education
Department: Education
GAUTENG PROVINCE

MECHANICAL TECHNOLOGY

WELDING and METALWORK

GRADE 10

PRACTICAL ASSESSMENT TASKS

2025

This Document Consists of 38 Pages.

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SECTION A: EDUCATOR GUIDELINES FOR PAT GRADE 10

1. INTRODUCTION / BACKGROUND

The 18 Curriculum and Assessment Policy Statements subjects which contain a practical component all include a practical assessment task (PAT). These subjects are:

- AGRICULTURE: Agricultural Management Practices, Agricultural Technology
- ARTS: Dance Studies, Design, Dramatic Arts, Music, Visual Arts
- SCIENCES: Computer Applications Technology, Information Technology, Technical Sciences.
- SERVICES: Consumer Studies, Hospitality Studies, Tourism
- TECHNOLOGY: **MECHANICALTECHNOLOGY**, Civil Technology, Electrical Technology, and Engineering Graphics and Design.
- MATHEMATICS: Technical Mathematics.

A practical assessment task (PAT) mark is a compulsory component of the final promotion mark for all candidates offering subjects that have a practical component and counts 25% (100 marks) of the end-of-year examination mark. The PAT is implemented across the first three terms of the school year. This is broken down into different phases or a series of smaller activities that make up the PAT. The PAT allows for candidate to be assessed on a regular basis during the school year and it also allows for the assessment of skills that cannot be assessed in a written format, e.g., test or examination. It is therefore important that schools ensure that all candidates complete the practical assessment tasks within the stipulated period to ensure that candidate have resulted at the end of the school year. The planning and execution of the PAT differs from subject to subject.

The PAT allows the teacher to directly and systematically observe applied competence. The PAT comprises the application/performance of the knowledge, skills and values particular to that subject and counts 25% of the total promotion/certification mark out of 400 for the subject.

The PAT is implemented across the first three terms of the school year.

Any profession requires of its members a thorough grounding in both theory and practice and mechanical technology is no exception. It is emphasized that the goal of the practical assessment task is to produce a skilled candidate in each specialisation field. A nation's true wealth is in its manpower and education that should aim to develop the talents of a candidate so that he/she can contribute to the well-being of the society by using and developing scientific and technological resources.

To prepare a candidate in mechanical technology specialisation fields, one must focus on the following:

- An attitude where the candidate can selectively use ideas, gather evidence and facts, to drawing logical conclusions to put them to good use creatively and with imagination;

- A capability to express ideas and information clearly by speech, writing, drawing and manufacturing and
- A willingness and capability to accept and exercise responsibility, to make decisions, and to learn by experience.

Attributes such as these cannot all be achieved in a classroom. A sound knowledge of engineering sciences is essential to equip the mechanical technology candidate with the necessary practical capabilities for the required processes. Practical training is the application of acquiring essential skills to bridge the gap between trade theory and practice.

Practical application in the workshop must therefore be made an interesting and challenging experience to develop the candidate's both physically and mentally. The candidates must show his/her initiative, curiosity and persistence in learning. In order to stimulate and develop self-confidence the granting of some degree of responsibility during the practical application is very important.

2. TEACHER GUIDELINES

2.1 Administration of the PAT

Teachers are requested to make copies of the different specialisation PAT documents. These documents need to be handed out to the candidates at the beginning of the year. The Practical Assessment Task for Grade 10 is internally set by the PED, internally assessed and provincially moderated.

Teachers must attach due dates for the different facets of the PAT (refer to the CAPS document). In this manner, candidates can easily assess their progress. Instances where formal assessments take place, it is the responsibility of the teacher to administer assessment.

The PAT should be completed within the first three terms. The PAT should be completed under controlled conditions (refer to Mechanical Technology SPECIALISATION: CAPS Grade 10 –12).

Educators MUST build a prototype of the task in order to be able to demonstrate to the candidates how the final product will look like. It will guide the candidates with visual presentation. It provides the educator with insight into possible challenges regarding machines, equipment or material and what possible manufacturing procedures he/she need to follow in the workshop in order to complete the PAT.

2.2 Assessment of PAT

Frequent and developmental feedback is needed to ensure necessary guidance and support to the candidates.

Both formal and informal assessment should be conducted to ensure that the embedded skills are developed. Informal assessment can be conducted only to monitor progress of the candidates. Formal assessment should always be conducted and recorded by the candidates.

On completion of each phase in each term, the marks for the completed phase need to be recorded onto the school administration system.

2.3 Moderation of PAT

The tasks, projects, assessment criteria as well as the mark sheets must be presented to the moderator during moderation of the PAT.

The moderator should be able to call on a candidate to explain and demonstrate the functions, principles and skills during the moderation purposes.

On completion the moderator will, if necessary, adjust the marks of the group upwards or downwards depending on the decision reached as a result of moderation.

The task must be clearly marked with the correct initials and surname of each candidate. Internal moderation MUST be conducted on each phase by the internal moderator on school level.

2.4 Consequences of absence / non-submission of tasks.

If a candidate's practical assessment task is incomplete or unavailable with valid reason, the candidate may be given three weeks before the commencement of the final end-of-year examination to submit the outstanding task. Should the candidate fail to fulfil the outstanding PAT requirement, such a candidate will be awarded a zero mark for that PAT component.

A candidate's results are regarded as incomplete if he/she does not offer any component of the PAT task. He / She will be given another opportunity based on the decision of the head of the assessment body.

Should the candidate fail to fulfil the outstanding PAT requirement, the marks for these components will be omitted and the final mark for Mechanical Technology will be adjusted for promotion purposes in terms of the completed tasks. If any tasks are still outstanding, the candidate runs the risk of not being resulted at the end of the year.

3. ADMINISTRATION OF THE PAT

The PAT (all phases) should be **completed in the first three terms**. The PAT must be completed under controlled conditions.

Educators must attach their own due dates for the different phases of the PAT (Refer: Mechanical Technology CAPS Gr10 – 12 Document.

In this manner, Learners can easily assess their progress. Instances where formal assessments take place, it is the responsibility of the Educator to administer the assessment.

Educators are requested to make copies of **Section B** and distribute to Learners at the beginning of the year. Learners should receive the assessment criteria of the PAT at the beginning of the year when the PAT is handed out and this must be mediated with the Learners.

STRUCTURE OF THE PAT

PROCESS OF THE PAT		**TOPIC**	**MARKS**
TERM 1	Phase 1 Task	Terminology / Manufacturing	**50**
	Phase 4 Task	*Teacher to Prepare (material and equipment)*	
TERM 2	Phase 2 Task	Terminology Welding Techniques	**50**
	Phase 4 Task	*Under construction*	
TERM 3	Phase 3 Task	Terminology / Manufacturing and Development	**50**
	Phase 4 Task	Terminology / Manufacturing and Development */ Complete Task*	**100**
		TOTAL MARKS	**250 Convert to 100**

Educators must attend to the following in their preparation:

The planning process;
The knowledge and skills to be achieved;
The safety and environmental aspects to be considered;
The applicable calculations, sketches and/ or diagrams;
The starting time and ending time – how long it took to complete from start to finish;
Bill of materials;
List of tools needed; and
Any other information that is relevant to the project.

4. Assessment and moderation of the Practical Assessment Task

To ensure national standardization the PAT for Grade 12 are externally set and moderated but internally assessed. The PAT for Grades 10 and 11 have to follow a similar standardization process but this is done provincially and thus are set by allocated people and moderated by the Subject Advisers for Mechanical Technology.

4.1 Assessment

Frequent developmental feedback by the Educator is needed to guide and give support to the Learner to ensure that the Learner is progressing as envisaged.

Both *formal and informal assessment* should be conducted on the different phases that constitute the PAT. Informal assessment can be conducted by the Learners themselves, by a peer group of Learners, or by the Educator. Formal assessment should always be conducted by the Educator and must be recorded on the working mark sheets distributed by the Subject Advisers, these also constitute the final mark sheet for the subject and must always be available in printed format in the Educators File. These mark sheets must be updated and printed after each formal assessment. Note that the School and District structures may require results to be transferred to other documents/ systems like SASAMS, in this instance ALL results must correspond on all systems. Any differences must be brought to the attention of the Subject Advisor so that the error can be rectified.

4.2 Moderation

During moderation of the PAT, the project/ skills tasks will be presented to the moderator with the assessment criteria and marks obtained on the **facets mark sheet** and the **combined Excel working** mark sheet.

