Competency Standard (CS)

Machine Shop Practice

Level-3

Light Engineering Sector

Competency Standard Code: CS-LE-MSP-L3-EN-V2

National Skills Development Authority
Chief Advisor's Office
Government of the People's Republic of Bangladesh

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This Competency Standard for **Machine Shop Practice** is a document for the development of curricula, teaching and learning materials, and assessment tools. It also serves as the document for providing training consistent with the requirements of industry in order to meet the qualification of individuals who graduated through the established standard via competency-based assessment for a relevant job.

This document has been developed by NSDA in association with **Light Engineering Sector**, industry representatives, academia, related specialist, trainer and related employee.

Public and private institutions may use the information contained in this standard for activities benefitting Bangladesh.

Introduction

The NSDA aims to enhance an individual's employability by certifying completeness with skills. NSDA works to expand the skilling capacity of identified public and private training providers qualitatively and quantitatively. It also aims to establish and operationalize a responsive skills ecosystem and delivery mechanism through a combination of well-defined set of mechanisms and necessary technical supports.

Key priority economic growth sectors identified by the government have been targeted by NSDA to improve current job skills along with existing workforce to ensure required skills to industry standards. Training providers are encouraged and supported to work with industry to address identified skills and knowledge to enable industry growth and increased employment through the provision of market responsive inclusive skills training program. "**Machine Shop Practice**" is selected as one of the priority occupations of **Light Engineering** Sector. This standard is developed to adopt a demand driven approach to training with effective inputs from Industry Skills Councils (ISC's), employer associations and employers.

Generally, a competency standard informs curriculum, learning materials, assessment and certification of trainees enrolled in Skills training. Trainees who successfully pass the assessment will receive a qualification in the National Skills Qualification Framework (BNQF) under Bangladesh National Qualification Framework and will be listed on the NSDA's online portal.

This competency standard is developed to improve skills and knowledge in accordance with the job roles, duties and tasks of the occupation and ensure that the required skills and knowledge are aligned to industry requirements. A series of stakeholder consultations, workshops were held to develop this document.

The document also details the format, sequencing, wording and layout of the Competency Standard for an occupation which is comprised of Units of Competence and its corresponding Elements.

Overview

A **Competency Standard** is a written specification of the knowledge, skills and attitudes required for the performance of an occupation, trade or job corresponding to the industry standard of performance required in the workplace.
The purpose of a competency standards is to:

- provide a consistent and reliable set of components for training, recognising and assessing people's skills, and may also have optional support materials
- enable industry recognised qualifications to be awarded through direct assessment of workplace competencies
- encourage the development and delivery of flexible training which suits individual and industry requirements
- encourage learning and assessment in a work-related environment which leads to verifiable workplace outcomes

Competency standards are developed by a working group comprised of representative from NSDA, Key Institutions, ISC, and industry experts to identify the competencies required of an occupation in **Light Engineering Sector**.

Competency standards describe the skills, knowledge and attitude needed to perform effectively in the workplace. CS acknowledge that people can achieve technical and vocational competency in many ways by emphasizing what the learner can do, not how or where they learned to do it.
With competency standards, training and assessment may be conducted at the workplace or at training institute or any combination of these.
Competency standards consist of a number of units of competency. A unit of competency describes a distinct work activity that would normally be undertaken by one person in accordance with industry standards.

Units of competency are documented in a standard format that comprises of:

- unit title
- nominal duration
- unit code
- unit descriptor
- elements and performance criteria
- variables and range statement
- curricular content guide
- assessment evidence guide

Together, all the parts of a unit of competency:

- describe a work activity
- guide the assessor to determine whether the candidate is competent or not yet competent

The ensuing sections of this document comprise of a description of the relevant occupation, trade or job with all the key components of a unit of competency, including:

- a chart with an overview of all Units of Competency for the relevant occupation, trade or job including the Unit Codes and the Unit of Competency titles and corresponding Elements
- the Competency Standard that includes the Unit of Competency, Unit Descriptor, Elements and Performance Criteria, Range of Variables, Curricular Content Guide and Assessment Evidence Guide.

Competency Standards for National Skill Certificate – 3 in Machine Shop Practice, Light Engineering Sector

