Competency Standard (CS)

CNC Lathe Operation with CAD & CAM

Level-3

Light Engineering Sector

Competency Standard Code: CS-LE-CNCLCDM-L3-EN-V1

National Skills Development Authority
Prime Minister's Office
Government of the People's Republic of Bangladesh

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This Competency Standard for **CNC Lathe Operation with CAD & CAM** 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. "**CNC Lathe Operation with CAD & CAM**" 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 CNC Lathe Operation with CAD & CAM in 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 analyze, 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
SS	-	Stainless Steel
SCVC	-	Standards and Curriculum Validation Committee
STP	-	Skills Training Provider
SOP	-	Standard Operating Procedure
UoC	-	Unit of Competency
CNC	-	Computer & Numeric Control
CADCAM	-	Computer Aided Design and Computer Aided Manufacturing
CDM	-	Computer Aided Design and Manufacturing
4 iR	-	4th Industrial Revolution

Approval of Competency Standard

Approved By
34th Authority Meeting of NSDA
Held on 27.06.2027

Table of Contents

Competency Standards for National Skill Certificate – 4 in
CNC Lathe Operation with CAD & CAM
Course Structure

SL.	Unit Code and Title		UoC Level	Nominal Hours
Generic Units of Competencies				**55**
1.	GU-02-L2-V1	Apply Occupational Health and Safety (OHS) Procedure in The Workplace	2	15
2.	GU-01-L3-V1	Apply Basic IT Skills	3	20
3.	GU-04-L3-V1	Lead Small Team	3	20
Sector Specific Units of Competencies				**40**
4.	SU-LE-01-L2-V1	Interpret Manuals, Sketches and Drawings	2	20
5.	SU-LE-02-L2-V1	Use measuring and Checking Tools and Instrument	2	20
Occupation Specific Units of Competencies				**265**
6.	OU-LE-CNCLCDM-01-L3-V1	Use Hand and Power Tools	3	25
7.	OU-LE-CNCLCDM-02-L3-V1	Write Program Using G&M Code for Machining	3	40
8.	OU-LE-CNCLCDM-03-L3-V1	Perform CNC Lathe Machine Operation	3	70
9.	OU-LE-CNCLCDM-04-L3-V1	Create Model Using CAD Software	3	60
10.	OU-LE-CNCLCDM-05-L3-V1	Apply CAM Software for Machining	3	70
Total Nominal Hours				**360**

Units & Elements at a Glance:

Generic Units of Competencies (55 hours)

Code	Unit of Competency	Elements of Competency	Duration (Hours)
GU-02-L1-V1	Apply Occupational Health and Safety (OHS) Procedure in the Workplace	1. Identify OSH policies and procedures 2. Follow OSH procedure 3. Report hazards and risks 4. Respond to emergencies 5. Maintain personal well-being	15
GU-01-L3-V1	Apply Basic IT Skills	1. Identify and use most commonly used IT Tools 2. Operate computer 3. Work with word processing software 4. Use spread sheet to create /prepare worksheets 5. Use presentation packages to create / prepare presentation 6. Print the documents 7. Use the internet and access E-mail	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

Sector Specific Units of Competencies (40 Hours)

Code	Unit of Competency	Elements of Competency	Duration (Hours)
SU-LE-01-L2-V1	Interpret Manuals, Sketches and Drawings	1. Interpret information and specifications 2. Interpret workplace documents 3. Read and interpret sketches and drawings 4. Practice professional ethics at workplace	20
SU-LE-02-L2-V1	Use Measuring and Checking Tools and Instrument	1. Prepare for work 2. Select the job to be measured and checked 3. Select measuring and checking tools and instruments 4. Take and check measurements	20

		5. Record and communicate measurements	

Occupation Specific Units of Competencies (265 Hours)

Code	Unit of Competency	Elements of Competency	Hours
OU-LE-CNCLCDM-01-L4-V1	Use Hand Tools and Power Tools	1. Identify and inspect hand and power tools 2. Use hand tools properly and safely 3. Operate power tools properly and safely 4. Clean and maintain hand and power tools	25
OU-LE-CNCLCDM-03-L4-V1	Write Program Using G&M Code for Machining	1. Identify the components of CNC Lathe 2. Machine co-ordinate systems 3. Create program using G&M code 4. Set up machine and workpiece 5. Perform 2D machining operation	40
OU-LE-CNCLCDM-03-L4-V1	Perform CNC Lathe Operation	1. Prepare for CNC Lathe operation 2. Set- up machine, cutting tools and workpiece 3. Create and input program 4. Simulate the program 5. Perform machining with CNC Lathe 6. Check and measure workpiece	70
OU-LE-CNCLCDM-04-L4-V1	Create model Using CAD Software	1. Prepare for application of CAD software 2. Create CAD model	60
OU-LE-CNCLCDM-05-L4-V1	Apply CAM Software for Machining	1. Prepare for computer-aided machining operation 2. Identify the sequence of tool path and machining strategy 3. Create 2D tool paths	70

