# Skills assessment: Drilling a pin/Drill sharpening

# Trainer & Assessor Marking Guide

**Event 3 of 3**

## Criteria

### Unit code, name and release number

MEM07032 - Use workshop machines for basic operations (1)

### Qualification/Course code, name and release number

MEM10119 – Certificate 1 in Engineering (1)

Version: *1.0*

Date created: *19 July 2018*

Date modified: *24/02/2020*

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*IMRS SkillsPoint*

*Block B Level 1*

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RTO Provider Number 90003 | CRICOS Provider Code: 00591E

This assessment can be found in the: [Learning Bank](https://share.tafensw.edu.au/share/access/searching.do?doc=%3Cxml%2F%3E&in=P7ac4831b-430a-4b8d-8b56-f7b32ed5b9cf&q=&type=standard&sort=rank&dr=AFTER)

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## Assessment instructions

Table 1 Assessment instructions

| Assessment details | Instructions |
| --- | --- |
| **Instructions for the trainer and assessor** | This is a skill based assessment and will be assessing the student on their ability to demonstrate skills required in the unit.  This assessment is in 2 parts:   1. Practical 2. Observation Checklist   Pre Assessment  The student must have successfully completed the knowledge assessment for MEM07032 prior to attempting the practical skills assessment tasks.  Assessor is to ensure the workshop is set up with all the necessary hand tools and measurement equipment and material available for the completion of the tasks in the skills assessment.  The assessor is to provide the student with the appropriate TAKE 5 risk assessment template. The student is to complete the TAKE 5 prior to commencing the task. This requirement is not an assessable task within this assessment.  Practical Task  The purpose of this task is to interpret a drawing of a Stepped/Headed pin and complete the manufacture of the pin by setting up the job in a radial arm drill and drilling a hole to accommodate a roll pin or similar. The hole will be as per the dimensions on the drawing. Assessor will demonstrate how to sharpen a HSS twist drill prior to commencing the task. Students will then sharpen a HSS twist drill to complete the task. |
|  | Model answers, sample responses or a criteria for each task or activity is provided below.  Use these to support your judgement when determining a satisfactory result.  The student’s response to each question must contain the information indicated in this marking guide in order for their response to be correct. However, if a student provides information other than indicated below, and in the professional opinion of the assessor it is appropriate and meets the intent of the question, it may be considered correct.  Complete the Observation Checklist for each task and activity and the Assessment Feedback to the student. Ensure you have taken a copy of the assessment prior to it being returned to the student.  The Assessment Feedback page must be signed by both the student and the assessor so the student displays that they have received, understood and accepted the feedback.  Ensure the students name appears on the bottom of each page of the submitted assessment. |
| **About this marking guide** | The student’s response to each task or activity must contain the criteria indicated in this marking guide in order for their response to be correct.  All tasks and activities must be completed correctly in order to satisfactorily complete this assessment event.  Assessors will need to make a judgement call as to whether each response meets the criteria based upon the:   * Rules of Evidence:   + Validity – does the answer address the skill required and does the evidence reflect the four dimensions of competency?   + Sufficiency – is the task or activity sufficient in terms of length and depth?   + Currency – has the work been done so recently as to be current?   + Authenticity – is this work the student’s own authentic work? * Principles of Assessment   + Fairness – individual student’s needs are considered in the assessment process   + Flexibility – assessment is flexible to the individual student   + Validity – any assessment decision is justified, based on the evidence of performance of the student   + Reliability – evidence presented for assessment is consistently interpreted and assessment results are comparable irrespective of the assessor conducting the assessment * Dimensions of competency   + Task skills   + Task Management Skills   + Contingency Planning Skills   + Job Role Environment Skills |
| **Student must provide** | Calculator, pen, Headed pin from Event 2 of 3 |
| **Assessor must provide** | All tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications   * Radial Arm Drill * HSS Twist Drill for sharpening * Drills to suit Task * Marking out kit * Tool Gauge (Drill Sharpening)   Assessment documents, Data sheets, reference text, organisational policy etc. that is referenced in the assessment. These may be hard copy or made available online. |
| **Due date and time allowed** | Time allowed 2 hours |

Simulated Environment Conditions

***Note: The assessor may direct the student to use different equipment in different spaces to ensure competency is applied in new and different situations.***

The assessment is to be carried out in the workshop complying with all WHS requirements and compliance with Standard Operating Procedures.