Level Descriptors of Skills Sector, BNQF Level 1-6

Level & Job classification	Knowledge Domain	Skills Domain	Responsibility Domain
6-Mid-Level Manager/ Sub Assistant Engineer	Comprehensive actual and theoretical knowledge within a specific work or study area with an awareness of the validity and limits of that knowledge, able to analyse, compare, relate and evaluate.	Specialised and wider range of cognitive and practical skills required to provide leadership in the development of creative solutions to defined problems. Communicate professional issues and solutions to the team and to external partners/users.	Work under broad guidance and self-motivation to execute strategic and operational plan/s. Lead lower-level management. Diagnose and resolve problems within and among work groups.
5-Supervisor	Broad knowledge of the underlying, concepts, principles, and processes in a specific work or study area, able to scrutinize and break information into parts by identifying motives or causes.	Broad range of cognitive and practical skills required to generate solutions to specific problems in one or more work or study areas. Communicate practice-related problems and possible solutions to external partners.	Work under guidance of management and self-direction to resolve specific issues. Lead and take responsibility for the work and actions of group/team members. Bridge between management.
4-Highly Skilled Worker	Broader knowledge of the underlying, concepts, principles, and processes in a specific work or study area, able to solve problems to new situations by comparing and applying acquired knowledge.	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying the full range of methods, tools, materials and information. Communicate using technical terminology and IT technology with partners and users as per workplace requirements.	Work under minimal supervision in specific contexts in response to workplace requirements. Resolve technical issues in response to workplace requirements and lead/guide a team/ group.
3-Skilled Worker	Moderately broad knowledge in a specific work or study area, able to perceive ideas and abstract from drawing and design according to workplace requirements.	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools. Communicate with his team and limited external partners upholding the values, nature and culture of the workplace	Work or study under supervision with considerable autonomy. Participate in teams and responsible for group coordination.
2-Semi Skilled Worker	Basic understanding of underpinning knowledge in a specific work or study area, able to interpret and apply common occupational terms and instructions.	Skills required to carry out simple tasks, communicate with his team in the workplace presenting and discussing results of his work with required clarity.	Work or study under supervision in a structured context with limited scope of manipulation
1 –Basic Skilled Worker	Elementary understanding of ability to interpret the underpinning knowledge in a specific study area, able to interpret common occupational terms and instructions.	Specific Basic skills required to carry out simple tasks. Interpret occupational terms and present the results of own work within guided work environment/ under supervision.	Work under direct supervision in a structured context with limited range of responsibilities.

List of Abbreviations

CS	-	Competency Standard
ISC	-	Industry Skills Council
FPS	-	Foot, Pound and Second
LEISC	-	Light Engineering Industry Skills Councils
NSDA	-	National Skills Development Authority
NSQF	-	National Skills Qualification Framework
MKS	-	Meter, Kilogram and Second
BNQF	-	Bangladesh National Qualification Framework
OSH	-	Occupational Safety and Health
PPE	-	Personal Protective Equipment
SCVC	-	Standards and Curriculum Validation Committee
STP	-	Skills Training Provider
SOP	-	Standard Operating Procedure
UoC	-	Unit of Competency
CNC	-	Computer & Numeric Control
MSP	-	Machine Shop Practice
4 iR	-	4^{th} Industrial Revolution

Competency Standard (CS) Review and Validation

Approved by

40th Authority Meeting of NSDA

Held on 26.02.2025

Table of Contents

Competency Standards for National Skill Certificate – 3 in
Machine Shop Practice
Course Structure

SL.	Unit Code and Title		UoC Level	Nominal Hours
Generic Units of Competencies				**40**
1.	GU-03-L2-V1	Communicate in the Workplace	2	20
2.	GU-04-L3-V1	Lead small team	3	20
Occupation Specific Units of Competencies				**280**
3.	OU-LE-MSP-01-L3-V2	Perform Lathe Operations	3	110
4.	OU-LE-MSP-02-L3-V2	Perform Tool and Cutter Grinding Operations	3	40
5.	OU-LE-MSP-03-L3-V2	Perform Cylindrical Grinding Operation	3	40
6.	OU-LE-MSP-04-L3-V2	Perform Basic Milling Operation	3	90
			Learning Hours	**320**
			Workplace Visit	**20**
			Total Nominal Hours	**340**

Units & Elements at a Glance:

Generic Units of Competencies (55 hours)

Code	Unit of Competency	Elements of Competency	Duration (Hours)
GU-03-L2-V1	Communicate in the Workplace	1. Receive verbal instructions. 2. Interpret verbal and written information/ instruction 3. Convey instructions using verbal and written forms of communication 4. Complete written documentation 5. Participate in work place meetings and discussions	20
GU-04-L3-V1	Lead Small Team	1. Provide team leadership 2. Assign responsibilities 3. Set performance expectations for team members 4. Supervise team performance	20
Total Hours			40

Occupation Specific Units of Competencies (280 Hours)

Code	Unit of Competency	Elements of Competency	Hours
OU-LE-MSP-02-L3-V2	Perform Lathe Operations	1. Prepare for work 2. Setup workpiece 3. Perform lathe operations 4. Clean and store tools and equipment	110
OU-LE-MSP-02-L3-V2	Perform Tool and Cutter Grinding Operations	1. Prepare for work 2. Perform tool and cutter grinding 3. Clean and store tools and equipment	40
OU-LE-MSP-01-L3-V2	Perform Cylindrical Grinding Operation	1. Prepare for work 2. Select and set up cylindrical grinding machine 3. Perform cylindrical grinding operations 4. Clean and store tools and equipment	40

OU-LE-MSP-03-L3-V2	Perform Basic Milling Operation	1. Prepare for work 2. Setup workpiece 3. Perform milling operations 4. Clean and store tools and equipment	90
Total Hours			280