		4. Create 3D tool paths	
OU-LE-CNCCDM-06-L4-V1	Perform basic multi-axis machining	1. Set dynamic work offset 2. Perform (3+2)/positional Machining	40

Generic Units of Competencies

Unit Code and Title	**GU-02-L1-V1: Apply Occupational Health and Safety (OHS) Procedure in the Workplace**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to apply occupational health and safety (OHS) procedure in the workplace. It specifically includes identifying OHS policies and procedures, following OHS procedure, reporting hazards and risks, responding to emergencies, and maintaining personal well-being.
Nominal Hours	**15 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Identify OSH policies and procedures	1.1. **OHS policies** and **safe operating procedures** are accessed and stated 1.2. **Safety signs and symbols** are identified and followed 1.3. Emergency response, evacuation procedures and other contingency measures are determined according to workplace requirements
2. Follow OSH procedure	2.1 **Personal protective equipment (PPE)** is selected and collected as required 2.2 Personal protective equipment (PPE) is correctly used in accordance with organization OHS procedures and practices 2.3 A clear and tidy workplace is maintained as per workplace standard 2.4 PPE is maintained to keep them operational and compliant with OHS regulations
3. Report hazards and risks.	3.1 **Hazards** and risks are identified, assessed and controlled 3.2 Incidents arising from hazards and risks are reported to designated authority
4. Respond to emergencies	4.1 Alarms and warning devices are responded 4.2 Workplace **emergency procedures** are followed 4.3 **Contingency measures** during workplace accidents, fire and other emergencies are recognized and followed in accordance with organization procedures 4.4 Frist aid procedures is applied during emergency situations
5. Maintain personal well-being	5.1 OHS policies and procedures are adhered to 5.2 OHS awareness programs are participated in as per workplace guidelines and procedures 5.3 Corrective actions are implemented to correct unsafe condition in the workplace 5.4 **"Fit to work" records** are updated and maintained according to workplace requirements

Range of Variables	
Variables	**Range** (may include but not limited to):
1. OHS policies	1.1. Bangladesh standards for OHS 1.2. Fire Safety Rules and Regulations 1.3. Code of Practice 1.4. Industry Guidelines
2. Safe operating procedures	2.1 Orientation on emergency exits, fire extinguishers, fire escape, etc. 2.2 Emergency procedures 2.3 First Aid procedures 2.4 Tagging procedures 2.5 Use of PPE 2.6 Safety procedures for hazardous substances
3. Safety signs and symbols	3.1 Direction signs (exit, emergency exit, etc.) 3.2 First aid signs 3.3 Danger Tags 3.4 Hazard signs 3.5 Safety tags 3.6 Warning signs
4. Personal Protective Equipment (PPE)	4.1 Gas Mask 4.2 Gloves 4.3 Safety boots 4.4 Face mask 4.5 Overalls 4.6 Goggles and safety glasses 4.7 Sun block 4.8 Chemical/Gas detectors
5. Hazards	5.1 Chemical hazards 5.2 Biological hazards 5.3 Physical Hazards 5.4 Mechanical and Electrical Hazard 5.5 Mental hazard 5.6 Ergonomic hazard
6. Emergency Procedures	6.1 Fire fighting 6.2 Earthquake 6.3 Medical and first aid 6.4 Evacuation
7. Contingency measures	7.1 Evacuation 7.2 Isolation 7.3 Decontamination
8. “Fit to Work” records	8.1 Medical Certificate every year 8.2 Accident reports, if any

	8.3 Eye vision certificate
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 stated OHS policies and safe operating procedures 1.2 followed safety signs and symbols 1.3 used personal protective equipment (PPE) 1.4 maintained workplace clear and tidy 1.5 assessed and Controlled hazards 1.6 followed emergency procedures 1.7 followed contingency measures 1.8 implemented corrective actions
2. Underpinning knowledge	2.1 Define OHS 2.2 OHS Workplace Policies and Procedures 2.3 Work Safety Procedures 2.4 Emergency Procedures 2.5 Hazard control procedure 2.6 Different types of Hazards 2.7 PPE and there uses 2.8 Personal Hygiene Practices 2.9 OHS Awareness
3. Underpinning skills	3.1 Accessing OHS policies 3.2 Handling of PPE 3.3 Handling cleaning tools and equipment 3.4 Writing report 3.5 Responding to emergency procedures
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Workplace 5.2 Equipment and outfits appropriate in applying safety measures 5.3 Tools, materials and documentation required 5.4 OHS Policies and Procedures
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration

	6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module. 7.2 Assessment should be done by NSDA certified/ nominated 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-01-L3-V1: Apply Basic IT Skills
Unit Descriptor	This unit covers the basic knowledge, skills and attitude required to apply basic IT skills. It specifically includes Identifying and use most commonly used IT Tools, operating computer, working with word processing software, use spread sheet to create /prepare worksheets, using presentation packages to create / prepare presentation, printing the documents and using the internet and access E-mail.
Nominal Hours	**20 Hours**
Elements of Competency	**Performance Criteria** **Bold and Underlined** terms are elaborated in the Range of Variables Training Components.
1. Identify and use most commonly used IT tools	1.1 Context of IT is interpreted 1.2 Commonly used **IT tools** are identified 1.3 Safe work practice and OSH Standards are followed
2. Operate computer	2.1 **Peripherals** are checked and connected with computer as per standard 2.2 Power cords / adapter are connected with computer and power outlets socket safely 2.3 Computer is switched on gently 2.4 PC **desktop / GUI settings** are arranged and customized as per requirement 2.5 Files and folders are created, opened, copied, renamed, deleted and sorted as per requirement 2.6 Properties of files and folders are viewed and searched 2.7 Disks are defragmented, formatted as per requirement
3. Work with word processing software	3.1 Word Processing software is selected and started 3.2 Basic typing technique is demonstrated 3.3 **Documents** are created as per requirement in personal use and office environment 3.4 **Contents** are entered 3.5 Documents are **formatted**
4. Use spread sheet to create /prepare worksheets	4.1 Spreadsheet are selected and started 4.2 Worksheets are created as per requirement in Personal use and office environment 4.3 Data are entered 4.4 **Functions** are used for calculating and editing logical operation 4.5 Sheets are formatted as per requirement 4.6 Charts are created 4.7 Charts/ Sheets are previewed

5. Use presentation packages to create / prepare presentation	5.1 Appropriate presentation software packages are selected and started 5.2 Presentation is created as per requirement in personal use and office environment 5.3 Image, Illustrations, text, table, symbols and media are entered as per requirements 5.4 Presentations are formatted and animated 5.5 Presentations are previewed
6. Print the documents	6.1 Printer is connected with computer and power outlet properly 6.2 Power is switched on at both the power outlet and printer 6.3 Printer is installed and added 6.4 Correct printer settings are selected and document is printed
7. Use the Internet and Access E-Mail	7.1 Appropriate internet **browsers** are selected 7.2 Search engines are used to access information 7.3 Video / Information are Shared /downloaded / uploaded from / to web site/social media 7.4 Web based resources are used 7.5 Email services are identified and selected to create a new email address 7.6 Document is prepared, attached and sent to different types of recipients 7.7 Email is read, forwarded, replied and deleted as per requirement 7.8 Custom email folders are created and manipulated 7.9 Email message is printed
Range of Variables	
Variable	**Range** (may include but not limited to):
1. IT tools	1.1 Phone 1.2 Cell Phone 1.3 TABs 1.4 Radio 1.5 Television 1.6 Computers 1.7 Laptops 1.8 Notebooks 1.9 Internet 1.10 Software 1.11 Satellite
2. Peripherals	2.1. Monitor 2.2. Keyboard 2.3. Mouse 2.4. Modem 2.5. Scanner 2.6. Printer

3. Desktop / GUI settings	3.1 Icons 3.2 Taskbar 3.3 View 3.4 Resolutions
4. Documents	4.1 Word documents 4.2 Standard CV / Bio-Data with different text & fonts, image and table. 4.3 Application / Official letter with proper paragraph and indenting, spacing, styles, Illustrations, Tables, Header & Footers and symbols. 4.4 Standard report / newspaper items with column, footnote and endnote, drop cap, indexing and page numbering.
5. Contents	5.1 Illustrations and styles 5.2 Text 5.3 Table 5.4 Symbols 5.5 Header & Footer
6. Formatted	6.1 Bold 6.2 Italic 6.3 Underline 6.4 Font size, colour, 6.5 Change case 6.6 Alignment and intend
7. Functions	7.1. Mathematics 7.2. Logical 7.3. Simple Statistical
8. Browsers	8.1 Internet Explorer 8.2 Firefox 8.3 Google Chrome 8.4 Opera 8.5 Safari 8.6 Omni Web
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 created, opened, copied, renamed, deleted and sorted files and folders as per requirement. 1.2 completed application software Installations as per standard 1.3 performed simple trouble shooting with Computer 1.4 created email accounts. 1.5 used email account for online platforms purpose
2. Underpinning	2.1 Basic competent of PC

Knowledge	2.2 IT and IT Tools 2.3 Different type of software and application packages 2.4 Use of word processor, spread sheet and presentation software 2.5 Different type of math and logical functions 2.6 Computer Trouble Shooting 2.7 Techniques to access internet
3. Underpinning Skills	3.1 Identifying and use IT Tools 3.2 Demonstrating typing on word processing software 3.3 Saving and retrieving documents on Word Processing software. 3.4 Demonstrated ability to create email accounts 3.5 Opening an email account and use it for different purpose. 3.6 Configured appropriate printer settings and printed the document
4. Underpinning Attitudes	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 Workplace (simulated or actual) 5.2 IT Tools 5.3 Computers with word processing application 5.4 Internet connection 5.5 Presentations 5.6 Learning manuals
6. Methods of Assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of Assessment	8. Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module. 9. Assessment should be done by NSDA certified/ nominated 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. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
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

