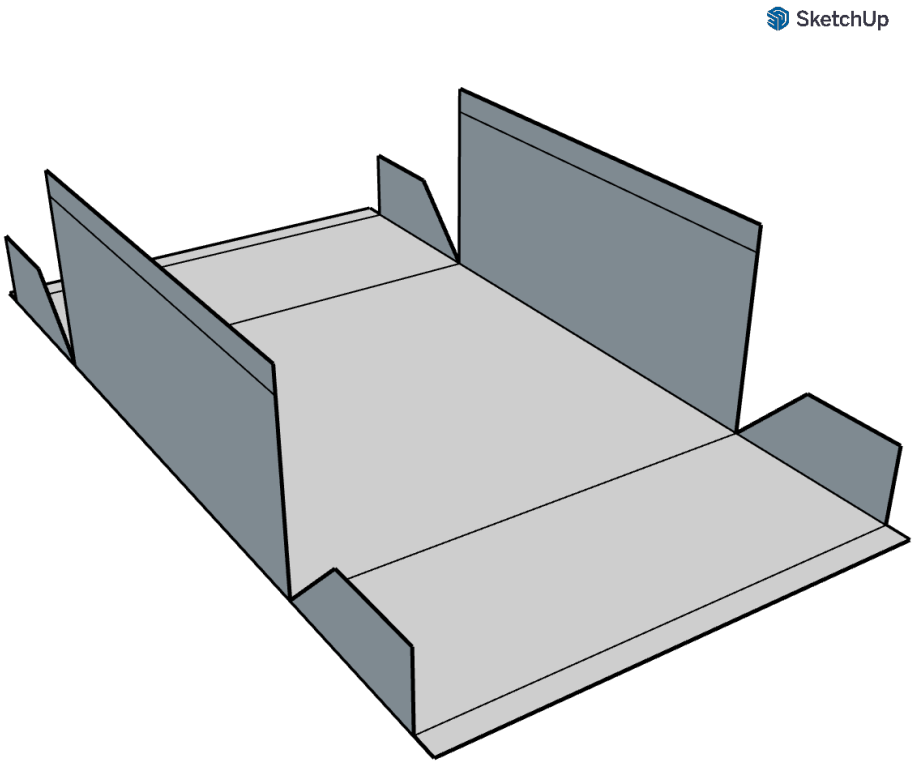
REPEAT STEPS 1 - 5 UNTIL ALL FOUR EDGES ARE FOLDED AND DONE.

FOLDING UP THE BOX SHAPE

1. Using the pan brake again, we now make two folds that incorporate the lap seems on each end, as per the diagram below.







Both sides folded

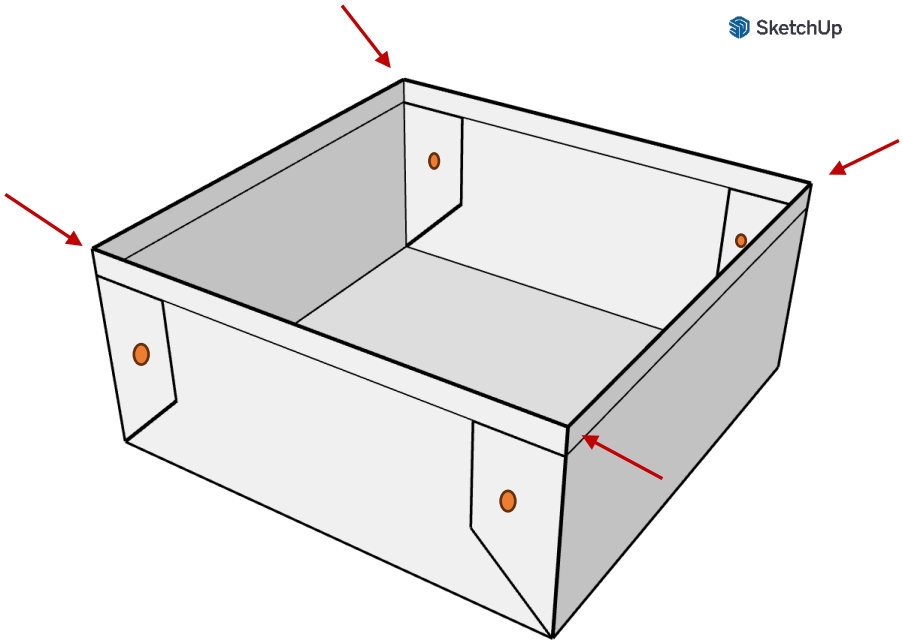
FOLDING THE ENDS

A similar process to the previous folding.