Generic Units of Competencies

Unit code and Title	GU-03-L2-V1: Communicate in the Workplace
Unit Descriptor	This unit covers the knowledge, skills and attitudes (KSAs) required to communicate in the workplace. It includes the use of verbal and written forms of communication to receive, interpret, convey, and document information/ instruction using appropriate communication equipment.
Nominal Hours	**20 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables Training Components
1. Receive verbal instructions.	1.1 Instructions are accessed and interpreted 1.2 Questions are asked to clarify understanding or gain more information. 1.3 Information/instruction is recorded.
2. Interpret verbal and written information/ instruction	2.1 **Written instructions** are interpreted. 2.2 Work **signage's** are properly responded. 2.3 Routine written instructions are followed in sequence. 2.4 Feedback is given to workplace supervisor.
3. 3. Convey instructions using verbal and written forms of communication	3.1 Relevant **communication** methods are used to transmit instructions. 3.2 Appropriate non-verbal communication is used. 3.3 Channels of communication are identified and followed 3.4 Communication **tools and equipment** are operated and faults are identified and reported. 3.5 Information is conveyed using appropriate **forms**.
4. Complete written documentation	4.1 All required **documentation** is completed 4.2 Workplace data are recorded 4.3 Written information/instruction is passed to personnel.
5. Participate in work place meetings and discussions	4.1 Meetings are attended regularly and on time. 4.2 Meeting inputs are consistent with the meeting purpose and established protocols. 4.3 Opinions are expressed without interruption. 4.4 Meeting outputs are processed and implemented.
Range of Variables	
Variable	**Range** (may include but not limited to):
1. Written instructions	1.1 Supervisor's/Manager's Instructions 1.2 Memoranda 1.3 Rules and Regulations 1.4 Signage 1.5 Approved Work Plan

	1.6 External communications
2. Workplace guidelines	2.1 Labor Policies and Guidelines 2.2 Written Instructions 2.3 Operations Manual 2.4 Organizational Manuals 2.5 Quality Assurance Handbook
3. Signage	3.1 On-site direction signs 3.2 Common site warnings 3.3 Location signs 3.4 Traffic signs
4. Communication	4.1 Verbal instructions 4.2 Written instructions 4.3 Online communication
5. Tools and machinery	5.1 Telephone 5.2 Mobile Phone 5.3 Fax machines 5.4 Two-way radio 5.5 Computers 5.6 Forms 5.7 Memo
6. Forms	6.1 Memorandum 6.2 Requisitioning Form 6.3 Personnel Form 6.4 6.4. Safety Report Form
7. Documentation	7.1 Reports (Monthly, Quarterly, Half-Yearly, Annual) 7.2 Plans (Strategic Plan, Operational Plan, Monthly 7.3 Schedule) 7.4 Monitoring and Evaluation Report 7.5 7.4. Minutes of Meetings
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency	
1. Critical Aspects of Competency	Assessment required evidence that the candidate: 1.1 demonstrated knowledge of workplace procedures in receiving, interpreting and conveying verbal & written communication. 1.2 satisfied the requirements mentioned in the Performance Criteria and Range of Variables.
2. Underpinning Knowledge	2.1 Workplace Communication Policies, Standards and Procedures

	2.2 Verbal and Non-verbal communication 2.3 Modes of Communication 2.4 Communication Equipment: Types, Uses and Faults 2.5 Channels of Communication
3. Underpinning Skills	3.1 Receiving verbal instructions. 3.2 Interpreting verbal and written information/ instruction 3.3 Conveying instructions using verbal and written forms of communication 3.4 Completing written documentation 3.5 Participating in workplace meetings and discussions
4. Underpinning Attitude	4.1 Commitment to occupational health and safety 4.2 Environmental concerns 4.3 Eagerness to learn 4.4 Tidiness and timeliness 4.5 Respect for rights of peers and seniors in workplace 4.6 Communication with peers and seniors in workplace
5. Resource Implications	The following resources must be provided: 5.1 Pens 5.2 Telephone 5.3 Computer 5.4 Writing materials 5.5 Online communication
6. Methods of Assessment	Methods of assessment may include but not limited to: 6.1 Demonstration 6.2 Oral questioning 6.3 Written test 6.4 Portfolio
7. Context of assessment	7.1 Competency assessment must be done in a training centre or in an actual or simulated workplace after completion of the training module 7.2 Assessment should be done by NSDA certified assessor.