Where required, the moderator should be able to call on the Learner to explain the function, principles of operation and also request the Learner to exhibit the skills acquired through the capability tasks for moderation purposes.

4.3 Time planning:

Phase 1: Complete at the end of first term – **March.**

Phase 2: Complete at the end of second term – **June.**

Phase 3: Complete during third term - End of **September.**

Phase 4: Plan and start task during the first term and complete at the end of **September.**

MARKING RUBRICS FOR MANUFACTURING

DRILLING AND TAPPING

NOTE:
Use the Rubric A below for assessment for all holes to be drilled.

RUBRIC A - DRILLING OF HOLES	
Assessment facet	**Mark**
Drilling of correct diameter of hole	1
Depth correctly drilled	1
Hole clean and without burrs	1
Hole perpendicular to workpiece	1
Hole drilled to correct position on workpiece	1
Sub-total:	**5**

NOTE:
Use the Rubric B below for assessment for all internal and external screw threads to be tapped.

RUBRIC B – TAPPING OF SCREW THREADS	
Assessment facet	**Mark**
Cut correct screw thread	1
Screw thread perpendicular to workpiece	1
Screw thread has no burs on outside	1
Depth/length to be tapped correctly	1
No defects (e.g., Cross thread)	1
Sub-total:	**5**

TOLERANCE RANGES

LENGTH AND DIAMETERS

NOTE:
On all the lengths and diameters candidates will lose 1 mark for every 0,1 mm deviation from the basic size. In the event of a candidate exceeding both length and diameter as per given rubric, then the candidate should be allocated 1 mark for process completed CORRECTLY.

Use rubric C for assessment on all lengths and diameters.

RUBRIC C - LENGTHS AND DIAMETERS	
DEVIATION	**MARK DEDUCTIONS**
0–0,1	-0
0,1–0,2	-1
0,2–0,3	-2
0,3–0,4	-3
0,4–0,5	-4
0,5 and more	-5

Safety (5)

1) Less 1 mark: Repetitive disregard for the use of PPE while working in the workshop.
2) Less 1 mark: Another negative mark for continuing to have a disregard for the use of PPE while working in the workshop.
3) Less 1 mark: Quality versus Time – “rush” job vs inefficient time to complete a good job
4) Less 1 mark: Not cleaning machine after work session.
5) Less 5 marks: Dangerous and fooling around in workshop, machines and equipment.

Finishing (5)

1) Less 1 mark for vice (jaw) damage - clamping marks for overtightening or loose slip.
2) Less 1 mark for lack of overall manufacturing competency in finishing / “look” of completed task related to surface finish and edges.
3) Less 1 mark for lack of overall manufacturing competency in squareness of project.
4) Less 1 mark for lack of overall manufacturing competency in centrality, etc.

5. PAT Planning

Educators must define and attach their own due dates for the different phases of the PAT in the following table, for the **successful completion of the PAT's** aligning with the overview dates above and those in the Mechanical Technology CAPS ATP Gr 10 – 12 Document.

Educators must prepare for the following, ensuring Learners complete applicable requirements:

- Bill of materials – effective pricing required for budgeting by the School Governing Body (SGB);
- List of tools needed;
- The planning process – effective use of available materials and limited equipment;
- The knowledge and skills to be achieved;
- The safety and environmental aspects to be considered;
- The applicable calculations, sketches and/ or diagrams in an accessible format for moderation;
- The starting time and end time – clearly indicated times within the prescribed framework;
- The time component of the PAT assessment must take the availability of a functional well-equipped workshop into consideration versus the number of Learners considering the real time it took individuals to complete from start to finish; and
- Any other information that is relevant/ may affect the task completion, positively or negatively.

With this guidance from the Educator, Learners can easily assess their progress. Instances where formal assessments take place, it is the responsibility of the Educator to administer the assessment.

Educators are requested to make copies of **Section B** and distribute to Learners at the beginning of the year. Learners should receive the assessment criteria of the PAT at the beginning of the year when the PAT is handed out and this must be *mediated with the Learners*.

6. Educator Support Material - Grade 10, Welding & Metalwork

The following points are *general in nature* as an **Educator resource**, with reference to any formal or informal assessments completed as practice and should be used as a guide to completing / assigning marks on a mark sheet. A quality finish is the focus and based on a predetermined level of accuracy as seen in *Tolerance Table in Annexure A*. Thus, adaptation is required for specific assessment aspects of the PAT's, this is indicated in the mark sheet.

7.1 General Assessment Criteria Applicable to all Phases

7.1.1. Quantity and cost calculations analyse a real-world problem, consider related technical drawings and solutions to determine the type of material and size or amount that will solve the problem. This is then translated into a cost calculation related to the division of full sheets or bulk units of material being divided by that required for the solution of the problem or need.

7.1.2. When completing a scientific calculation, the mark allocation varies according to the complexity of the calculation. At the Gr10 level marks may be allocated to correct substitution, reducing complex numbers and final

7.1.3. When an artefact is shaped or constructed, the design is relative to size and accuracy. Thus, a *Tolerance Table* can be applied to ensure a standard in the manufacturing process. Certain materials can be bent to shape if the material used is thin or cut into sections and joined if thicker. In either of the processes the final artefact must be bent or cut accurately to size, referring to the seven-unit scale in the Tolerance Table.

7.1.4. When assessing "roundness", (PAT 3 bending of the back curved section), for shape and smoothness (lack of impact dents). The assessor may use the 12 point circle division (as in EGD), as a guide to mark an effective circle or any segment of a circle with the final determination being on diameter and this is also in units up to seven.

7.1.5. Assess all joints, no matter the joining method – from temporary nut & bolt, soft soldering, hard soldering or riveted through to permanently welded joints - for effectiveness / quality / strength and alignment focusing on three positions: beginning, end and the look of the whole joint.

7.1.6. Assess angular joints for perpendicular squareness or accuracy as determined by its function. Apply the Tolerance Table to any deviation from any given angle in degrees.

7.1.7. Holes must be drilled to specification but that is a simple choice of selecting the correct drill bit. Thus, the focus of a hole is on alignment, roundness – not oval on the outside or "egg timer" shaped in the middle and a lack of burrs around the edges. Tapping thread in a drilled hole, cuts into the surface and masks the errors

indicated in the point above.

7.1.8. Correct use of tools and equipment for the completion of a task is always vitally important and at times a mark is allocated if a tool is unique or perhaps used for the first time. Yet effective usage is also seen in the quality of the finish. Thus, the mark is often allocated at that juncture and not for tool usage directly. The allocation of marks varies in terms of the need / desired result at the time. At Grade 10 level the use of the following tools should be clearly mastered: centre & prick punches, cutting chisels, pedestal & hand drill machines, engineer squares, scriber, steel rule, different hammers, tin snips, angle grinder, guillotines, rivet gun, soldering iron, oxy-acetylene equipment, welding magnets, clamps, appropriate PPE, etc.

7.1.9. When precision cutting is not a focus, Tolerance Tables do not apply. The assessment is on functionality – like a neatly finished, firm, straight hold (PAT 4, pipe cover & flat bar). Assessing “Overall Finish” is done so that most of the assigned marks are awarded **before painting that could hide certain defects**!

7.1.10. Thus, overall finish looks at the quality of workmanship in terms of smoothness, lack of vice marks, lack of burrs on drilled and cut edges, neatly merged joints without air gaps.
This assessment is completed before the grinding away of any splatter around a permanent join as well as before any attempt to improve the actual joint through grinding.
It is at the discretion of the Educator whether a Learner(s) will be allowed to redo a joint completely or repair a joint, noting that any Learner getting a second chance, must be compared to a Learner completing the joint correctly on the first attempt – with marks being **assigned in a fair and reliable manner**.

Safety and Finishing is the last assessment component that may apply:

7.1.11. A maximum of Five NEGATIVE marks allocated.
7.1.12. Less 1 mark for dirty and drawings that are not neat.
7.1.13. Less 1 mark for lack of overall drawing competency in finishing / “look” of completed task related to line work, squareness, centrality, labelling etc.
7.1.14. Less 1 mark: *Repetitive* disregard for the use of drawing equipment / facilities in the venue and the use of PPE while working in the workshop during oxy-acetylene start-up / shut down task.
7.1.15. Less 1 mark: *Another* negative mark for continuing to have a disregard for the use of drawing equipment / facilities in the venue and the use of PPE while working in the workshop during oxy-acetylene start-up / shut down task.
7.1.16. Less 1 mark: Quality versus Time – “rush” job vs inefficient time to complete a good job.