The assessment should take approximately 2 Hours.

## Part 1: Practical

To complete this part of the assessment, the student is required to participate in a practical demonstration of how to complete a task or activity.

These practicals will be observed by you, or the student can digitally record them and submit them as evidence.

The student’s responses will be used as part of the overall evidence requirements of the unit.

You should refer to the list of criteria provided in the Observation Checklist to understand what skills the student is required to demonstrate in this section of the assessment. This Checklist outlines the Performance Criteria, Performance Evidence and Assessment Conditions you will be marking the student on.

Once completed the student is required to submit this assessment and the tasks and activities required to be completed to you for marking.

**Contingency Management:**

While undertaking this task a number of unforeseen circumstances may arise. The assessor will have the opportunity to question each learner to gather an understanding of how the student will respond to these events. Below is a table with examples of possible questions and acceptable responses.

The assessor has the opportunity in the Observation Checklist to record additional relevant questions and responses in the table ***“Part 2 Table 3 Additional Questions”***

Table 1 Unforeseen Circumstances

|  |  |  |
| --- | --- | --- |
| Scenario | Assessors question | Acceptable students response |
| Power failure in workshop | What is the correct action in the case of power failure? | *Determine the cause of the failure and rectify if possible. If not call in the appropriately qualified to rectify the problem* |
| Emergency evacuation | What do you do if an emergency evacuation drill happens during the assessment? | *Turn of any equipment and make the workplace safe. Exit in an orderly manner to the nearest Emergency Assembly Area*  *Do not leave TAFE site.* |
| Measurement tool defective | What do you do if you find a measurement tool defective | *Try to repair tool, if not tag it out of service*  *Arrange for replacement tool* |

**Task 1: Sharpen HSS Drill**

In this task, the student is to attend a demonstration on sharpening a HSS Drill and sharpen a drill to complete the task. Student is to complete the table on following the SOP for the grinder. The student is to follow the steps in the sharpening process and use a tool gauge as a guide. The student will then use a drill or drills to drill a hole in a pin which will be Task 2.

**Step 1:**

Refer to the SOP document for the equipment being used. Complete both tables A and B with the relevant information

**Table A and B: Follow SOP**

Refer to the SOP for the equipment to be used and complete the following tables

Table A: Equipment information

|  |  |  |
| --- | --- | --- |
| Item/Description | Manufacturer | Location  Eg. (TAFE Campus: Mechanical Workshop #) |
| *Example response*  *Pedestal Grinder* | *Example response*  *Hafco* | *Example response*  *E.g. Ultimo TAFE : Mechanical Workshop* |

Table B: Follow SOP

|  |  |
| --- | --- |
| PPE Requirements  (list the PPE requirements) | *Benchmark responses may include, but limited to:*  *Cotton drill clothing, Safety glasses, Safety boots* |
| **Procedure prior**  (list a minimum of two (2) main points) | *Student response must include:*  *Check condition machine prior to use for damage*   * *Grinding wheel condition – chips and grooves in wheel to be dressed. If wheel is cracked remove and replace wheel* * *Correct gap obtained between tool rest and grinding wheel*   *Check operation of E stop*  *Eye shields must be in place* |
| **Procedure during**  (list a minimum of two (2) main points) | *Benchmark responses may include, but limited to:*  *Machine was operated safely – Be aware of sharp points and edges*  *Be aware of hot metal/tools and sparks* |
| **Procedure after**  (list a minimum of two (2) main points) | *Student response must include:*  *Check grinding wheels for damage after use*   * *Damaged components tagged and placed out of service*   *Student kept work area clean and clear of grinding dust*   * *Swept area clear of grinding dust*   *Dust placed in appropriate waste bins* |

**Step 2:**

The student is to attend a teacher demonstration on how to safely operate a bench/pedestal grinder and to sharpen HSS twist drill on the bench/pedestal grinder