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	GU-04-L3-V1: Lead Small Team
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to lead small team. It specifically includes providing team leadership, assigning responsibilities, setting performance expectations for team members and supervising team performance.
Nominal Hours	**20 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Provide team leadership	1.1 **Work requirements** are identified and presented to team members 1.2 Reasons for instructions and requirements are communicated to team members 1.3 **Team members' queries and concerns** are recognized, discussed and dealt with.
2. Assign responsibilities	2.1 Duties, and responsibilities are allocated having regard to the skills, knowledge and attitudes required to properly undertake the assigned task 2.2 Duties are allocated having regard to individual preference, domestic and personal considerations, whenever possible.
3. Set performance expectations for team members	3.1 Performance expectations are established based on client needs and according to assignment requirements 3.2 Performance expectations are based on individual team members' duties and area of responsibility 3.3 Performance expectations are discussed and directed to implement in the workplace.
4. Supervise team performance	4.1 **Monitoring of performance** are taken place against defined performance criteria and / or assignment instructions and corrective action taken if required 4.2 Team members are provided **feedback,** positive support and advice on strategies to overcome any deficiencies 4.3 **Performance issues** which cannot be rectified or addressed within the team are referenced to appropriate personnel 4.4 Team members are kept informed of any changes in the priority allocated to assignments or tasks which might impact on clients' / customers' needs and satisfaction 4.5 Team operations are monitored to ensure that employer /

	client needs and requirements are met 4.6 Follow-up communication is provided on all issues affecting the team 4.7 All relevant documentation is completed.
Range of Variables	
Variable	**Range** (may include but are not limited to):
1. Work requirements	1.1 Client Profile 1.2 Assignment instructions
2. Team member's queries and concerns	2.1 Roster 2.2 Shift details
3. Monitoring of performance	3.1 Formal process 3.2 Informal process
4. Feedback	4.1 Formal process 4.2 Informal process 4.3 Sandwich process
5. Performance issues	5.1 Work output 5.2 Work quality 5.3 Team participation 5.4 Compliance with workplace protocols 5.5 Safety 5.6 Customer service
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 maintained or improved individuals and / or team performance given a variety of possible scenario 1.2 assessed and monitored team and individual performance against set criteria 1.3 represented concerns of a team and individual to next level of management or appropriate specialist and to negotiate on their behalf 1.4 allocated duties and responsibilities, having regard to individual's knowledge, skills and attitude and the needs of the tasks to be performed 1.5 set and communicated performance expectations for a range of tasks and duties within the team and provided feedback to team members.
2. Underpinning knowledge	2.1 Company policies and procedures 2.2 Relevant legal requirements 2.3 How performance expectations are set 2.4 Methods of Monitoring Performance

	2.5 Client expectations 2.6 Team members' duties and responsibilities
3. Underpinning skills	3.1 Informal performance counselling skills 3.2 Team building skills 3.3 Negotiating skills
4. Required attitudes	4.1 Commitment to occupational health and safety 4.2 Promptness in carrying out activities 4.3 Sincere and honest to duties 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect for rights of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace.
5. Resource implications	The following resources must be provided: 5.1 Workplace (actual or simulated) 5.2 Tools, equipment and facilities appropriate to processes or activity 5.3 Materials relevant to the proposed activity 5.4 Equipment and outfits appropriate in applying safety measures 5.5 Relevant drawings, manuals, codes, standards and reference material.
6. Assessment methods	Assessment methods may include but not limited to: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning 6.4 Portfolio
7. Context of assessment	7.1 Competency assessment must be done in a training centre or in an actual or simulated workplace after completion of the training module 7.2 Assessment should be done by NSDA certified assessor.
Accreditation Requirements Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.	

Occupation Specific Units of Competencies

Unit Cod and Title	**OU-LE-MSP-01-L3-V2: Perform Lathe Operations**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform lathe operations. It includes following OSH practices, determining job requirements, setting up workpiece, performing lathe operations and cleaning and storing tools and equipment.
Nominal Hours	**120 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Prepare for work	1.1 **Safe work practices** are observed. 1.2 **Personal Protective Equipment (PPE)** is collected and worn as per job requirement 1.3 **Routine maintenance** is performed to prepare the machine for required operation as per manufacturer's instruction. 1.4 **Drawings** are interpreted to produce component to specifications. 1.5 Sequence of operation is determined to produce component to specifications. 1.6 **Cutting tools** are selected according to the requirements of the operation.
2. Setup workpiece	2.1 **Workpiece** is clamped on chuck to required level of accuracy using **tools and equipment** 2.2 Workpiece is centered to required level of accuracy using tools and equipment in accordance with worksite procedures. 2.3 **Cutting tool** is set in accordance with the requirement of the operation. 2.4 **Lathe accessories** are used as appropriate to the requirements of the operation. 2.5 Setting up quick change gear box as per job required. 2.6 Machine guards and coolant devices are checked according to work requirement.

3. Perform lathe operations	3.1 Cutting speeds and feeds and depth of cut are calculated as per job requirement. 3.2 Machine performance is checked conforming to the work requirement. 3.3 **Coolant** is applied to prevent over heating of workpiece and cutting tool as per manufacturer instruction. 3.4 **Lathe operations** are performed to produce component to specifications in the drawing. 3.5 Workpiece is checked / measured for conformance to specification using appropriate techniques, **measuring tools** and equipment.
4. Clean and store tools and equipment	4.1 Waste materials are disposed of in accordance with environmental requirements. 4.2 Cleaning of equipment is performed in accordance with work site procedures. 4.3 Tools and equipment are stored safely in appropriate location according to standard procedures.
Range of Variables	
Variable	**Range** (may include but not limited to):
1. Safe work practice	1.1 Use PPE 1.2 Identify hazards 1.3 Control hazards 1.4 Report to the designated authority regarding hazards 1.5 Response to emergency situations
2. Personal Protective Equipment (PPE)	2.1 Apron 2.2 Mask 2.3 Helmet 2.4 Goggles / eye shields 2.5 Safety shoes
3. Routine maintenance	3.1 Cleaning of dust and chips 3.2 Checking and adjust machine guards 3.3 Checking and use coolant and lubricant 3.4 Checking machine performance 3.5 Checking proper ventilation and lighting
4. Drawings	4.1 Views and projections 4.2 Drawing symbols 4.3 Dimensions and features 4.4 Limit, Fit and Tolerance