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Sector Specific Units of Competencies

Unit Code and Title	SU-LE-01-L2-V1: Interpret Manuals, Sketches and Drawings
Unit Descriptor	This unit covers the skills, knowledge and attitudes required to interpret manuals, sketches and drawings. It specifically includes interpreting information and specifications, workplace documents, reading and interpreting sketches and drawings and practicing professional ethics at workplace.
Nominal Hours	**20 hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables Training Components
1. Interpret information and specifications	1.1 Appropriate **manuals** for work activity are identified and collected 1.2 Information and specifications in the manuals are interpretedand applied
2. Interpret workplace documents	2.1 Workplace documents are interpreted as per standard 2.2 Assistance is taken to aid comprehension when required from peers / supervisors 2.3 Visual information / symbols / signage's are understood and followed 2.4 Specific and relevant information are accessed from appropriate sources 2.5 Appropriate medium is used to transfer information and ideas
3. Read and interpret sketches and drawings	3.1 Relevant **sketches and drawings** are identified for job requirement 3.2 Key terms and abbreviations are identified and interpreted 3.3 Signs and symbols are identified and interpreted 3.4 Schedules, dimensions, sketches, drawings and specifications are correctly read and interpreted
4. Practice professional ethics at workplace	4.1 Responsibilities as a team member are demonstrated and kept promises and commitments made to others 4.2 Tasks are performed in accordance with workplace procedures 4.3 Confidentiality is respected and maintained 4.4 Situations and actions considered inappropriate or which present a conflict of interest are avoided
Range of Variables	
Variable	**Range** (may include but not limited to):

1. Manuals	1.1. Buyers' specification 1.2. Compliance 1.3. Maintenance procedure 1.4. Periodic maintenance 1.5. Quality assurance 1.6. Standard operating procedure (SOP)
2. Sketches and drawings	2.1. Technical 2.2. Measurement 2.3. Design
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 Interpret information and specifications 1.2 Interpret workplace documents 1.3 Read and interpret sketches and drawings 1.4 Practice professional ethics at workplace
2. Underpinning knowledge	2.1. Describe Manuals 2.2. Types of manuals 2.3. Units of measurement 2.4. Units of conversion 2.5. Signs and symbols 2.6. Define Sketch 2.7. Define drawings 2.8. Define specifications
3. Underpinning Skills	3.1 Interpreting performance of workplace communication and etiquette 3.2 Interpreting workplace instructions and symbol 3.3 Interpreting workplace code of conducts is as per organizational guidelines 3.4 Interpreting workplace documents as per standard 3.5 Interpreting and implementing meeting outcomes
4. Underpinning 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 Communication with peers and seniors in workplace
5. Resource Implications	The following resources must be provided: 5.1. Workplace (simulated or actual) 5.2. Computer/laptop/notebook

	5.3. Software 5.4. Stationary 5.5. Learning manual 5.6. Fire extinguisher
6. Methods of Assessment	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 center or in an actual or simulated workplace after completion of the training module. 7.2 Assessment should be done by NSDA certified/ nominated 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	**SU-LE-02-L2-V1: Use Measuring and Checking Tools and Instruments**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to use measuring and checking tools and instruments. It includes the tasks of preparing for work, selecting the job to be measured and checked, selecting measuring and checking tools and instruments, taking and checking measurements, recording and communicating measurements, cleaning and storing measuring and checking instruments.
Nominal Hours	**20 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the range ofvariables
1. Prepare for work	1.1 Safe work practices are observed and **Personal Protective Equipment (PPE)** worn as required for the work performed. 1.2 **Hazards** are identified and risks are minimized and controlled. 1.3 **Measuring and checking tools and instruments** are selected and collected for use.
2. Select the job to be measured and checked	1.4 Jobs to be measured are identified 1.5 Jobs to be checked are identified 1.6 **Documents** and specifications are Interpreted
3. Select measuring and checking tools and instruments	3.1 Measuring and checking instrument is selected according to job requirements 3.2 Tolerance and/or clearance, limits are interpreted from the drawing
4. Take and check measurements	4.1 Measuring and checking instruments are calibrated to ensure accurate reading/measurement 4.2 **Routine adjustments** are done as required 4.3 **Measurements** are taken precisely/ accurately as per supplied drawing or manual 4.4 Measurements are checked against job requirement.
5. Record and Communicate Measurements	5.1 Measurements are recorded on form/drawings/sketches as per company procedures 5.2 Recorded measurements are interpreted and communicated to supervisor
6. Clean and store measuring and checking instruments	6.1 Measuring and checking instruments are cleaned 6.2 Measuring instruments are stored as per industry procedure.
Range of Variables	
Variable	**Range** (May include but not limited to)