**Step 3:**

Follow the steps provided in the SOP

Prior to use of the grinder

* Check condition machine prior to use for damage. Tag out damaged equipment and place out of service*.*
* Check grinding wheel condition – chips and grooves on the grinding wheel are to be dressed. If wheel is cracked remove and replace wheel. Tag cracked wheel for disposal.
* Correct gap to be obtained between tool rest and grinding wheel (approximately 2mm)

**Step 4:**

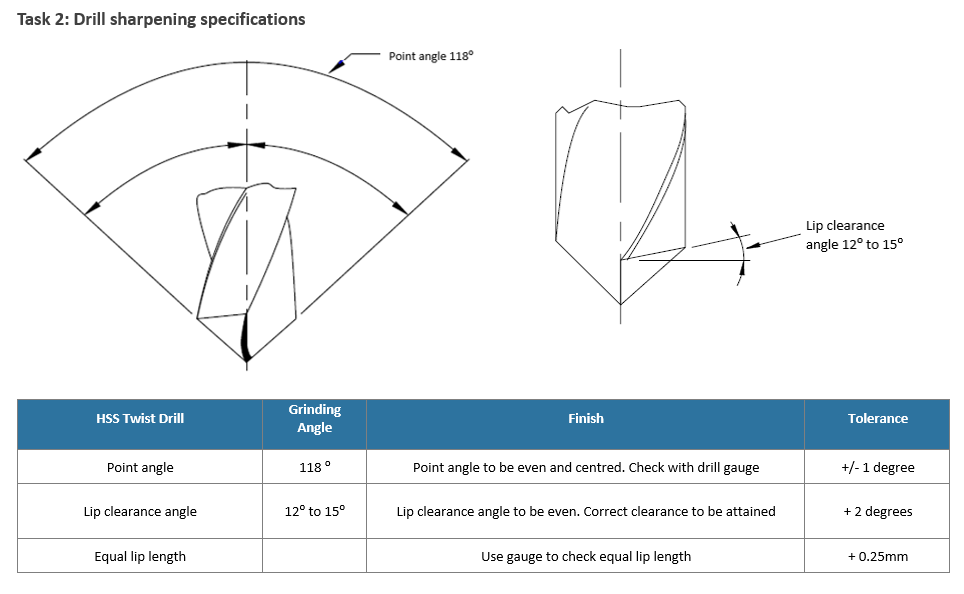
Sharpen a HSS twist drill for drilling mild steel

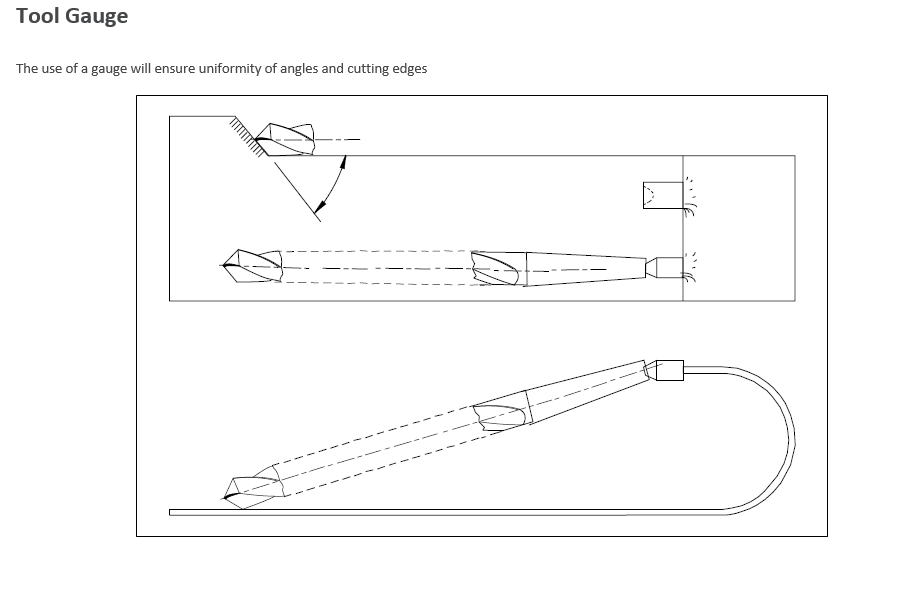
* A tool gauge is to be used to measure correct point angle and equal lip length
* Cutting edges on the lathe tool must be sharp without signs of overheating