5. Cutting tools	5.1 Tool bits (high speed steel/ carbide tips/ high carbon speed) ▪ Side cutting tool ▪ Grooving tool ▪ Parting tool ▪ Forming tool ▪ V-thread tool ▪ boring tools 5.2 Centre drill 5.3 Drill bits
6. Workpiece	6.1 Mild steel 6.2 Medium Carbon steel 6.3 Gun metal 6.4 Bright steel 6.5 Aluminum 6.6 Brass
7. Tools and equipment	7.1 Outside caliper 7.2 Inside caliper 7.3 Self-centering chuck 7.4 4-jaw chuck 7.5 Drill chuck 7.6 Chuck key 7.7 Box wrench 7.8 Drill chuck key 7.9 Surface gauge 7.10 Dial indicator with magnetic stand 7.11 Mallet 7.12 Allen key set 7.13 Assorted open ended wrench 7.14 Adjustable wrench
8. Lathe accessories and attachment	8.1 Face plate 8.2 Steady rest 8.3 Follower rest 8.4 Lathe dog 8.5 Dead center 8.6 Live center 8.7 Self-centering tool post 8.8 Tool holder 8.9 Grinding attachment
9. Coolant	9.1 Cutting fluid 9.2 Kerosine for aluminum

10. Lathe operations	10.1 Face and turn external shapes 10.2 Grinding 10.3 Drilling 10.4 Boring 10.5 Internal Grooving 10.6 Face Grooving 10.7 square threading 10.8 Bearing Fitting.
11. Measuring tools	11.1 measuring tape 11.2 Telescopic gauge 11.3 Vernier calipers / Digital Vernier calipers 11.4 Micrometer (inside, outside, depth) / Digital micrometer 11.5 Gauge (center, radius, screw pitch,
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment required evidences that the candidate: 1.1 followed Occupational Safety and Health (OSH) in the workplace 1.2 performed routine maintenance to prepare the machine for required operation 1.3 determined job requirements 1.4 setup and clamped the workpiece 1.5 interpreted drawing 1.6 performed lathe operation 1.7 checked / measured workpiece.
2. Underpinning knowledge	2.1 Limit, fit, tolerance, allowance and clearance. 2.2 Fundamentals of work holding and tool holding devices. 2.3 Fundamentals of turning tools and tool geometry. 2.4 Lathe accessories, fixtures and attachments. 2.5 Cutting speed. 2.6 RPM (revolution per minute). 2.7 Cutting feed 2.8 Depth of cut 2.13 Routine maintenance, SOP 2.14 Workpiece materials 2.15 Use of different coolant 2.16 Use of different measuring tools 2.17 Use of different gages used for checking turning product

3. Underpinning skills	3.1 Selecting and grinding cutting tools. 3.2 Calculating feed, cutting speed and machine rpm as per job requirement. 3.3 Setting cutting Speed, RPM, Feed rate. 3.4 Selecting and setting proper cutting tools. 3.5 Holding workpieces. 3.6 Sharping cutting tools. 3.7 Holding cutting tools. 3.8 Performing required operation. 3.9 Using measuring instruments and gauges to check dimension and tolerance.
4. Required attitudes	4.1 Commitment to occupational safety and health. 4.2 Promptness in carrying out activities. 4.3 Sincere and honest to duties. 4.4 Eagerness to learn. 4.5 Tidiness and timeliness. 4.6 Environmental concerns. 4.7 Respect for rights of peers and seniors at workplace. 4.8 Communication with peers and seniors at workplace.
5. Resources implication	The following resources must be provided: 5.1 workplace (actual or simulated) 5.2 tools and equipment appropriate to activities or process 5.3 materials relevant to the proposed activity / task 5.4 equipment and outfits appropriate in applying safety measures 5.5 relevant drawings, manuals, codes, standards and reference material.
6. Methods of assessment	Methods of assessment may include but not limited to: 6.1 written test 6.2 demonstration 6.3 oral questioning 6.4 portfolio.
7. Context of assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated work place after Completion of the training module; 7.2 Assessment should be done by NSDA certified assessor.