1. Personal Protective Equipment (PPE)	1.1 Safety shoes 1.2 Goggles 1.3 Hand gloves 1.4 Safety helmet 1.5 Overall apron 1.6 Safety Mask 1.7 Ear plug
2. Hazards	1.8 Physical hazard 1.9 Chemical hazard 1.10 Electrical and mechanical hazard 1.11 Biological hazard 1.12 Ergonomic hazard
3. Measuring and checking tools and instruments	3.1 **Measuring tools and instrument** ▪ Measuring tape ▪ Slide/Vernier Calipers ▪ Steel Rules ▪ Micrometer ▪ Protecter ▪ Combination square set ▪ Vernier Hight gauge ▪ Depth gauge ▪ Dial indicator 3.2 **Checking tools** ▪ Inside calipers ▪ Outside calipers ▪ Filler gauge ▪ Thread gauge ▪ Divider ▪ Plug gauge ▪ Snap gauge ▪ Ring gauge ▪ Radius gauge
4. Documents	4.1 Drawings 4.2 Sketches 4.3 Technical manuals 4.4 Specifications 4.5 Written instructions
5. Routine adjustment	5.1 Calibration 5.2 Simple zeroing 5.3 Scale adjustment 5.4 Reference adjustment

6. Measurements	6.1 Measuring length 6.2 Thread pitch 6.3 Angle 6.4 Diameter 6.5 Clearances
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent and recent andmeet the requirements of the current version of the Unit of Competency.	
1. Critical aspects of competency	1.1 Followed OSH practices 1.2 Identified the proper graduated measuring instrument 1.3 Took measurement 1.4 Recorded measurement 1.5 Interpreted written inspection.
2. Underpinning knowledge	2.1 Relevant OSH. 2.2 Principles of using different graduated measuring instruments. 2.3 Workplace standard. 2.4 Sequence of using the instruments. 2.5 Maintaining rules of instruments. 2.6 Method s of checking for instruments 2.7 Calibration of instrument
3. Underpinning skill	3.1 Practicing workplace safety 3.2 Using PPE 3.3 Using measuring instruments 3.4 Interpreting and following data sheet, instruction and manuals, technical drawing 3.5 Performing measurement 3.6 Checking for conformance to specification 3.7 Keeping record 3.8 Calibrating measuring instrument
4. Underpinning attitudes	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
5. Resource implications	5.1 Adequate workplaces 5.2 Materials for proposed activities 5.3 Hand tools and power tools appropriate to propose activities 5.4 Information and documentation 5.5 Manual, Codes, Standards and reference materials
6. Methods of assessment	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 center or in an actual or simulated workplace after completion of the training module. 7.2 Assessment should be done by NSDA certified/ nominated assessor

Accreditation Requirements

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Occupation Specific Units of Competencies

Unit Code and Title	**OU-LE-CNCLCDM-01-L3-V1: Use Hand Tools and Power Tools**
Unit Descriptor	This unit covers the skills, knowledge, and attitudes required to use hand tools and power tools. It specifically includes identifying and inspecting hand and power tools, using hand tools properly and safely, operating power tools properly and safely and cleaning and maintaining hand and power tools.
Nominal Hours	**25 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables Training Components
1. Identify and inspect hand and power tools	1.1 Appropriate **hand tools** and **power tools** are identified as per workplace requirement 1.2 Application of hand and power tools is recognized 1.3 Usability of hand and power tools is checked and verified
2. Use hand tools ~~properly and~~ safely	2.1 Appropriate hand tools are selected as per job requirement 2.2 Safety precautions are ensured before using hand tools 2.3 Unsafe or faulty hand tools are identified and marked for repair 2.4 Use hand tools ~~properly and~~ safely to perform a work activity
3. Operate power tools safely	3.1 Appropriate **power tools** are selected as per job requirement 3.2 Safe work practice is observed and **Personal Protective Equipment (PPE)** is worn as per workplace requirement 3.3 Power supply outlet and electrical cord are inspected and confirmed safe for use following established workplace safety requirements 3.4 Safety precautions are ensured before using power tools following the manufacturer's operating specifications 3.5 The proper sequence of operation is applied for using power tools 3.6 Unsafe or faulty power tools are identified and marked for repair 3.7 Operate power tools safely to perform a work activity