**Step 5:**

After use of the grinder

* Present the sharpened drill to the assessor for marking.
* Check grinding wheels for damage after use. Damaged components are to be tagged and placed out of service
* Clean and clear machine and immediate area of grinding dust
* Dust to be placed in appropriate waste bins





**Task 2: Drill pin**

## In this task, the student is to use a radial arm drill to to complete the manufacture of a pin. The pin is have a hole drilled as per the specifications of Drawing number IMRS-0008. Student is to complete the table on following the SOP for operation of the radial arm drill. The student is is to follow the work instructions for the radial arm drill operation.

**Step 1:**

Refer to the SOP document for the equipment being used. Complete both tables A and B with the relevant information

**Table A and B: Follow SOP**

Refer to the SOP for the equipment to be used and complete the following tables

Table A: Equipment information

|  |  |  |
| --- | --- | --- |
| Item/Description | Manufacturer | Location  Eg. (TAFE Campus: Mechanical Workshop #) |
| *Example response*  *Radial Arm Drill* | *Example response*  *Hafco* | *Example response*  *E.g. Ultimo TAFE : Machine shop* |

Table B: Follow SOP

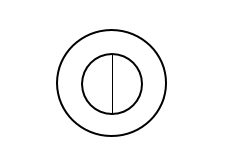
|  |  |
| --- | --- |
| PPE Requirements  (list the PPE requirements) | *Benchmark responses may include, but limited to:*  *Cotton drill clothing, Safety glasses, Safety boots* |
| **Procedure prior**  (list a minimum of two (2) main points) | *Student response must include:*  *Check condition of machine prior to use for damage*   * *‘E’ stops functioning* * *Correct operation of locking mechanisms* * *Vice is securely anchored to table*   *Damaged machine is tagged and placed out of service.* |
| **Procedure during**  (list a minimum of two (2) main points) | *Benchmark responses may include, but limited to:*  *Correct speeds and feeds*  *Control of swarf/Be aware of hot metal*  *Job is tight in vice* |
| **Procedure after**  (list a minimum of two (2) main points) | *Student response must include:*  *Shut down machine*  *Do not leave chuck key in chuck*  *Check radial arm drill for damage after use*   * *Damaged equipment tagged and placed out of service*   *Clean radial arm drill and immediate work area*   * *Swept area clear of swarf* * *Swarf placed in appropriate waste bins* |

**Step 2:**

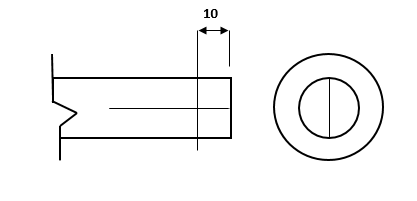
Follow work instructions and steps provided in the SOP

**Work Instructions:**

1. Identify specifications from Drawing Number IMRS-0008
2. Apply marking blue to the end of the pin to be drilled
3. Using a centre square and scriber find the centre on the end of the pin
4. Transpose the centre point to the outer edge of the Ø20mm by scribing a centre line



1. Square a line back along the axis of the pin
2. Mark out the 10mm dimension and centre punch point



1. Check the pin to ensure dimensions meet the specifications of the drawing and make adjustments as required

**Step 3:**

1. Make any adjustments to the radial arm drill before starting
2. Mount job into vice

* Job is to be square to the vice (centre punched mark to be top and centre)
* Job is to be level in the vice