ALWAYS READ ALL THE INSTRUCTIONS FIRST THEN PLAN AND ONLY THEN PROCEED
FOLLOW ASSESSMENT INSTRUCTIONS AS INDICATED
THIS WILL ASSIST IN MAXIMUM MARK ATTAINMENT

General Resources Required for all PAT's:

- Appropriate PPE - Personal Protection Equipment (gloves, welding goggles, etc.).
- Hand Cleaner (different brands available).
- Technical Drawing equipment (compass, set squares, ruler, etc.).
- Appropriate range of metal hand files (single cut, double cut, flat, round, half round, etc.).
- Measuring equipment (vernier, dividers, callipers, steel rule, etc.).
- Marking medium (engineers blue, Koki pen, chalk etc.).
- Marking off instruments (square, combination square, scriber etc.).
- Hammers, Centre and Prick punches.
- Mechanical bender (or use appropriate manual bending methods).
- Cutting equipment (mechanical and mounted hand guillotines, tin snips, hacksaw, chisels, etc.).
- *Appropriately sized* Twist Drill bits (as per theoretical input to enable threads to be cut).
- Press / pedestal drilling machine - If using a hand drill machine, then use a large engineer's square against the drill machine or some similar jig, ensuring a perpendicular hole.
- Appropriate equipment for semi-permanent and permanent joining methods and procedures (oxy-acetylene bottles, gauges, pipes, torch, spanners / soldering iron, rivet gun, screwdrivers, spanners, steel brush, clamps, welding magnets etc.).
- Appropriate consumables for different joining methods and procedures (range of gas welding or braising rods, silver solder, lead solder, appropriate rivets, nuts, bolts, etc.).
- Appropriate oxy-acetylene gas leak detection liquid.

Grade 10 – Welding & Metalwork PAT for 2025

The Practical Assessment Task (PAT) consists of FOUR Phases, one per term over term 1 to 3, with the **Phase 4 Task** to be started in the **First Term** and **completed in the Third Term** – Thus spanning all three terms. Term 4 is reserved for the final theoretical content and revision.

PHASE ONE: TASK: Basic Hand skills

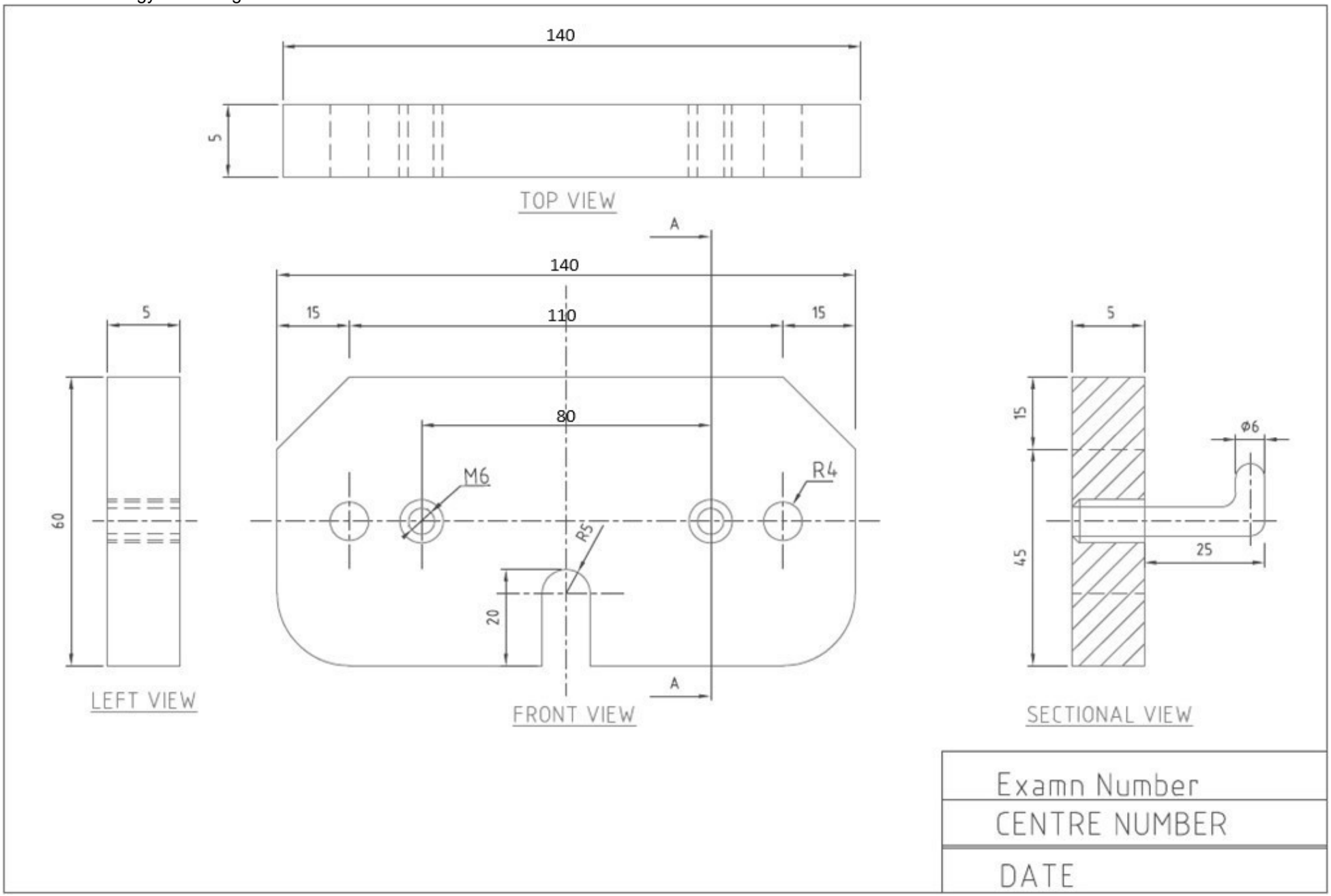
Resources Required:

- Mild steel flat bar 140 x 60 x 5 mm (the school may opt to use between 5-6 mm) (if flat plate is used, ensure that two sides are parallel to each other).
- Appropriate metal hand files.
- Vernier and other measuring equipment (callipers, steel rule etc).
- Marking medium (Engineers blue, Koki pen, chalk etc.)
- Marking off instruments (Square, combination square, scriber etc.)
- Centre punch.
- Hammer- ball pene /cross pene
- Hacksaw.
- Files, smooth- bastard flat- square- triangle- round and half round
- Stocks and dies
- *Appropriately sized* Twist Drill bits to enable M6
- Cut the radii with a hacksaw and then smoothen with hand file
- Press drilling machine.

Instructions:

1) Apply marking blue or any other medium onto the workpiece and mark out the dimensions according to the drawing
2) Use a steel rule to check / ensure that the material can be cut / filed to 140 mm in length i.e., if pre-cut pieces are used the starting length should be about 120 mm.
3) Use engineers square on either of the 140 mm ends of the material to plan a square line.
4) Use a scriber to scribe this straight square line about 5 mm from the rough edge.
5) Use the square and scriber on the opposite end of the material to scribe a straight, square line so that the material between the lines is 140 mm in length (ensure lines are parallel).
6) ***Request an informal assessment on the marked lines before proceeding.***
7) Cut with a hacksaw about 1-2 mm on the waste side of the above lines (Do NOT cut on the line).
8) ***Request a formal assessment on your ability to cut straight before proceeding.***
9) First use a rough-cut bastard file to file both ends, use the engineers square regularly to check for squareness.
10) ***Request a formal assessment on your ability to file all sides square and to size, before proceeding.***

