

Instruction Sheet for the Candidate

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| Qualification | National Vocational Certificate in Metal Forming & Processing Level 4 |
| Competency Standard | Perform Milling and Hobbing Operations |
| Purpose of Assessment | Formative Assessment |
| Candidate Details | Name _____ Registration/Roll Number _____ |
| Guidance for Candidate | <p>To meet this standard, you are required to complete the following within 04 Hrs. time frame (for practical demonstration & assessment):</p> <ul style="list-style-type: none"> • Arrange Tools, Equipment and material for Milling Operation • Prepare work piece for milling operation • Perform setting of milling machine • Carryout Milling operations. • Arrange Tools, Equipment and material for hobbing to make the gear • Set Hobbing Machine for operations • Carry out Hobbing operations to make gear |
| Time: 04 Hrs. | During a practical assessment, under observation by an assessor, you are required to |
| Minimum Evidence Required | <p>Arrange Tools, Equipment and material for Milling Operation</p> <ul style="list-style-type: none"> • Identify tools, equipment and material for milling operation • Select the tool, equipment, material (type, shape and size of cutter) according to the job requirements • Arrange the measuring instruments and holding devices <p>Prepare work piece for milling operation</p> <ul style="list-style-type: none"> • Interpret drawing as per job requirement • Prepare the work-piece by required machining (sawing and filing etc.) • Check and verify the dimensions of blank for making gear as per drawing <p>Perform setting of milling machine</p> <ul style="list-style-type: none"> • Clamp the blank work-piece and tool into its holding devices as per SOPs • Maintain the safe distance between work-piece and cutter as per prescribed method • Adjust the revolution per minute(rpm) of spindle according to the |

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| | <p>specifications of work piece</p> <ul style="list-style-type: none"> • Adjust parameters of speed and feed from control unit as per prescribed methods <p>Carryout Milling operations</p> <ul style="list-style-type: none"> • Check the alignment of work piece • Locate the cutter at work piece as per standard practice • Start the milling operation as per drawing and job specifications • Verify the dimensions of work piece as per drawing <p>Arrange Tools, Equipment and material for hobbing to make the gear</p> <ul style="list-style-type: none"> • Identify tools, equipment and material for hobbing operation • Select the tool, equipment, material (type, shape and size of cutter) according to the job requirements • Arrange the measuring instruments and holding devices <p>Set Hobbing Machine for operations</p> <ul style="list-style-type: none"> • Clamp the gear blank in their holding devices as per the standard practice • Attach the Hob cutter as per the standard practice • Maintain safe distance between gear blank and hob cutter as per prescribed method • Adjust the Revolution Per Minute (RPM) of hob cutter • Adjust feed from control unit as per prescribed method • Adjust the table according to the specifications of work piece <p>Carry out Hobbing operations to make gear</p> <ul style="list-style-type: none"> • Produce simple/angled/differential indexing and divide the gear into required number of divisions • Check the position of hob cutter and the gear blank and adjust them, if required • Operate Hobbing machine according to given specifications • Ensure the parameters of the gear as per requirement • Check and confirm the measurements with given specifications and finalize the gear |
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Self-Assessment Checklist

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| Candidate Name | |
| Registration No. | |
| Qualification | National Vocational Certificate in Metal Forming & Processing Level 4 |
| Competency Standard | Perform Milling and Hobbing Operations |
| Purpose of Assessment | Formative Assessment |
| Assessment Task | <ul style="list-style-type: none"> • Arrange Tools, Equipment and material for Milling Operation • Prepare work piece for milling operation • Perform setting of milling machine • Carryout Milling operations. • Arrange Tools, Equipment and material for hobbing to make the gear • Set Hobbing Machine for operations • Carry out Hobbing operations to make gear |

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| Performance Criteria | Yes | No |
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| 1. Identify tools, equipment and material for milling operation | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Select the tool, equipment, material (type, shape and size of cutter) according to the job requirements | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Arrange the measuring instruments and holding devices | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Interpret drawing as per job requirement | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Prepare the work-piece by required machining (sawing and filing etc.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Check and verify the dimensions of blank for making gear as per drawing | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Clamp the blank work-piece and tool into its holding devices as per SOPs | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Maintain the safe distance between work-piece and cutter as per prescribed method | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Adjust the revolution per minute(rpm) of spindle according to the specifications of work piece | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Adjust parameters of speed and feed from control unit as per prescribed methods | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Check the alignment of work piece | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Locate the cutter at work piece as per standard practice | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Start the milling operation as per drawing and job specifications | <input type="checkbox"/> | <input type="checkbox"/> |

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| 14. Verify the dimensions of work piece as per drawing | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Identify tools, equipment and material for hobbing operation | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Select the tool, equipment, material (type, shape and size of cutter) according to the job requirements | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Arrange the measuring instruments and holding devices | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Clamp the gear blank in their holding devices as per the standard practice | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Attach the Hob cutter as per the standard practice | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Maintain safe distance between gear blank and hob cutter as per prescribed method | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Adjust the Revolution Per Minute (RPM) of hob cutter | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Adjust feed from control unit as per prescribed method | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Adjust the table according to the specifications of work piece | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Produce simple/angled/differential indexing and divide the gear into required number of divisions | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Check the position of hob cutter and the gear blank and adjust them, if required | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Operate Hobbing machine according to given specifications | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. Ensure the parameters of the gear as per requirement | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Check and confirm the measurements with given specifications and finalize the gear | <input type="checkbox"/> | <input type="checkbox"/> |