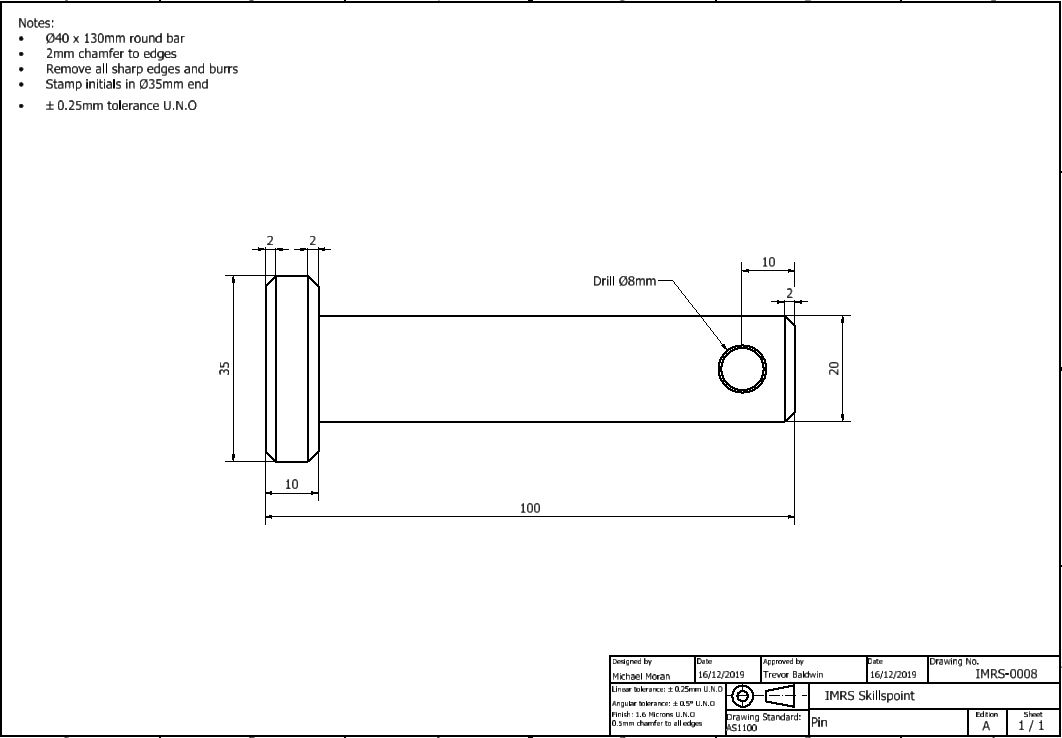
1. Tighten the vice

**Step 4:**

1. Set up the radial arm drill with a Jacobs chuck and a centre drill
2. Set Speed = = 3000 RPM
3. Position drill over centre punch mark
4. Lock Lift/lower, column and cross travel clamps
5. Check position of drill and adjust if required
6. Centre drill pin

**Step 5:**

1. Turn power off and isolate machine
2. Remove centre drill and replace with 10mm HSS twist drill
3. Set Speed = = 900 RPM
4. Make any adjustments to the radial arm drill before starting
5. Drill 10mm hole
6. Deburr hole
7. Use the observation checklist to confirm the tasks have been completed
8. Ensure all tools are cleaned, packed away, and returned to store at the completion of the tasks.
9. Ensure machine is are cleaned and lubricated after use.



## Part 2: Observation Checklist

The Observation Checklist will be used by you to mark the students’ performance in any of the previous three event types. Use this Checklist to understand what skills the student is required to demonstrate in this section of the assessment. This Checklist outlines the Performance Criteria, Performance Evidence and Assessment Conditions you will be marking the student on. All the criteria must be met. The student’s demonstration will be used as part of the overall evidence requirements of the unit. You may ask questions while the demonstration is taking place or if appropriate directly after the task/activity has been completed.