11) Then using a smooth double cut file, complete the filing process.
12) Request formal assessment on ability to file square to tolerance.
13) Use the centre punch to mark the holes for drilling.
14) Request informal assessment on your ability to mark and punch this centre point, before proceeding (5).
15) Measure and mark a point 15 mm from each end on the 140 mm length.
16) Scribe a line across the width of the material at the 15 mm marks, parallel to the middle line scribed earlier.
17) Along one 15 mm line, measure and mark from both sides 15 mm inwards and centre punch these TWO marks in preparation for drilling.
18) Use this punch mark to scribe the two 15 mm radii on the two corners
19) Along the other 15 mm line, measure and mark from each side 15 mm inwards and centre punch these TWO marks in preparation for drilling.
20) Cut 1-2 mm away from the line using a hacksaw, then use a smooth finish to complete a neat curve.
21) Request <u>formal</u> assessment on your ability to mark and punch these centre points accurately and the grinding of the radii, before proceeding.
22) Use a press drill machine to drill two 4 mm holes. (Ensure the hole is perpendicular, using large engineers square if hand drill is used!)
23) Request an informal assessment / guidance on attempt and required skill to drill the other holes perpendicular to the surface, before proceeding.
24) Use a press drill machine to drill two holes on the centre punched holes positioned on the on the plate, suitable to cut a M6 thread. (Ensure holes are perpendicular, use large engineers square if hand drill is used!)
25) Hand task in for formal assessment on your ability to drill perpendicular holes.
26) Use the taps in the correct order to 2 x M6 thread. (Taper, tap, second tap and plug tap)
27) Cut a 40 mm x Ø6 mm round bar for the key hook.
28) Taper one end to ensure an easy start for cutting the external M6 thread.
29) Secure the rod in the vice and cut the threads for a length of 5 mm.
30) Secure the rod in the bench vice to form a hook (approximately 8-10 mm) The hook can be at 90° or greater than as an option.
31) Screw the hook onto the backing plate.
32) Hand the task in for formal assessment on your ability to cut square / perpendicular thread in different sized holes.
33) Clean any burs, roughness and dirt caused by the drilling, cutting and manufacturing process.
34) Hand the task in for **formal final assessment** on your **ability to clean your project.**



MARKING RUBRIC

GRADE: 10	YEAR: 2025	SCHOOL:	
DATE STARTED:		DATE COMPLETED:	
SUBJECT: Mechanical Technology – Welding & Metalwork		EDUCATOR:	
PROJECT: **TERM ONE - PHASE ONE**		NUMBER OF LEARNERS:	
PAGE ___ of ___		Tools: Hand skills Task	

	ASSESSMENT	FACETS	Measuring and marking	cutting with the hacksaw	Squareness of ALL sides	Filing of angles	Cutting the recess.	Filing the radii	Drilling of 4 x 10mm holes.	Thread cutting x 2(M6)	Finishing	SUB-TOTAL	
			10	**10**	**5**	**10**	**10**	**10**	**20**	**20**	**5**	**100**	**50**
1	Learner – Self-Assessment												
	Date of self-assessment:												
2	Teacher Assessment												
	Comment:												
3	Internal Moderation												
	Comment:												
4	Provincial Moderation												
	Comment:												
5	External Moderation												
	Comment:												

General Feedback:

SIGNATURE EDUCATOR	
SIGNATURE HEAD OF DEPARTMENT	
SIGNATURE SUBJECT ADVISOR	
SIGNATURE PRINCIPAL	

1. Term Two: Phase Two – Welding Techniques [50]

Time Frame: April – June 2025

This phase focusses on the skills development on welding and welding techniques. Welders need to practice enormous amount of time in order to enhance their welding skills and techniques. Therefor a lot of practice time need to be planned for this phase.

Learners need to practice welding on a constant basis in order to enhance their skills for Grade 12 and the industry thereafter.

Phase 2 will focus on practice of welding, tag welding and welding and weld-runs.

Material / equipment needed:

- PPE
- Measurement and marking equipment.
- Files
- Wire brushes
- Welding equipment and accessories (MIG or Arc)
- Angle grinder
- Angle grinder grinding disc
- Angle grinder flapper disc
- Scrap metal for weld practice. **(ONE piece MUST be submitted with 5 weld runs (30 – 50 mm in length) and 5 tag welds for assessment).**
- 4 of 50 x 5 x 110 flat bar for two welding assessments.

Weld Practice.

Learner needs to practice at least a **minimum of 5 hours BEFORE** attempting the weld assessment projects.

Scrap metal or identified excess material needs to be allocated to the learners. A final practice sheet off a minimum of at least 50 x 60 (if bigger or available excess material allocated) whereby 5 weld runs (30 – 50 mm in length) and 5 tag welds can be submitted for assessment.

FIGURE 1 & 2: Examples of weld practice piece

FIGURE 2: Tag weld practice piece

Examples of common welding defects:

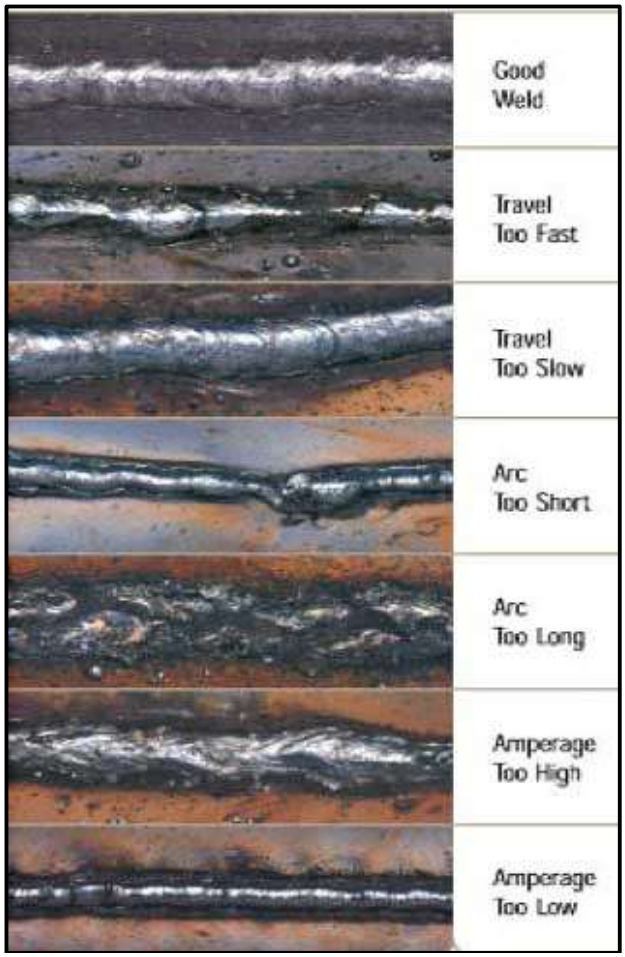


FIGURE 4: Weld defects

Weld Project 1: Butt Joints

You need to prepare TWO sets of plates (4 plates of 50 x 5 x 110). Mark your plates CLEARLY with your unique identification mark (for e.g., name or class number).

- Set 1 is for assessment of tag welding.
- Set 2 is for assessment for complete welding.

ASSESSMENT
Annexure A and Annexure B

NB!! Before any of these projects are being submitted for assessment, you need to start practice your welding skills. **You need at least 5 hours of practice** using scrap or excess material to practice your welding skills. Your practice material needs to be submitted to your educator for assessment.
Do not attempt your final project unless you are comfortable with your welding skills and techniques.

Figure 5: Practice welding

Figure 6: Butt joint

You prepare hot-rolled flat bar steel for welding by first grinding off the mill finish. This finish protects the steel from rusting while it is being transported from the mill to your workspace, but if it isn't removed, you will have a contaminated weld that could potentially break. You can use a flapper disc on an angle grinder to clean the material. **NB! Remember your safety equipment and rules!**

Figure 7: Flapper Disc

Figure 8: Flapper disc mounted on angle grinder

Preparation:

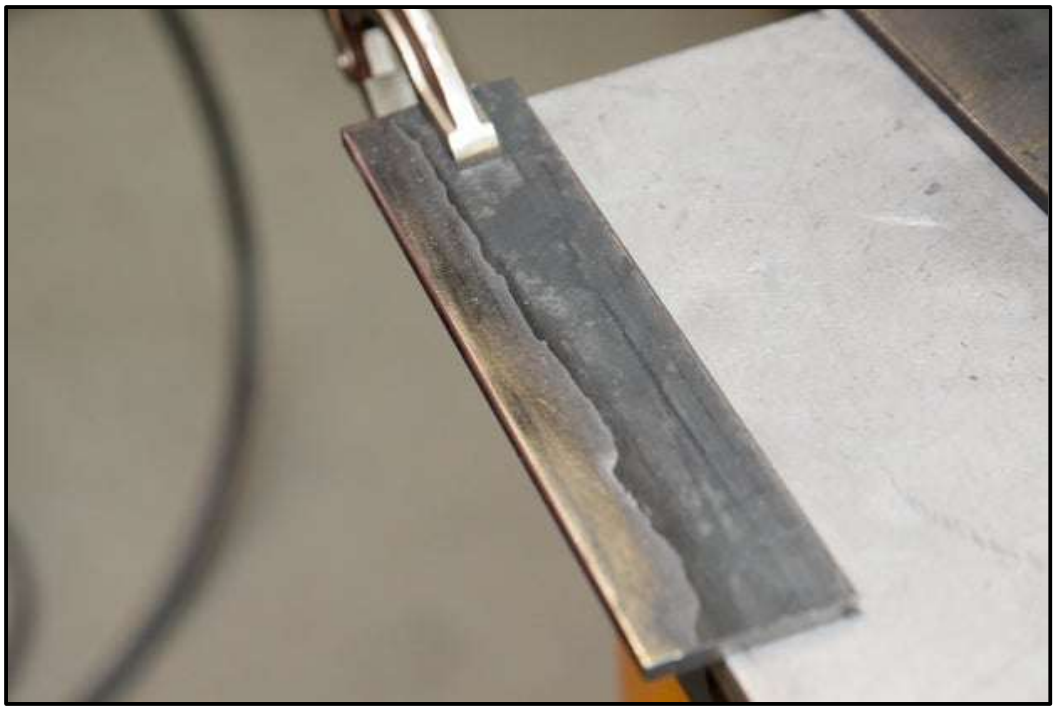


Figure 9: Start preparing material

Figure 10: Cleaning material of foreign material

Measure 2 mm on each side of the material and draw lines with a scriber to indicate where you have to create your bevels for welding.