Candidate's Signature_____ Assessor's Signature_____

Date: _____

Assessors Judgment Guide

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|------------------------------|---|
| Qualification | National Vocational Certificate in Metal Forming & Processing Level 4 |
| Competency Standard | Perform Milling and Hobbing Operations |
| Purpose of Assessment | Formative Assessment |
| Candidate Details | Name: _____ Registration/Roll Number: _____ Signature: _____ |
| Assessment Outcome | <div style="display: flex; justify-content: space-between; align-items: center;"> COMPETENT <input type="checkbox"/> NOT YET COMPETENT <input type="checkbox"/> </div> Name of the Assessor _____ Assessor's code: _____ Signature: _____ |

| Assessment Summary (to be filled by the assessor) | | | | | | | |
|---|---------|------|-------------|-----------|-----------|-----------|-------------------|
| Activity | Method | | | | | Result | |
| Nature of Activity | Written | Oral | Observation | Portfolio | Role Play | Competent | Not Yet Competent |
| Practical Skill Demonstration | | | ✓ | | | | |
| Knowledge Assessment | | ✓ | | | | | |
| Other Requirement | | | | | | | |

Observation Checklist

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| Assessment Task | | <ul style="list-style-type: none"> • Arrange Tools, Equipment and material for Milling Operation • Prepare work piece for milling operation • Perform setting of milling machine • Carryout Milling operations. • Arrange Tools, Equipment and material for hobbing to make the gear • Set Hobbing Machine for operations • Carry out Hobbing operations to make gear | | |
| During the practical assessment, candidate demonstrated the following: | | Yes | No | Remarks |
| 1. | Identify tools, equipment and material for milling operation | | | |
| 2. | Select the tool, equipment, material (type, shape and size of cutter) according to the job requirements | | | |
| 3. | Arrange the measuring instruments and holding devices | | | |
| 4. | Interpret drawing as per job requirement | | | |
| 5. | Prepare the work-piece by required machining (sawing and filing etc.) | | | |
| 6. | Check and verify the dimensions of blank for making gear as per drawing | | | |
| 7. | Clamp the blank work-piece and tool into its holding devices as per SOPs | | | |
| 8. | Maintain the safe distance between work-piece and cutter as per prescribed method | | | |
| 9. | Adjust the revolution per minute(rpm) of spindle according to the specifications of work piece | | | |
| 10. | Adjust parameters of speed and feed from control unit as per prescribed methods | | | |
| 11. | Check the alignment of work piece | | | |
| 12. | Locate the cutter at work piece as per standard practice | | | |
| 13. | Start the milling operation as per drawing and job specifications | | | |
| 14. | Verify the dimensions of work piece as per drawing | | | |
| 15. | Identify tools, equipment and material for hobbing operation | | | |
| 16. | Select the tool, equipment, material (type, shape and size of cutter) according to the job requirements | | | |
| 17. | Arrange the measuring instruments and holding devices | | | |

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| 18. | Clamp the gear blank in their holding devices as per the standard practice | | | |
| 19. | Attach the Hob cutter as per the standard practice | | | |
| 20. | Maintain safe distance between gear blank and hob cutter as per prescribed method | | | |
| 21. | Adjust the Revolution Per Minute (RPM) of hob cutter | | | |
| 22. | Adjust feed from control unit as per prescribed method | | | |
| 23. | Adjust the table according to the specifications of work piece | | | |
| 24. | Produce simple/angled/differential indexing and divide the gear into required number of divisions | | | |
| 25. | Check the position of hob cutter and the gear blank and adjust them, if required | | | |
| 26. | Operate Hobbing machine according to given specifications | | | |
| 27. | Ensure the parameters of the gear as per requirement | | | |
| 28. | Check and confirm the measurements with given specifications and finalize the gear | | | |
| Competent <input type="checkbox"/> | | Not Yet Competent <input type="checkbox"/> | | |

Knowledge Assessment

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|------------------------------|---|
| Qualification | National Vocational Certificate in Metal Forming & Processing Level 4 |
| Competency Standard | Perform Milling and Hobbing Operations |
| Purpose of Assessment | Formative Assessment |
| Candidate Details | Name: _____ Registration/Roll Number: _____ Candidate Signature: _____ |
| Assessment Outcome | <div style="display: flex; justify-content: space-around; align-items: center;"> COMPETENT <input type="checkbox"/> NOT YET COMPETENT <input type="checkbox"/> </div> Name of the Assessor: _____ Assessor's code: _____ Signature of the Assessor: _____ |

Candidate's response is not required to be identical, but similar concepts and/or keywords must be used. Oral questioning may be used to clarify candidate understanding of topic and its application.

| Questions (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application) | | Satisfactory | Not Satisfactory |
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| 1. | What are milling operations? | | |
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| 2. | What is difference between Conventional and climb milling? | | |
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| 3. | Define Hobbing operation. | | |

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| 4. | What are different operating parameters of milling machine and hobbing machine? | | |
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| 5. | What are different types of materials used for making the gears? | | |
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| Feedback to the Candidate | |
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| Candidate's Signature _____ | Assessor's Signature _____ |