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	**OU-LE-MSP-02-L3-V2: Perform Tool and Cutter Grinding Operations**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform tools and cutter grinding operation. It includes preparing for work, determining job requirements, performing tools and cutter grinding and cleaning and storing tools and equipment.
Nominal Hours	**40 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Prepare for work	1.1 **Safe work practices** are observed throughout work procedure. 1.2 **Personal Protective Equipment (PPE*)*** is collected and worn as required for the work performed. 1.3 Drawings are interpreted and sequence of operations is determined. 1.4 Tool holding devices are selected according to the requirements of the operation. 1.5 **Grinding wheels** are selected, balanced and dressed. 1.6 **Accessories** are selected to facilitated production to specification. 1.7 Machine guards, coolant and dust collection devices are checked according to worksite procedure.
2. Perform tool and cutter grinding	2.1 **Grinding machine** is adjusted in accordance with worksite procedures. 2.2 Cutting tool is hold or clamped to avoid damage. 2.3 Coolant is used to reduce heat of tool and prevent damages. 2.4 **Tool and cutter** grinding machines are operated to sharpen. 2.5 Parallel grinding is carried out. 2.6 Proper grinding is carried out according to drawing specifications. 2.7 Components are checked for conformance to specification using appropriate techniques, tools and equipment.

3. Clean and store tools and equipment	3.1 Waste materials are disposed of in accordance with environmental requirements. 3.2 Cleaning of equipment is performed in accordance with standard procedures. 3.3 Tools and equipment are stored safely in appropriate location according to standard procedures.
Range of Variables	
Variable	**Range** (may include but not limited to):
1. Safe work practice	1.1 Safe use of PPE 1.2 Identify hazards 1.3 Control hazards 1.4 Report to the designated authority regarding hazards 1.5 Response to emergency situations 1.1 Safe use of tools and equipment
2. Personal Protective Equipment (PPE)	2.1 Hand gloves 2.2 Goggles 2.3 Safety shoes 2.4 Apron 2.5 Helmet
3. Grinding wheels	3.1 Cup type grinding wheel 3.2 Disc type grinding wheel 3.3 Double and single angle type grinding wheel 3.4 Recess and Double Recess type grinding wheel 3.5 Con type grinding
4. Accessories	4.1 Wheel dresser 4.2 Diamond pen 4.3 Various collates 4.4 Tool holder
5. Grinding machine	5.1 Pedestal grinder or 5.2 Bench grinder or 5.3 Universal Tool grinder or 5.4 U2 grinder or 5.5 Drill bit grinder or 5.6 End mill grinder or
6. Tools and cutter	6.1 End mill cutter 6.2 Drill bits
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.	

1. Critical aspects of competency	Assessment required evidences that the candidate: 1.1 followed OSH 1.2 selected holding device as required. 1.3 selected wheels and accessories 1.4 performed tool and cutter grinding operations 1.5 checked cutter and cutting tools angles
2. Underpinning knowledge	2.1 Sequence of operations. 2.2 Function of coolant and dust extraction devices. 2.3 Criteria for grinding wheel selection: ▪ grain size ▪ grade 2.4 Grinding wheel dressing. 2.5 Parallel grinding procedures on a tool and cutter grinder. 2.6 Tapers grinding procedures on a tool and cutter grinder. 2.7 Dimensions and tolerances 2.8 Geometry and tolerances 2.9 Cutting edge finishing.
3. Underpinning skills	3.1 Interpreting job instructions, specifications, charts, lists, drawings and other applicable reference documents. 3.2 Planning and sequencing operations. 3.3 Performing safety checks of equipment. 3.4 Selecting tool and cutter grinding accessories. 3.5 Balancing / dressing grinding wheels. 3.6 Sharpening / shaping tools and cutters. 3.7 Checking components for conformance with specification.
4. Required attitudes	4.1 Commitment to occupational safety and health. 4.2 Promptness in carrying out activities. 4.3 Sincere and honest to duties. 4.4 Eagerness to learn. 4.5 Tidiness and timeliness. 4.6 Environmental concerns. 4.7 Respect for rights of peers and seniors at workplace. 4.8 Communication with peers and seniors at workplace.
5. Resources implication	The following resources must be provided: 5.1 workplace (actual or simulated) 5.2 tools, equipment and facilities appropriate to processes or activity 5.3 materials relevant to the proposed activity. 5.4 equipment and outfits appropriate in applying safety measures. 5.5 relevant drawings, manuals, codes, standards and reference material.

6. Methods of assessment	Methods of assessment may include but not limited to: 6.1 written test 6.2 demonstration 6.3 oral questioning 6.4 portfolio.
7. Context of assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated work place after Completion of the training module; 7.2 Assessment should be done by NSDA certified assessor.

