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| Title | **Perform milling machine operations** | | |
| Level | **3** | **Credits** | **36** |

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| Purpose | This competency standard identifies the competencies you need to perform milling operations on aMillingmachine in accordance with approved procedures. You will be expected to perform Face milling, Plain milling, Step milling, Squaring, Gear milling, slotting, Grooving, Drillingand Boring.You will be required to operate the milling machine safely by complying the organizational safety policy and approved procedures.  Your underpinning knowledge regarding milling machine operations will be sufficient to provide you with the basis for your work. |

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| Classification ISCED | 0715 Mechanics and metal trades |

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| Available grade | Competent / Not yet competent |

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| Modification history | N/A |

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| **Unit of Competency** | **Performance Criteria** | **Knowledge and Understanding** | **Tools & Equipment** |
| **F1. Produce a square shaped work piece** | ***You must be able to:***  **P1.** Identify safety hazards related with milling operations and take appropriate steps to avoid any injury or accident.  **P2.** Dial the machine vice according to job requirement.  **P3.** Select cutters and set machine as per requirements.  **P4.** Mount cutters and work piece in the machine.  **P5.** Produce a part matching the process plan and the part print specifications.  **P6.** Check quality of the component at suitable intervals.  **P7.** Shut down the machine at safe position after finishing the work. | ***You must know and understand:***  **K1.** List safety hazards related with the milling machine operations.  **K2.** Use of dial indicator  **K3.** Method of mounting the cutters  **K4.** Checking of right angle with the tri- square.  **K5.** Explain square milling procedure.  **K6.** Safety guidelines and procedures.  **K7.** Safety checks for operating milling machine.  **K8.** Interpreting information given in the engineering drawings and job specifications.  **K9.** How to use different measuring system | **T1**. Milling machine **T2**. Machine Vice **T3**. Tri square  **T4**. Vernier Caliper  **T5**. Dial indicator with magnet stand  **T6**. Milling cutters  **T7**. Personal Protective Equipment |

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| **Unit of Competency** | **Performance Criteria** | **Knowledge and Understanding** | **Tools & Equipment** |
|  |  | and techniques.  **K10.** Handling cutting tools and their storage.  **K11.** Recognizing faults in milling machine.  **K12.** How to identify when cutters need re- sharpening.  **K13.** Quality control procedures involved in squaring of work piece. |  |
| **F2. Perform spur gear cutting** | ***You must be able to:***  **P1.** Identify safety hazards related with milling operations and take appropriate steps to avoid any injury or accident.  **P2.** Set the gear blank on the mandrel according to job requirement.  **P3.** Hold the mandrel between indexing head and foot stock or tail stock.  **P4.** Select the cutter according to the circular pitch and number of teeth.  **P5.** Mount the cutter on the arbor according to procedure. | ***You must know and understand:***  **K1.** Types of different cutters  **K2.** Select exact number of cutters  **K3.** Calculation of spur gear  **K4.** Explain gear cutting procedure  **K5.** Method of using tooth vernier  **K6.** Method of mounting the cutter on the arbor.  **K7.** Quality checks procedures and techniques.  **K8.** Safety guidelines and procedures. | **T1**. Milling machine **T2**. Indexing head **T3**. Gear cutter  **T4**. Vernier Caliper  **T5**. Dial indicator with magnet stand  **T6**. Set of module cutters.  **T7**. Tooth Vernier |

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| **Unit of Competency** | **Performance Criteria** | **Knowledge and Understanding** | **Tools & Equipment** |
|  | **P6.** Set the dividing headaccording to requirements.  **P7.** Perform the gear cutting according to the given specifications.  **P8.** Check quality of the component at suitable intervals.  **P9.** Shut down the machine at safe position after finishing the work. |  |  |
| **F3. Perform slotting or grooving on work piece** | ***You must be able to:***  **P1.** Identify safety hazards related with milling operations and take appropriate steps to avoid any injury or accident.  **P2.** Set the work piece in machine vice according to procedure.  **P3.** Select the appropriate cutter as per specifications.  **P4.** Adjust the milling cutter for slotting and grooving.  **P5.** Determine the touching point of the work piece.  **P6.** Produce slotting or grooving on the work | ***You must know and understand:***  **K1.** Identifying safety hazards associated with milling machine operations.  **K2.** Safety guidelines and procedures. **K3.** Method of using of dial indicator **K4.** Method of mounting the cutters **K5.** Checking of right angle with the tri-  square.  **K6.** Explain the procedure of slotting and grooving.  **K7.** Quality checks procedures and techniques. | **T1**. Slotting cutter **T2**. Vernier caliper **T3**. Depth gauge **T4**. End mil cutter |

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| **Unit of Competency** | **Performance Criteria** | **Knowledge and Understanding** | **Tools & Equipment** |
|  | piece to the required quality.  **P7.** Check quality of the component at suitable intervals.  **P8.** Shut down the machine at safe position after finishing the work.  **P9.** Observe personal and workplace safety at all time. | **K8.** Types of slotting and grooving cutters. |  |
| **F4. Perform drilling or boring using milling machine** | ***You must be able to:***  **P1.** Identify safety hazards related with milling operations and take appropriate steps to avoid any injury or accident.  **P2.** Select drill or boring tools according to drawings.  **P3.** Mount and set the required work-holding devices, work piece and cutting tools.  **P4.** Adjust the RPM of machine according to the standard chart.  **P5.** Perform the boring operation according to the drawing.  **P6.** Check quality of the component produced at different intervals. | ***You must know and understand:***  **K1.** Identifying safety hazards associated with milling machine operations.  **K2.** Types of drill or boring tools and their function.  **K3.** Procedure of mounting and setting up of work-holding devices, work pieces and cutting tools.  **K4.** Method and technique of adjusting RPM of milling machine.  **K5.** Safe Boring and milling procedures.  **K6.** Techniques of checking quality of components. | **T1**. Milling Machine  **T2**. Boring unit **T3**. Boring tools **T4**. Depth gauge **T5**. Drill  **T6**. Internal Micrometer  **T7**. Personal Protective Equipment |

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| **Unit of Competency** | **Performance Criteria** | **Knowledge and Understanding** | **Tools & Equipment** |
|  | **P7.** Shut down the machine at safe position after finishing the work.  **P8.** Observe personal and workplace safety at all time. | **K7.** Calculation of RPM.  **K8.** Use of standard RPM chart.  **K9.** Safety precautions and procedures. |  |