4. Clean and maintain hand and power tools	4.1 Dust and foreign matter are removed from hand and power tools following workplace standards 4.2 Condition of hand and power tools is checked after use and reported to authorised personnel 4.3 Appropriate lubricant is applied after use and before storage 4.4 Defective hand and power tools are inspected and repaired or replaced 4.5 Hand and power tools are stored and secured following workplace requirements
Range of Variables	
Variable	**Range** (may include but not limited to):
1. Hand tools	1.1. Ball peen hammer 1.2. Soft hammer 1.3. Bench vice 1.4. Flat File 1.5. Half round file 1.6. Triangular file 1.7. Square file 1.8. Knife file 1.9. Round file 1.10. Diamond file set 1.11. Center punch 1.12. Prick punch 1.13. Spanner set 1.14. Chisels 1.15. Adjustable wrenches 1.16. Nose pliers 1.17. Combination pliers 1.18. Neon tester 1.19. Allen key set 1.20. C-clamp 1.21. Scriber 1.22. Screwdrivers 1.23. Hacksaw 1.24. Socket spanner set 1.25. Grip vice 1.26. Tap and Die
2. Power tools	2.1. Pedestal grinding machine 2.2. Hand grinder 2.3. Pedestal Drill machine 2.4. Blower machine

3. Personal Protective Equipment (PPE)	3.1 Safety helmets 3.2 Apron/Boiler suit 3.3 Earplugs 3.4 Safety goggles 3.5 Hand gloves 3.6 Safety boots
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 Identified and selected appropriate hand and power tools for work to be performed 1.2 Followed safety precautions when using hand and power tools 1.3 Operated power tools safely and according to manufacturer's operating specification 1.4 Performed cleaning and maintenance of hand and power tools after use and before storing
2. Underpinning knowledge	2.1 Mention the types of hand and power tools,its functions, and use 2.2 Procedures for safely using hand and power tools
3. Underpinning Skills	3.1 Identifying hand and power, ~~and measuring~~ tools 3.2 Following safety precautions when using hand and power, tools 3.3 Using hand tools correctly and safely 3.4 Operating power tools correctly and safely 3.5 Cleaning and maintaining hand and power tools after use 3.6 Applying appropriate lubricant on hand and power tools after use and before storing
4. Underpinning 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
5. Resource Implications	5.1 Workplace (simulated or actual) 5.2 Personal protective equipment (PPE) 5.3 Hand tools 5.4 Power tools 5.5 Measuring tools 5.6 Stationary

	5.7 Learning manual
6. Methods of Assessment	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 center or in an actual or simulated workplace after completion of the training module. 7.2 Assessment should be done by NSDA certified/ nominated 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-CNCLCDM-02-L3-V1: Write Program Using G&M Code for Machining**
Unit Descriptor	This unit covers the skills, knowledge and attitudes required to create and use G&M code for machining. It specifically includes identifying the component of CNC Lathe, determining machine co-ordinate systems, creating program using G&M code,
Nominal Hours	40 Hours
Elements of Competency	**Performance Criteria** **Bold and Underlined** terms are elaborated in the Range of Variables.
1. Identify the components of CNC Lathe	1.1. Personal Protective Equipment (PPE) is identified as per job requirement 1.2. Personal Protective Equipment (PPE) is worn as per job requirement 1.3. **Different components of CNC Lathe** are identified as per manufacturer manual
2. Determine machine co-ordinate systems	1.4. Reference position of a turning center/CNC lathe is determined 1.5. **Work coordinates** are set 1.6. **Cutting parameters** are calculated as per job requirement
3. Create program using G & M code	2.1 Preparatory **G & M code** is determined 2.2 Modal and non-modal codes are identified 2.3 Use of Absolute and Incremental positioning code is identified 2.4 Use of circular and linear interpolation are identified 2.5 Use of rapid mode and home positioning code are identified 2.6 Tool nose radius compensation is selected 2.7 Tools offset and work offset are set 2.8 Spindle commands and program stop commands are executed 2.9 **Canned cycles** are executed
Range of Variables	
Variables	Range (may include but not limited to):
1. Different components of CNC Lathe	1.1 Bed 1.2 Headstock 1.3 Live centre 1.4 Dead centre 1.5 Chuck

	1.6 Tailstock 1.7 Tool turret 1.8 Tool holders 1.9 CNC Control Unit 1.10 Axis Drives 1.11 Coolant System 1.1 Chip Conveyor
2. Work co-ordinates	1.2 Machine co-ordinate 1.3 WCS / Work offset 1.4 Machine reference
3. Cutting parameter	1.5 Cutting Speed 1.6 Spindle Speed RPM 1.7 Cutting feed 1.8 Depth of cut 1.9 Chip load
4. G & M code	2.1. Rapid 2.2. Absolute 2.3. Incremental 2.4. Linear interpolation 2.5. Circular interpolation 2.6. Tool change command 2.7. Spindle command 2.8. Tool nose radius compensation. 2.9. Drilling cycle 2.10. Dwell 2.11. Inch and mm selection code 2.12. Plane selection code 2.13. Home positioning code
5. Canned cycle	4.1. Facing cycle 4.2. Turning Cycle 4.3. Finishing cycle 4.4. Grooving/Parting cycle 4.5. Threading cycle
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 Identified the components of CNC Lathe 1.2 Determined machine co-ordinate systems 1.3 Created program using G & M code
2. Underpinning knowledge	2.1 Job requirements 2.2 Drawing interpretation methods 2.3 The sequence of operation in producing component