Figure 11: Creating bevel

It is a good practice to use an angle grinder to bevel the edges of steel stock before it gets welded. By creating two bevels on the joining edges, you create a tiny little valley for the weld pool to form in. Doing this for butt welds is a good idea to ensure good penetration.

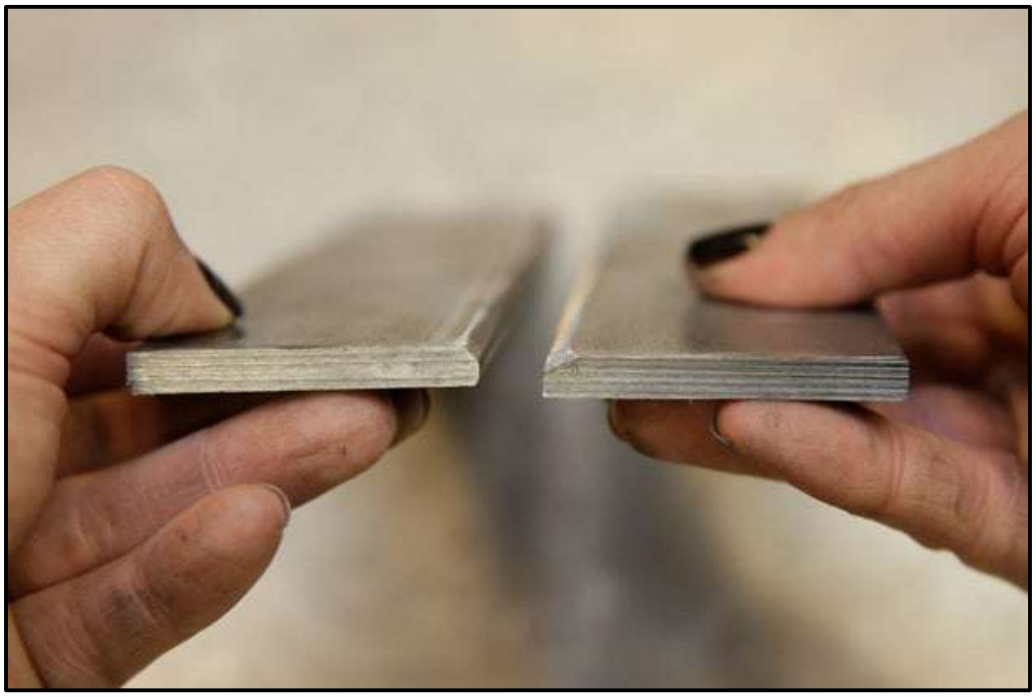


Figure 12: Completed bevels

Tag welding:

Weld set 1:

After you have prepared your two sets, you now need to tag weld set 1 and present it for assessment. There must be at least 10 tag welds on your set for assessment, spaced 10 mm apart.

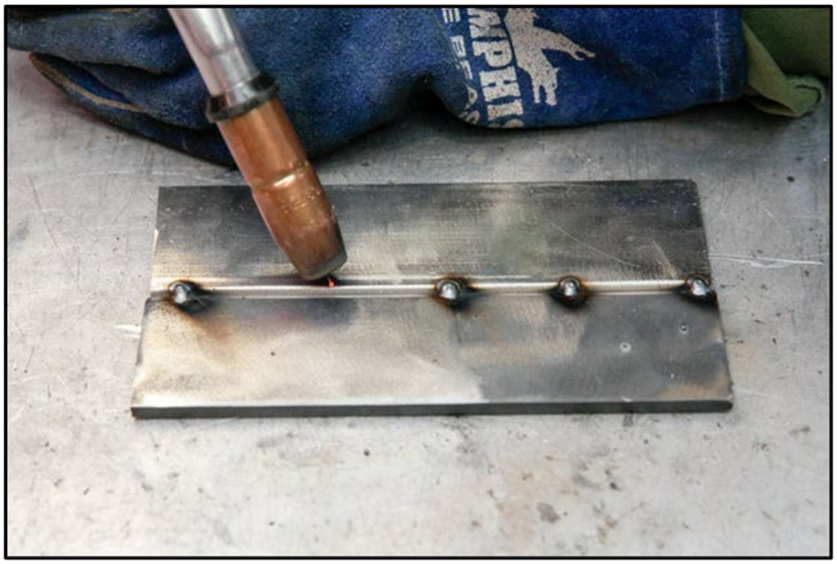


Figure 13: Tag welds

Complete your first tack weld. To do so, position your electrode sticking out of the gun or electrode (if you are using stick welding) between the crevasses of bevel valley you created with the angle grinder. Your wire / electrode should barely be touching your base material. When using MIG, squeeze the trigger for two seconds, and complete the tacking loop motion.

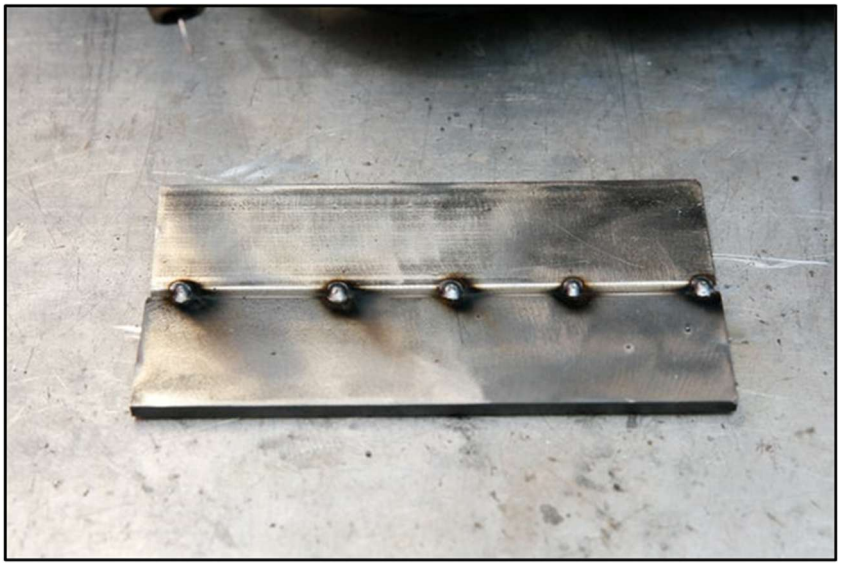


Figure 14: Completing tag welds

Complete your project with the tag welds. Repeat this action, alternating side to side so that the heat spreads evenly until you have tacks spaced 10 mm apart across the span that is being butt-welded together.

Complete weld runs:
Using your second set of plates, first tag welds your plates together by using 3 tag welds – on each end and in the middle.