The pan brake is adjusted to have the right size finger that aligns with the dimension of the end.

With these two folds, it is important to push the sides in a little, and the laps seams out a little. That way, the lap seams will fold in front of the sides when the fold is done.

PROVIDE DEMO OF WHAT IS MEANT.



IMPORTANT

Check the heights of all the sides to ensure they meet neatly on ends. Adjust where necessary.

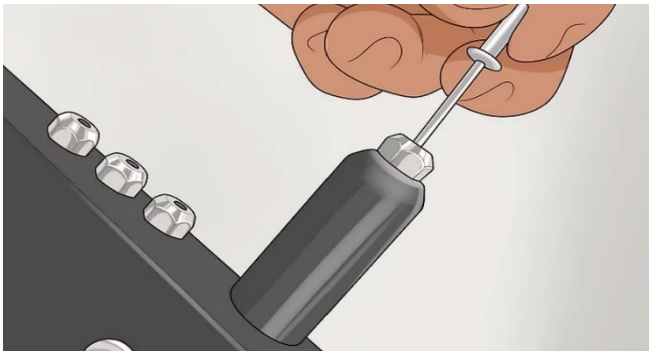
When all folding is completed, it's time to drill holes in the ends and pop rivet them together.

STEP 8 Drilling and Pop Riveting

QUIZ

How do we join metal? What methods can be used to join sheet metal?

Students to answer with suggestions.



- In this case, we will be using pop rivets.
- Pop rivets come in a variety of sizes and are made of aluminium.
- They are easy to install and serve the goal of joining sheet metal together very well.
- Testifying to how effective they are, specific components of planes are pop-riveted together using 1000s of them! These are called blind rivets.

1. Mark and Drill the Holes

- Line up the side and the hole in the lap seam.
- Using a backstop block secured in a vice (demo), drill through both pieces using a drill bit that matches the size of your rivet (3.2mm).
- Make sure the hole is clean and free of burrs.

2. Load the Rivet Gun

- Open the handles of the pop rivet gun.
- Insert the **mandrel of the rivet into the nosepiece** of the gun until it stops.

3. Insert the Pop Rivet

- Push through the hole so that the **rivet head sits on the outside** of your workpiece and the **mandrel (the pin sticking out)** is firmly in the nosepiece.

- Squeeze the handles together—**you might need to do this more than once,** depending on the size of the rivet.

4. Listen for the 'Pop'

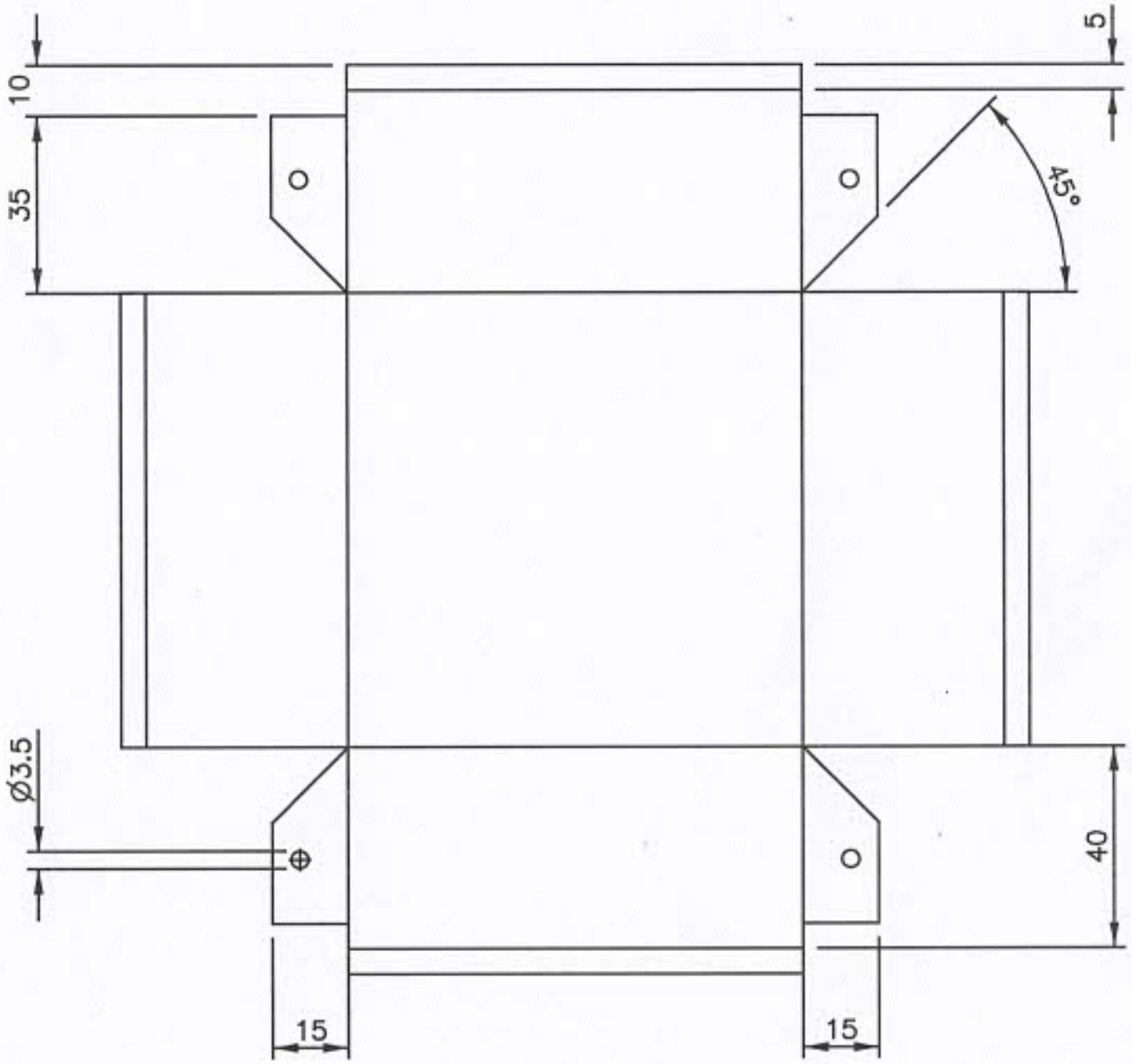
- Keep squeezing until you hear a **click or pop**—that means the rivet has snapped and is now holding your pieces together.