Table 1 Observation Checklist

| Item# | Task 1: Sharpen HSS Twist Drill | S | U/S | Assessor Comments (Describe the student’s ability in demonstrating the required skills and knowledge) |
| --- | --- | --- | --- | --- |
| 1 | Attend a demonstration on sharpening a HSS twist drill |  |  | (PE1,PE2) (PC1.1,1.2.1.3) Student attends demonstration and follows verbal instructions  *(a list of verbal questions and responses can be noted in Table 3 additional questions following the observation checklist)*  *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 2 | Follow Standard Operating Procedure (SOP) for the use of a pedestal or bench grinder, use correct PPE and follow safe work practices |  |  | (PE1) (PC1.1,1.2.1.3, PC2.4) Student referred to and followed SOP for the use of pedestal/bench grinder  Student completed Equipment information and Follow SOP tables  *Correct PPE worn when using pedestal/bench grinder*   * *Safety glasses* * *Cotton drill shirt and trousers* * *Safety boots*   *Student checked condition of machine prior to use for damage*   * *Student checked for the correct gap between tool rest and grinding wheel and adjustments made if required* * *Student checked eye shields were in place*   *Student took appropriate action for damaged machine, tagged and placed out of service*  Follow safe practices   * *Check all safety guards are in position* * *Never leave machine while running* * *Do not stand behind the machine* * *Do not use gloves, pliers etc to hold work piece* * *Do not grind on the side of wheel* * *Slowly move the work piece across the face of the wheel*   Housekeeping   * *Switch of with E stop when complete* * Clean work area of abrasive dust * Coolant spills on the floor absorbed up * *Damaged equipment tagged and placed out of service*   *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 2.1 Complete Equipment information and Follow SOP tables |  |  |
| 2.2 Wear correct PPE suitable for task |  |  |
| 2.3 Carry out before use checks   * check for the correct gap between tool rest and grinding wheel and adjust if required (2mm) * check eye shields are in place and not damaged * Damaged equipment tagged and placed out of service |  |  |
| 2.4 Follow safe practices and housekeeping   * Follow steps provided in the SOP |  |  |
| 3 | Sharpen a HSS twist drill |  |  | (PE3) (PC2.2) *Student displayed appropriate techniques when sharpening a HSS twist drill*   * *Student kept drill cool using water* * *Correct angles were obtained using tool gauge* * *Correct tip lengths were obtained using gauge*   *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 3.1 Check drill angles using tool gauge |  |  |
| 3.2 Check drill tip length using gauge |  |  |
| 4 | Carry out after use checks |  |  | (PE1,PE2) (PC1.1,1.2) Student carries out after use checks  *Student checks machine after use for damage*   * *Damaged components tagged and placed out of service*   *Student kept work area clean and clear of grinding dust*  *Student followed sound housekeeping practices. Student cleaned up immediate area on completion of task*   * *Swept area clear of grinding dust* * *Dust placed in appropriate waste bins*   *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 4.1 Check grinder for damage after use   * damaged components tagged and placed out of service |  |  |
| 4.2 Clean around grinder and immediate area   * dust placed in appropriate waste bins |  |  |
| 4.3 Present sharpened drill to assessor for marking |  |  |