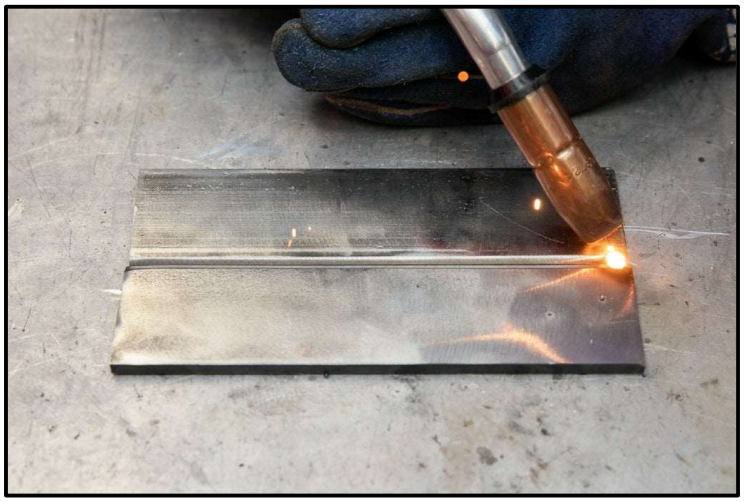


Figure 15: Tag weld

Start your welding runs. Run welded beads across your joint, start by connecting your tack on the outer edges than work your way towards the centre. It's ideal to weld from the bottom of the stock up to the top, pushing the weld forward with the tip of the gun, however that isn't always comfortable or a good way to start learning. In the beginning, it's perfectly fine to weld in whatever direction/position that is comfortable and that works for you.

Figure 16: Start weld runs

Complete your weld runs and present your project for assessment.

Figure 17. Completed weld runs

GRADE: 10	JAAR / YEAR: 2025	SKOOL / SCHOOL:	
DATUM BEGIN / DATE STARTED:		DATUM VOLTOOI / DATE COMPLETED:	
VAK / SUBJECT: Welding & Metalwork		ONDERWYSER / EDUCATOR:	
PROJEK / PROJECT: Term 2/ Phase 2		GETAL LEERLINGE / NUMBER OF LEARNERS:	
PAGE ___ of ___		**WELDING TECHNIQUES**.	

NAAM VAN LEERDERS / NAME OF LEARNERS		**FASETTE / FACETS**	Practice Tag weld piece	Practice Weld-run piece	Cleaning of work pieces (5 x 4)	Cutting of 4 pieces to size (7 x 4)	Measure 4 x bevels (7 x 4)	Grinding / filing of 4 x bevels (7 x 4)	Tag-weld x 10 (5 x 10)	Completed weld run (5 x 2)	Safety	**Sub-Total**	**TOTAL**
			5	**5**	**20**	**28**	**28**	**28**	**50**	**10**	**5**	**179**	**50**
1	Learner – Self-Assessment												
	Date of self-assessment:												
2	Teacher Assessment												
	Comment:												
3	Internal Moderation												
	Comment:												
4	Provincial Moderation												
	Comment:												
5	External Moderation												
	Comment:												

General Feedback:

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HANDTEKENING VAK FASILITEERDER / SIGNATURE SUBJECT ADVISOR	
HANDTEKENING HOOF / SIGNATURE HEADMASTER	

2. Term Three: Phase Three – Toolbox [50]

Time Frame: July – September 2025

FIGURE 1 – Example of a toolbox

Specifications:

Material / equipment needed:

- PPE
- Measurement and marking equipment.
- Files
- Drilling machine
- Bending equipment.
- Guillotine.
- Tin snips.
- Hammers and Mallets
- 5 mm drill bits
- 4,8 mm x 10 mm pop rivets
- Pop riveter
- Drawing equipment.
- Material to create toolbox development.
- Spot Welding machine (If available)
- Scriber, prick and centre punch.
- Engineer try square
- Steel rule /Tape measure

Instructions:

- Manufacture the handle of the toolbox using either 0,5 mm or 0,8 mm galvanized sheet metal.
- Select the correct material for the template, mark and cut accurately to size.
- Transfer the template the material.
- Cut off 100 x 460 mm using either a guillotine or tin nips.
- Mark out the bottom, hem and positions for holes and drill them.
- Cut off the sides and the hem to 400 mm.
- Bend the hem close to 180˚ and flatten them using a mallet.
- Bend the bottom and sides to 90˚
- Observe safety during all your practical sessions.

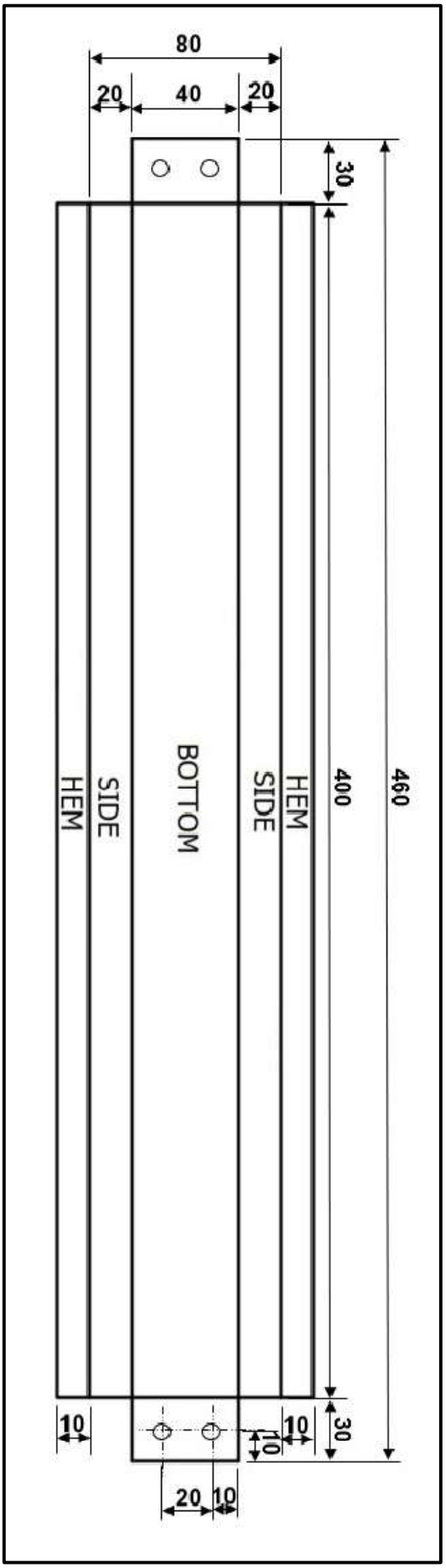

FIGURE 3: Toolbox handle

GRADE: 10	JAAR / YEAR: 2025	SKOOL / SCHOOL:	
DATUM BEGIN / DATE STARTED:		DATUM VOLTOOI / DATE COMPLETED:	
VAK / SUBJECT: Welding & Metalwork		ONDERWYSER / EDUCATOR:	
PROJEK / PROJECT: Term 3 / Phase 3		GETAL LEERLINGE / NUMBER OF LEARNERS:	
PAGE ___ of ___		TEMPLATE & TOOLBOX HANDLE.	

NAAM VAN LEERDERS / NAME OF LEARNERS	FASETTE / FACETS	TEMPLATE			HANDLE							SUB-TOTAL	TOTAL
		Appropriate material used	Neatness of template / Cutting out	Accuracy of template	Cutting out of material	Drill 4 x 5 mm holes	Length of total handle = 460 mm	Length of handle = 400 mm	Hem Bending and flatten x 2	Bending 90° x 4	Safety		
		5	5	5	5	20	5	5	10	20	5	85	50
1	Learner – Self-Assessment												
	Date of self-assessment:												
2	Teacher Assessment												
	Comment:												
3	Internal Moderation												
	Comment:												
4	Provincial Moderation												
	Comment:												
5	External Moderation												
	Comment:												

General Feedback:

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3. Term One - Three: Phase Four – Toolbox Development, Construction and Assembly of toolbox [100]

Time Frame: January – September 2025

This project should have started in January in order to prepare for the final phase completion.

Material / equipment needed:

- Galvanised sheet metal 420 x 330 x 0,5 (0,8)
- PPE
- Measurement and marking equipment.
- Files
- Drilling machine.
- Guillotine.
- Tin snips.
- Bending equipment.
- Hammers/mallets
- 5 mm drill bits
- 4,8 mm x 10 mm pop rivets
- Pop riveter
- 5 mm drill bits

FIGURE 1 shows an example of the completed project.