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	**OU-LE-MSP-03-L3-V2: Perform Cylindrical Grinding Operation**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform cylindrical grinding operation. In includes preparing for work, selecting wheels and accessories, performing cylindrical grinding operations and cleaning and storing tools and equipment.
Nominal Hours	**40 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Prepare for work	1.1 **Safe work practices** are observed. 1.2 **Personal Protective Equipment (PPE)** is collected and worn as per job requirement 1.3 Sequence of operation is determined to produce component to specifications.
2. Select and set up cylindrical grinding machine	2.1 **Grinding wheels** are selected and dressed as per job requirement. 2.2 **Accessories** selected are appropriate techniques to the job requirement. 2.3 **Grinding machine** is setup and adjusted in accordance to job requirement. 2.4 Machine guards, coolant and dust extraction devices 2.5 are checked according to worksite procedure.
3. Perform cylindrical grinding operations	3.1 Workpiece is set up and hold or clamped to required level of accuracy as per specifications. 3.2 Feed and depth of cut are selected according to the job requirement. 3.3 **Grinding operations** are performed to produce component to specifications as per drawing. 3.4 Workpiece is checked / measured for conformance to specification using measuring tools and equipment.
4. Clean and store tools and equipment	4.1 Waste materials are disposed of in accordance with environmental requirements. 4.2 Cleaning of equipment is performed in accordance with work site procedures. 4.3 Tools and equipment are stored safely in appropriate location according to standard procedures.
Range of Variables	
Variable	**Range** (may include but not limited to):

1. Safe work practice	1.1 Safe use of PPE 1.2 Identify hazards 1.3 Control hazards 1.4 Report to the designated authority regarding hazards and risks 1.5 Response to emergency situations 1.6 Safe use of tools and equipment
2. Personal Protective Equipment (PPE)	2.1 Apron 2.2 Mask 2.3 Helmet 2.4 Goggles / eye shields 2.5 Safety shoes
3. Grinding wheels	3.1 Cylindrical type 3.2 Grades (Rough, semi rough, smooth and dead smooth)
4. Accessories	4.1 Adapter plates 4.2 Wheel dresser 4.3 Balancing stand with weights 4.4 De-burring tools 4.5 Centre
5. Grinding machine	5.1 Plain cylindrical grinder 5.2 Universal cylindrical grinder
6. Cylindrical Grinding operation	6.1 Cylindrical straight grinding 6.2 External taper grinding

Evidence Guide

The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.

1. Critical aspects of competency	Assessment required evidences that the candidate: 1.1 followed Occupational Safety and Health (OSH) in the workplace 1.2 determined job requirements 1.3 selected wheel and accessories 1.4 interpreted drawing 1.5 performed cylindrical grinding operations 1.6 checked / measured workpiece.

2. Underpinning knowledge	2.1 Coolants and Lubricants. 2.2 Types of cylindrical grinding machine. 2.3 Grinding machine parts and functions. 2.4 Selection criteria of grinding wheels. 2.5 Work holding devices. 2.6 Grinding machine accessories, fixtures and attachments.
3. Underpinning skills	3.1 Selecting grinding wheel. 3.2 Calculating of feed and depth of cut 3.3 Setting feed and depth of cut 3.4 Using techniques to performing cylindrical grinding operations. 3.5 Using measuring instruments to check dimension and tolerance.
4. Required attitudes	4.1 Commitment to occupational safety and health. 4.2 Promptness in carrying out activities. 4.3 Sincere and honest to duties. 4.4 Eagerness to learn. 4.5 Tidiness and timeliness. 4.6 Environmental concerns. 4.7 Respect for rights of peers and seniors at workplace. 4.8 Communication with peers and seniors at workplace.
5. Resources implication	The following resources must be provided: 5.1 workplace (actual or simulated) 5.2 tools and equipment appropriate to activities or process 5.3 materials relevant to the proposed activity / task 5.4 equipment and outfits appropriate in applying safety measures 5.5 relevant drawings, manuals, codes, standards and reference material.
6. Methods of assessment	Methods of assessment may include but not limited to: 6.1 written test 6.2 demonstration 6.3 oral questioning 6.4 portfolio.
7. Context of assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated work place after Completion of the training module; 7.2 Assessment should be done by NSDA certified assessor.

Accreditation Requirements

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

Unit Code and Title	**OU-LE-MSP-04-L3-V2: Perform Basic Milling Operation**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform basic milling operation. It includes preparing for work, setting up workpiece, performing milling operations and cleaning and storing tools and equipment.
Nominal Hours	**90 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Prepare for work	1.1 **Safe work practices** are observed throughout the work procedure 1.2 **Personal Protective Equipment (PPE)** is used. 1.3 Drawings are interpreted to produce component to specifications. 1.4 Sequence of operation is determined to produce component to specifications. 1.5 Cutting fluid is selected according to the instruction manual. 1.6 **Cutting tools** are selected according to the requirements of the operation.
2. Setup workpiece	2.1 **Routine maintenance** is performed to prepare machine for required operation in accordance with manufacturer manuals. 2.2 **Workpiece** is set to required level of accuracy using instruments / equipment according to work site procedures. 2.3 Workpiece is set and clamped to required level of accuracy using **instruments / equipment** according to work site procedures. 2.4 Cutting tool is set up in accordance with the requirement of the operation. 2.5 Machine guards and coolant devices are checked and set according to work requirement.