	2.4 The selection process of cutting tools 2.5 Calculation of cutting speed, feed rate, and depth of cut of different types of materials 2.6 CNC programming using G & M code 2.7 Program simulation, editing, downloading, and saving procedure 2.8 Basic file maintenance procedures 2.9 CNC lathe machine cleaning and maintenance procedures. 2.10 Sequence of G&M Code as per operation.
3. Underpinning skills	3.1 Interpreting drawings to produce component 3.2 Determining the sequence of operation 3.3 Selecting cutting tools 3.4 Calculating cutting speed, feed rate, and depth of cut 3.5 Simulating and editing program 3.6 Saving and downloading program 3.7 Writing CNC program using G & M codes 3.8 Determining the optimum sequence of operations 3.9 Conducting data security
4. Underpinning attitudes	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
5. Resource implications	5.1 Workplace (simulated or actual) 5.2 Personal protective equipment (PPE) 5.3 CNC turning Center/CNC Lathe and accessories 5.4 Tools and equipment 5.5 Materials 5.6 Internet 5.7 Instructions, specifications, and drawings 5.8 PC/Laptop 5.9 Projector 5.10 Stationary 5.11 Learning manual
6. Methods of assessment	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 center or in an actual or simulated workplace after completion of the training module. 7.2 Assessment should be done by NSDA certified/ nominated assessor

Accreditation Requirements

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Unit Code and Title	**OU-LE-CNCLCDM-03-L3-V1: Perform CNC Lathe Operation**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform CNC lathe operations. It includes preparing for CNC Lathe operation, setting-up machine, cutting tools and workpiece, creating and inputting program, simulating the program, performing machining with CNC Lathe, checking and measuring workpiece.
Nominal Hours	70 Hours
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Prepare for CNC Lathe operation	1.1 Safe work practices observed and **Personal Protective Equipment (PPE)** worn as required for the work performed. 1.2 **Tools** and **materials** for CNC operation are selected conforming to the job requirement. 1.3 **Routine checkup** is performed to prepare the machine for required operation. 1.4 Drawings are interpreted to produce component to specifications.
2. Set- up machine, cutting tools and workpiece	2.1 Work offset is set according to the required tool position) 2.2 **Cutting tools** are set according to required sequence of operations. 2.3 **Work holding and clamping devices** are tightened according to standard operating procedures. 2.4 Workpiece is mounted on clamping device using tools in accordance with workplace procedures.

3. Create and input program	3.1 Program is created on the machine in accordance with job requirement. 3.2 **Program** is inputted to the machine using **appropriate devices.** 3.3 Program is checked to determine the correctness of work parameters. 3.4 Workpiece zero point is set to the required position.
4. Simulate the program	4.1 Program simulation is performed to check the desired tool path movement. 4.2 Perform dry run as required. 4.3 program is edited for the desired tool path movement.
5. Perform machining with CNC Lathe	5.1 Door is closed in order to safe operation. 5.2 Program is reset to ensure start position from the first program block. 5.3 machine auto mode feature is confirmed. 5.4 **CNC Lathe operations** are performed to produce component as programmed. 5.5 **Corrective measures/adjustments** are performed if necessary.
6. Check and measure workpiece	6.1 Workpiece is checked and measured in conformance to specification using appropriate methods, **measuring tools** and equipment. 6.2 Defective workpieces are marked, recorded and reported for proper action. 6.3 Waste materials are disposed of in accordance with environmental requirements. 6.4 Cleaning of machine and equipment is performed in accordance with standard procedures 6.5 Tools and equipment are stored safely in appropriate location according to standard work place procedures

Range of Variables

Variable	**Range** (may include but not limited to):
1. Personal Protective Equipment (PPE)	1.1 Hand gloves 1.2 Goggles 1.3 Safety shoes 1.4 Apron 1.5 Safety helmet 1.6 Ear plug
2. Tools	2.1 Adjustable wrench 2.2 Spanner 2.3 Allen key 2.4 Mallet