Table 2 Observation Checklist

| Item # | Task 2: Drill Pin | S | U/S | Assessor Comments (Describe the student’s ability in demonstrating the required skills and knowledge) |
| --- | --- | --- | --- | --- |
| 1 | Follow Standard Operating Procedure (SOP) for the use of a Radial Arm Drill and use correct PPE and follow safe work practices |  |  | (PE1) (PC1.1,1.2.1.3, PC2.4) Student referred to and followed SOP for the use of a radial arm drill  Student completed Equipment information and Follow SOP tables  *Correct PPE worn when using a radial arm drill*   * *Safety glasses* * *Cotton drill shirt and trousers* * *Safety boots*   *Student checked condition of machine prior to use for damage*   * *‘E’ stops functioning* * *Correct operation of locking mechanisms* * *Vice is mounted correctly to bed and hold down bolts tightened*   *Student took appropriate action for damaged machine, tagged and placed out of service.*   * *Student did not use damaged equipment* * *Damaged equipment tagged and placed out of service*   *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 1.1 Complete Equipment information and Follow SOP tables |  |  |
| 1.2 Wear correct PPE suitable for task |  |  |
| 1.3 Carry out before use checks   * ‘E’ stops functioning * Correct operation of locking mechanisms * Vice is securely anchored to table * Damaged machine is tagged and placed out of service. |  |  |
| 1.4 Follow safe practices and housekeeping   * Follow steps provided in the SOP |  |  |
| 2 | Interpret drawing and marking out |  |  | (PE2,PE5) (PC1.4,PC2.1,PC3.3) Student interprets drawing   * *Student obtains dimension as per the drawing (No.IMRS-0008)* * *Student selects measurement and marking out tools appropriate to complete the task*   + *Scriber*   + *Centre Punch*   + *Hammer*   + *150mm rule*   + *Combination Square (with Centre Square attachment)* * *Student marks out hole as per the drawing*   *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 2.1 Obtain dimensions for marking out 10mm hole |  |  |
| 2.2 Select measurement and marking out tools |  |  |
| 2.3 Mark out hole as per the drawing (IMRS-0008) |  |  |
| 3 | Mount job in machine vice |  |  | (PE4) (PE2.1,PC2.2,PE3.1,PC3.2) Student mounts the job to be drilled in a machine vice   * *Student uses an engineers square to set up job in machine vice* * *Student checks job is level in machine vice* * *Student tightens job securely in machine vice*   *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 3.1 Job is to be square to the vice (centre punched mark to be top and centre) |  |  |
| 3.2 Job is to be level in the vice |  |  |
| 3.3 Tighten the vice |  |  |
| 4 | Set up Radial Arm Drill |  |  | (PE3,PE5) (PC2.1,PC2.3, PC3.4)Student employs appropriate speed for centre drilling   * *Student selects 3000 RPM or speed on assessors advice* * *Student secures Jacobs chuck in radial arm drill and fits and tightens centre drill in chuck* * *Student aligns drill over marked out position and clamps all locking mechanisms on radial arm drill* * *Student makes any adjustments to alignment before starting drill*   *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 4.1 Select speed for centre drilling |  |  |
| 4.2 Fit and secure Jacobs chuck to Morse taper on radial arm drill |  |  |
| 4.3 Fit centre drill to chuck and tighten |  |  |
| 4.4 Align drill point to marked out centre on job and clamp lift/lower, column and cross travel locking mechanisms |  |  |
| 4.5 Check alignment and make any adjustments to the radial arm drill before starting |  |  |
| 5 | Drill hole in pin |  |  | (PE3,PE5) (PC2.3,PC3.2,PC3.3,PC3.4) Student drills hole in pin   * *Student centre drills pin* * *Student isolates drill and removes centre drill* * *Student employs appropriate speed for drill 10mm* * *Student selects 900 RPM or speed on assessors advice* * *Student checks alignment of drill and makes any adjustments before starting* * *Student drills 10mm hole* * *Student checks hole for against dimension on drawing*   *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 5.1 Centre drill hole |  |  |
| 5.2 Shut down and isolate drill |  |  |
| 5.3 Remove centre drill and replace with 10mm HSS twist drill |  |  |
| 5.4 Set speed for 10mm drill |  |  |
| 5.5 Check alignment and make any adjustments to the radial arm drill before starting |  |  |
| 5.6 Drill 10mm hole |  |  |
| 6 | Remove all burrs and sharp edges |  |  | (PE5) (PC3.3) Student removes all burrs and sharp edges  *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 6.1 Safely remove any burrs around the hole |  |  |
| 7 | Carry out after use checks   * Follow steps provided in the SOP |  |  | (PE1) (PC1.1,1.2) Student carries out after use checks (Follow steps provided in the SOP)  *Student checks machine after use for damage*   * *Damaged components tagged and placed out of service* * *Student kept work area clean and clear of swarf*   *Student followed sound housekeeping practices. Student Cleaned up lathe and immediate area on completion of task*   * *Swept area clear of swarf* * *Swarf to appropriate waste bins*   *Student cleaned and lubricated radial arm drill*  *Student returns tools to the correct storage and hands job in for marking*  *Assessors are to record their observations in sufficient detail to demonstrate their judgement of the student’s performance against the criteria required.* |
| 7.1 Check radial arm drill for damage after use |  |  |
| 7.2 Clean radial arm drill and immediate area |  |  |
| 7.3 Return drills and equipment to correct storage |  |  |
| 7.4 Clean and lubricate machines after use. |  |  |
| 7.5 Hand job in for marking |  |  |

|  |
| --- |
|  |
| Assessors may ask additional questions to clarify student understanding. List here any additional questions that were asked during this assessment event.  *Record all additional questions that were asked of the student during the assessment event.* |
| **Student Reponses to Additional Questions** |
| List here the student responses to any additional questions that were asked during this assessment event.  *Record the student responses to any additional questions that were asked during this assessment event.* |

Table 3: Additional Questions