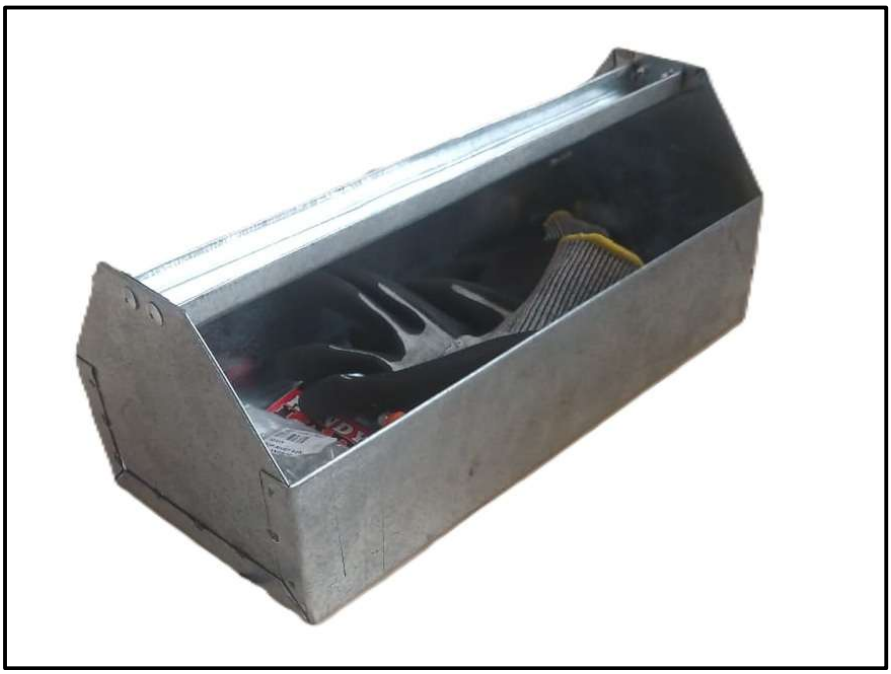

FIGURE 1

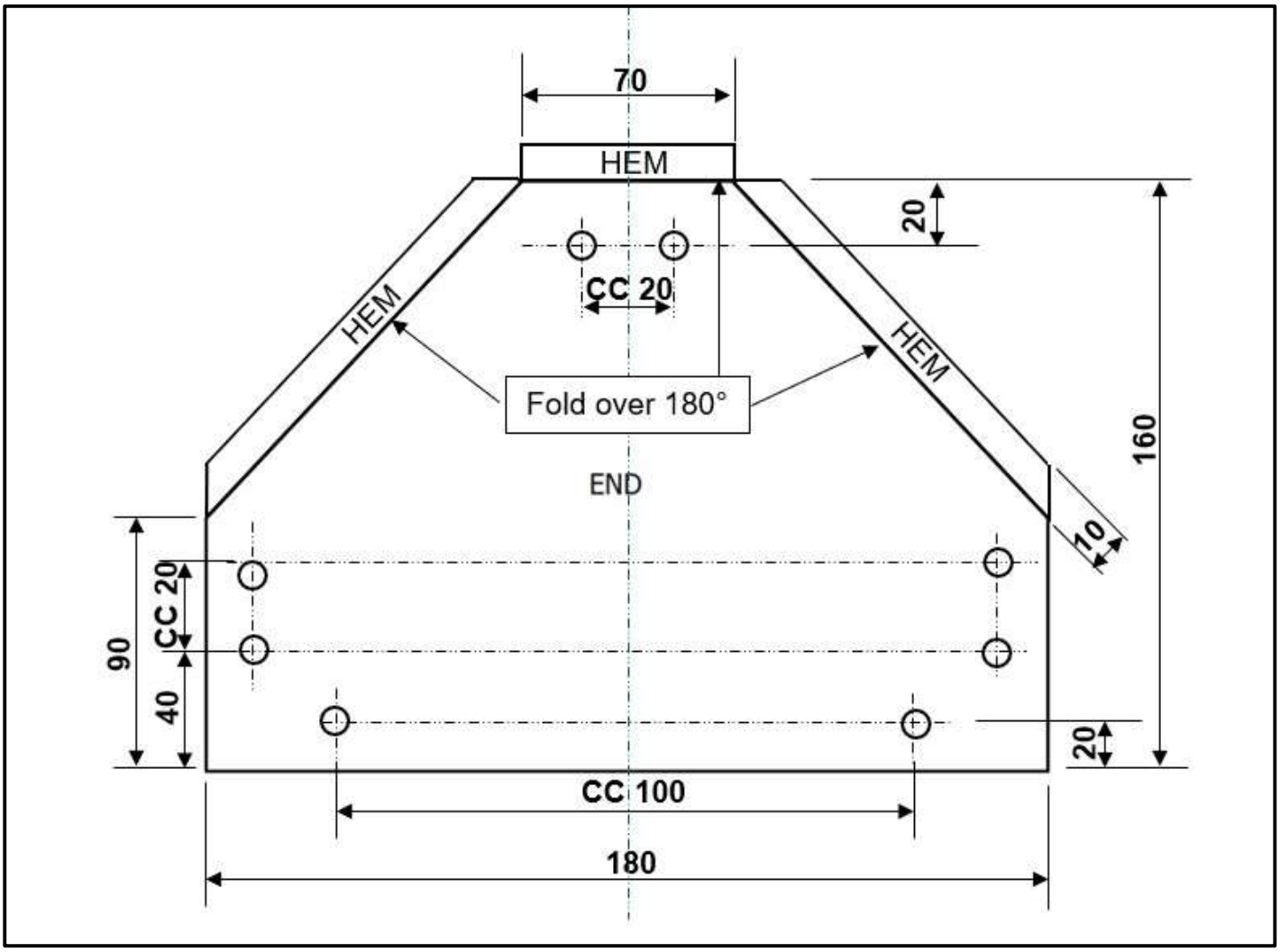

FIGURE 2 – Toolbox sides

Instructions for sides:

- Manufacture the template accurately and transfer to the material.
- Cut off 180 x 170 mm by 2 sides
- Measure and mark the hem including position of holes.
- Mark the position of holes using a centre punch and ball pein hammer.
- Drill holes to correct size.
- Cut the hem to correct size, fold and flatten them.
- Observe safety during all your practical sessions.

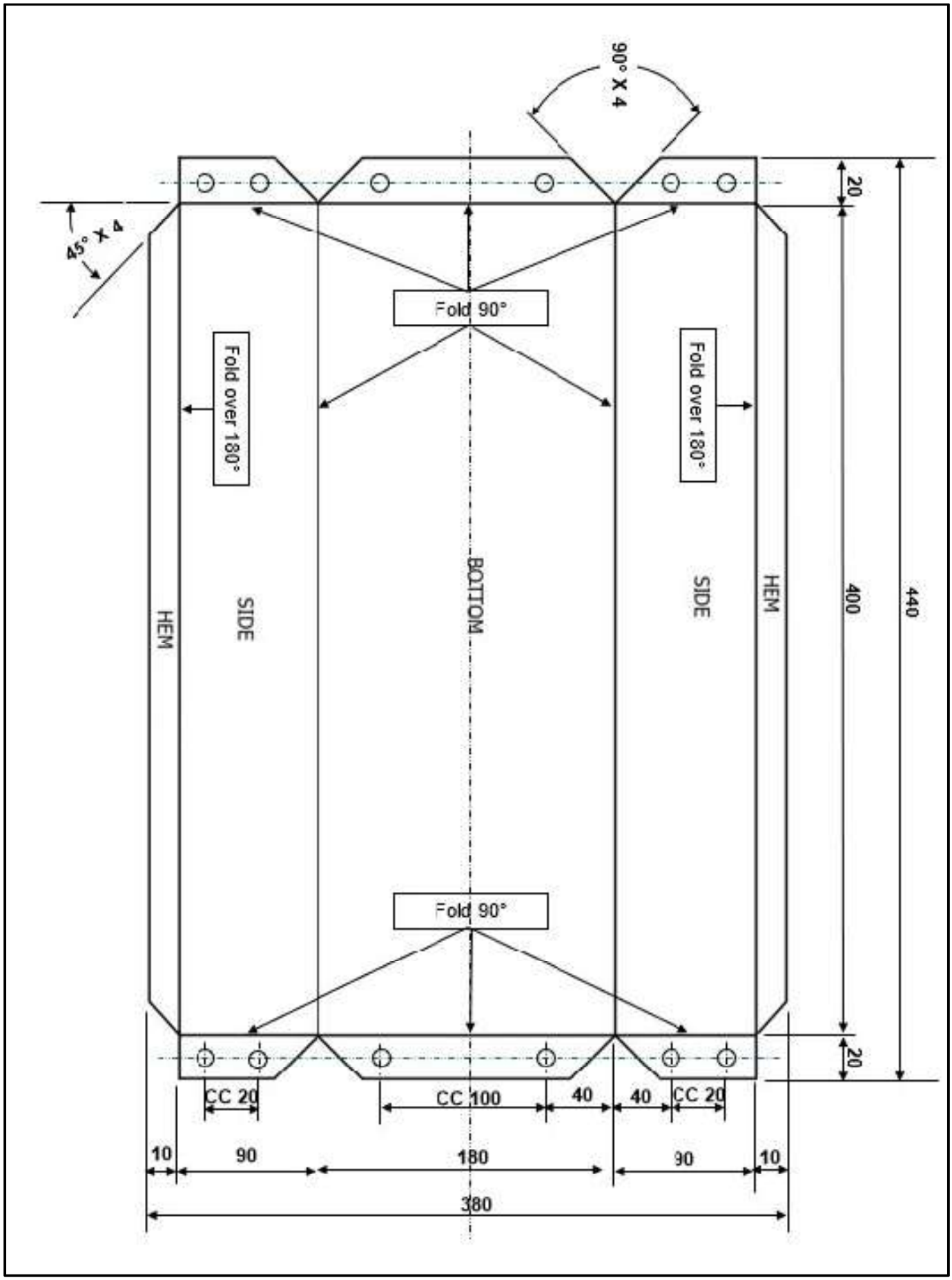

FIGURE 3 – Toolbox shell

Instructions for Template, manufacturing and assembly:

- Manufacture the template accurately and transfer to the material.
- Cut off 380 x 440 mm galvanized sheet metal.
- Measure and mark the bottom, sides and hem including position of holes.
- Cut the hem to the required size, fold and flatten down using a mallet.
- Fold the sides to 90˚ accurately.
- Align and rivet or spot weld the bottom.
- Align and rivet or spot weld the uprights
- Align and rivet the handle in position (handle can **only** be **riveted**)
- Observe safety during all your practical sessions.

GRADE: 10	JAAR / YEAR: 2025	SKOOL / SCHOOL:	
DATUM BEGIN / DATE STARTED:		DATUM VOLTOOI / DATE COMPLETED:	
VAK / SUBJECT: Welding & Metalwork		ONDERWYSER / EDUCATOR:	
PROJEK / PROJECT: TERM 1 -3 / PHASE 4		GETAL LEERLINGE / NUMBER OF LEARNERS:	
PAGE ___ of ___		TERMINOLOGY: TOOLBOX DEVELOPMENT AND CONSTRUCTION	

	NAAM VAN LEERDERS / NAME OF LEARNERS	FASETTE / FACETS	Transfer of template to material	Cutting out of material (Shell and 2 x sides)	Marking and Drilling of holes (5 marks per item)	2 x Sides – Folding of HEM	Shell - Folding of HEM sides	Folding shell 90° (4 x sides)	2 x Sides: Rivet bottom (Optional: Spot Weld)	2 x Sides: Rivet uprights (Optional: Spot Weld)	Rivet handle in place.	Alignment of sides correct (90°	Alignment of handle correct (In line)	Folding of HEM – No hammer marks per item	Safety	Fit for Purpose	SUB-TOTAL	TOTAL
			5	**15**	**15**	**30**	**10**	**20**	**20**	**20**	**10**	**10**	**5**	**15**	**5**	**5**	**185**	**100**
1	Learner – Self-Assessment																	
	Date of self-assessment:																	
2	Teacher Assessment																	
	Comment:																	
3	Internal Moderation																	
	Comment:																	
4	Provincial Moderation																	
	Comment:																	
5	External Moderation																	
	Comment:																	

General Feedback:

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HANDTEKENING VAK FASILITEERDER / SIGNATURE SUBJECT ADVISOR	
HANDTEKENING HOOF / SIGNATURE HEADMASTER	

Please turn over

ANNEXURE A

The focus when completing practical work is on accuracy and quality. For personal accomplishment, pride and to achieve maximum marks, Learners must process their work according to the following limits or tolerances.

TOLERANCE	Marks	CUT & MANUFACTURE Diameter	CUT & MANUFACTURE Length	FILING Measure 4 places	ANGLES in DEGREES Measure 2 places	*Percentage Equivalent to Seven Mark Scale*
		+ 1.0	+ 1.0	+ 1.0	+ 1.5	
		- 1.0	- 1.0	- 1.0	- 1.5	
DEVIATION	7	0.00 - 0.10	0.00 - 0.10	0.00 - 0.10	0.00 - 0.20	100 %
	6	0.11 - 0.20	0.11 - 0.20	0.11 - 0.20	0.21 - 0.40	86 %
	5	0.21 - 0.30	0.21 - 0.30	0.21 - 0.30	0.41 - 0.60	71 %
	4	0.31 - 0.40%	0.31 - 0.40%	0.31 - 0.40%	0.61 - 0.80	57 %
	3	0.41 - 0.60	0.41 - 0.60	0.41 - 0.60	0.81 - 1.00	43 %
	2	0.61 - 0.80	0.61 - 0.80	0.61 - 0.80	1.01 - 1.25	29 %
	1	0.81 - 1.00	0.81 - 1.00	0.81 - 1.00	1.26 - 1.50	14 %

When submitted tasks are outside limits the following may be applied, noting that the allocation of one mark for an out of limit submission is at the discretion of the Educator but there must be justifiable evidence for this assessment.

DEVIATION					
	1	1.00 - 1.50 = 10%	1.00 - 1.50 = 10%	1.00 - 1.50 = 10%	1.50 - 1.75 = 10%
	0	Greater than 1.50 = 0%	Greater than 1.50 = 0%	Greater than 1.50 = 0%	Greater than 1.75 = 0%
	0	Non-submission.	Non-submission.	Non-submission.	Non-submission.

ANNEXURE B
RUBRIC: RUBRIC FOR CUTTING, WELDING AND PRESENTATION

CATEGORY	Excellent (5)	Good (4)	Average (3)	Poor (2)	Incomplete (1)
TEMPLATE TRANSFER AND CUTTING OF MATERIAL	Transfer excellent – accurate cutting from template. Moderate transfer and cutting out of material. Dimensions ±0,5 mm out	Good transfer and cutting out of material. Dimensions ±1 mm out	Moderate transfer and cutting out of material. Dimensions ±2 mm out	Poorly to moderate transfer quality and cutting out of material. Dimensions ±3 mm out.	No template or poorly transfer quality and bad cutting of material. Dimensions ±3 mm out.
PREPARATION OF PARTS / PIECES	All parts prepared according to specifications. Excellent filing / grinding.	Nearly all parts prepared with neat filing / grinding done	Most parts prepared and some accuracy in filing / grinding done.	Some parts partially prepared. Poor filing / grinding done.	No or poorly preparation.
WELDING QUALITY	No welding defects visible. Beading neat and complete fusion of metals achieved. All slag is removed.	Neat welding done. Good beading with some minor defects visible. Good fusion achieved. All slag is removed.	Some beading visible. Presence of some welding defects. Not complete fusion achieved. All slag is partially removed.	Poor welding done. Lot of welding defects visible. Poor or no fusion achieved. Some burning through metal occurred.	Bad welding. Lot of welding defects with no fusion and holes burned through.
FINISHING AND PRESENTATION	Weld areas are cleanly finished, ground and painted. Project excellent presented. Excellent functionality obtained.	Nearly all welded areas are cleanly finished, ground and painted. Project well presented. Will function well.	Most welded areas are cleanly finished, ground and painted. Average presentation. Project will function.	Some welded areas are cleanly finished, ground and painted. Poor presentation with limited functionality.	No welded areas cleanly finished, ground and painted. No complete assembly. Bad presentation with no functionality.

ANNEXURE C

GRADE 10

ALL PRACTICAL ASSESSMENT TASKS

and

FORMAL PHASES: ONE, TWO, THREE and FOUR

DECLARATION of AUTHENTICITY and UNDERSTANDING of WORKSHOP SAFETY

NAME of the SCHOOL: _____

NAME of LEARNER: _____

(FULL FIRST NAME and SURNAME)

I hereby declare:

- That the section covered by the Educator on **Safety in the Workshop**, is **Understood** and that I will Implement the Regulations when in the Workshop as well as when using Relevant Equipment and Machinery, to complete any PAT's assigned to me.
- That the PAT Phases I will submit for Assessment is my **OWN, ORIGINAL WORK** and has not been previously submitted for moderation.

_____ _____

SIGNATURE of CANDIDATE **DATE**

INITIAL and NAME of TEACHER: _____

I Confirm the Candidates Work Submitted has been Completed Under my Supervision, therefore the above Declaration by the Candidate is True and I Accept that the Work Offered for Assessment is the Candidates Own Work.

_____ _____

SIGNATURE of TEACHER **DATE**

SCHOOL STAMP