5. Check Your Rivet

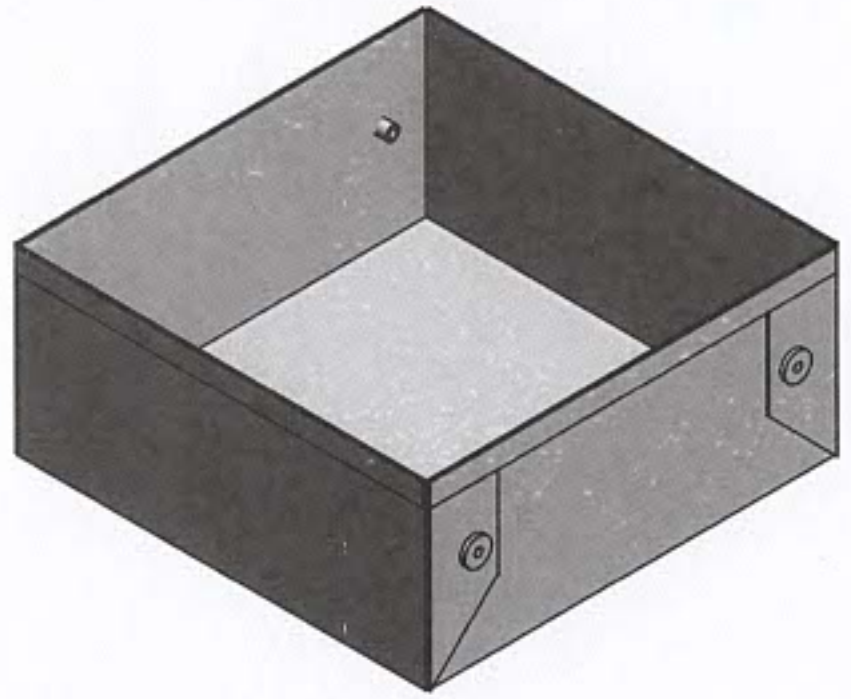
- Make sure the **rivet is sitting flat and snug** against your metal.
- The snapped mandrel should fall out (or you can remove it from the gun and discard it safely).

After pop riveting, file off sharp corners. Put your name on the bottom side ready for marking.

COMPLETED



DEVELOPMENT



ISOMETRIC VIEW

BODY	GALVABOND	178x.4	178	1
PART	**MATERIAL**	**SIZE**	**CUT**	**NO.**

SCALE 1:1		SHEETMETAL BOX	
YEAR 7	19–9–16	EARNSHAW S.C.	J.C.