3. Perform milling operations	3.1 Speeds and feeds are set to requirements of the job. 3.2 **Milling machine accessories** are used appropriately to the requirements of the operation. 3.3 Machine performance is checked conforming to the work requirement. 3.4 Coolant is applied to prevent over heating of workpiece and cutting tool as per manufacturer instruction. 3.5 **Milling operations** are performed to produce component to specifications in the drawing. 3.6 Workpiece is checked / measured for conformance to specification using appropriate techniques, **measuring tools** and equipment.
4. Clean and store tools and equipment	4.1 Waste materials are disposed of in accordance with environmental requirements. 4.2 Cleaning of equipment is performed in accordance with work site procedures. 4.3 Tools and equipment are stored safely in appropriate location according to standard procedures.
Range of Variables	
Variable	**Range** (may include but not limited to):
1. Safe work practices	1.1 Identify hazards 1.2 Control hazards 1.3 Report to the designated authority regarding hazards and risk 1.4 Response emergency situation 1.5 Use PPE 1.6 Participate in training relevant with OSH
2. Personal Protective Equipment (PPE)	2.1 Apron 2.2 Mask 2.3 Helmet 2.4 Hand gloves 2.5 Goggles / eye shields 2.6 Safety shoes

3. Cutting tools	3.1 Drill bits 3.2 Reamers 3.3 Slab mills 3.4 End mills 3.5 Shell mills 3.6 Side and face cutters 3.7 Formed cutter 3.8 Slitting saw 3.9 T-slot cutter 3.10 Convex and concave cutter 3.11 Dovetail slot cutter
4. Routine maintenance	4.1 Checking and adjust machine guards 4.2 Checking and use coolant and lubricant 4.3 Checking and adjust chips extraction devices 4.4 Checking machine performance
5. Workpiece	5.1 MS 5.2 Carbon steel 5.3 Cast iron 5.4 Brass 5.5 Aluminum
6. Instruments / equipment	6.1 Machine vice 6.2 Swivel vice 6.3 Rotating vice 6.4 Hook wrench 6.5 Jig & Fixture 6.6 Adjustable wrench 6.7 Pipe wrench 6.8 Spirit level 6.9 Allen key set 6.10 Mallet 6.11 Open ended wrench
7. Milling machine accessories	7.1 Arbor 7.2 Rotary tables 7.3 Tailstock 7.4 Clamping kit 7.5 Collet set 7.6 Adapter

8. Milling operations	8.1 Facing/surfacing 8.2 Drilling 8.3 Milling slot and keyways 8.4 Milling serrations 8.5 Milling v slots 8.6 Dovetail slotting 8.7 Square slotting, 8.8 T-slotting, 8.9 Convex and concave Cutting 8.10 Key way
9. Measuring tools	9.1 measuring tape 9.2 Vernier calipers 9.3 Micrometer (inside, outside, depth) 9.4 Gauges (bore, surface finish, radius, depth) 9.5 Dial indicator
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.	
1. Critical aspects of competency	Assessment required evidences that the candidate: 1.1 followed Occupational Safety and Health (OSH) in the workplace 1.2 performed routine maintenance to prepare the machine for required operation 1.3 determined job requirements 1.4 setup and clamped the workpiece 1.5 interpreted drawing 1.6 performed milling operation 1.7 checked / measured workpiece.
2. Underpinning knowledge	2.1 Types and function of lubricants and coolants. 2.2 Milling types. 2.3 Milling machine parts and their functions. 2.4 Fundamentals of milling cutters and holders. 2.5 Cutting speed, RPM, Feed rate. 2.6 Functions of milling machine accessories, fixtures and attachments.

3. Underpinning skills	3.1 Handling tools and equipment. 3.2 Selecting and setting proper cutting tools. 3.3 Calculating feed, cutting speed and machine RPM as per job requirement. 3.4 Setting cutting speed, RPM, Feed. 3.5 Applying techniques of required milling operation. 3.6 Using measuring instruments to check dimension.
4. Required attitudes	4.1 Commitment to occupational safety and health. 4.2 Promptness in carrying out activities. 4.3 Sincere and honest to duties. 4.4 Eagerness to learn. 4.5 Tidiness and timeliness. 4.6 Environmental concerns. 4.7 Respect for rights of peers and seniors at workplace. Communication with peers and seniors at workplace.
5. Resources implication	The following resources must be provided: 5.1 workplace (actual or simulated) 5.2 tools, equipment and machines 5.3 materials relevant to the proposed activity 5.4 drawings and specifications relevant to the task.
6. Methods of assessment	Methods of assessment may include but not limited to: 6.1 written test 6.2 demonstration 6.3 oral questioning 6.4 portfolio.
7. Context of assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated work place after Completion of the training module; 7.2 Assessment should be done by NSDA certified assessor.
Accreditation Requirements Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.	

References:

a. Competency Standard of National Skills Development Authority (NSDA)
b. Competency Standard of Bangladesh Technical Education Board (BTEB)
c. Competency standard of Philippine with web address https://www.tesda.gov.ph

Review and Validation of Competency Standard

The Competency Standards for National Skills Certificate Level-3 in Machine Shop Practice with CAD and CAM is reviewed and validated by NSDA on 09 December, 2025.

List of Members of Review and Validation Workshop

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