	2.5 Dial indicator with magnetic stand 2.6 Test indicator 2.7 Screwdriver
3. Materials	3.1 Mild steel/Alloy steel 3.2 Aluminum 3.3 Nylon
4. Routine checkup	4.1 Checking and adjust machine guards 4.2 Checking and use coolant and lubricant 4.3 Checking & adjusting air and hydraulic pressure 4.4 Checking and adjust chips extraction device 4.5 Checking machine performance
5. Cutting tools	5.1 Turning tool 5.2 Grooving/Parting tools 5.3 Drilling tools 5.4 Threading tools 5.5 Finishing tool 5.6 Tap and die 5.7 Cutting tool insert 5.8 Cutting tool holder
6. Work holding and clamping device	6.1 Three jaw chuck 6.2 Soft jaw 6.3 Collet chuck 6.4 Tailstock 6.5 Live center
7. Program	7.1 Liner programing 7.2 Canned cycle programing 7.3 Absolute programing 7.4 Incremental programing
8. Appropriate input devices	8.1 Machine Key board 8.2 Computer 8.3 Flash drive 8.4 Mouse/Key board 8.5 USB Drive
9. CNC Lathe operation	9.1 Facing 9.2 Straight turning 9.3 Contour turning (circular, taper) 9.4 Grooving 9.5 Fillet 9.6 Drilling 9.7 Chamfers 9.8 External thread cutting

	9.9 Parting-off
10. Corrective measures/ adjustments	10.1 Replacement of cutting tools 10.2 Adjustment of tool offset 10.3 Adjustment of cutting speed and feed rate, depth of cut
11. Measuring tools	11.1 Vernier caliper (Digital or read out) 11.2 Micrometer (Digital or read out, inside, outside, depth) 11.3 Gauges (surface comparator / roughness tester, radius, screw pitch gauges, Go and Not Go gauges, plug gauges,)

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 Used safety rules and procedure 1.2 Performed machine set-up 1.3 Performed cutting tools setting 1.4 Created and inputted programs 1.5 Performed workpiece set-up 1.6 Simulated the program 1.7 Turned workpiece 1.8 Checked and measured workpiece
2. Underpinning knowledge	2.1 Lubricant checking 2.2 Emergency stop 2.3 Machine axis 2.4 G-Code programing 2.5 M-code programing 2.6 Coordinate 2.7 Absolute position 2.8 Relative position 2.9 Machine position 2.10 Mode ▪ Edit (Program) mode ▪ 2.10.2 JOG (Handle) mode ▪ 2.10.3 MDI/Data mode ▪ 2.10.5 Single block mode ▪ 2.10.6 Auto/memory mode ▪ 2.11 Feed rate overwrite 2.11 Spindle speed overwrite 2.12 Rapid travels 2.13 Tool offset and tool geometry 2.14 Zero return

	2.15 Memory lock key 2.16 Machine lock 2.17 Coolant on/off 2.18 Cycle start and cycle stop 2.19 Low lubrication indicator 2.20 Classification and mechanical properties of engineering materials 2.21 Setting cutting speed, rpm, feed rate 2.22 Work holding and tool holding devices 2.23 Tool offset and tool geometry 2.24 Tool set up in turning operations 2.25 Lathe accessories, fixtures and attachment
3. Underpinning skills	3.1 Selecting of cutting tools 3.2 Calculating of feed, cutting speed and machine RPM 3.3 Applying of G – codes and M – codes 3.4 Creating /inputting programs 3.5 Setting workpiece 3.6 Simulating the program 3.7 Executing the program 3.8 Applying techniques to turn workpiece 3.9 Using measuring tools and equipment to check and measure of workpiece
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 work 5.3 CNC Lathe 5.4 materials relevant to the proposed activity / task 5.5 computer with data transfer device 5.6 measuring instruments 5.7 drawings and sketches.
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 for assessment	7.1 Competency assessment must be done in a training center or in an actual or simulated workplace after completion of the training module. 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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Unit Code and Title	**OU-LE-CNCLCDM-04-L3-V1: Create Model Using CAD Software**
Unit Descriptor	This unit covers the skills, knowledge and attitudes required to create model using CAD software. It specifically includes preparing for application of CAD software and creating CAD model.
Nominal Hours	**60 Hours**
Elements of Competency	**Performance Criteria** **Bold and Underlined** terms are elaborated in the Range of Variables.
1. Prepare for application of CAD software	1.1 **Workpiece orientation** of the 3D model is analysed to produce a CAD model 1.2 All general symbol, the standard of drawing is identified 1.3 **Tools and equipment** are selected and collected as per job requirements 1.4 Appropriate **CAD software** is installed as per the standard operating procedure 1.5 **System parameters** are selected according to the job requirement
2. Create CAD model	2.1 Drawing **interface** is set required for 2D drawing 2.2 **Drafting software tools** are used for 2D drawing 2.3 **Feature tool** is used 2.4 Created model is saved as per standard **file format**
Range of Variables	
Variables	**Range** (may include but not limited to):
1. Workpiece orientation	1.1 Top view 1.2 Front view 1.3 Side view (left and right) 1.4 Isometric view 1.5 Sectional view

2. Tools and equipment	2.1 Measuring steel tape 2.2 Vernier caliper 2.3 Vernier height gauge 2.4 Inside vernier micrometer 2.5 Outside vernier micrometer 2.6 Radius gauge 2.7 Thread gauge 2.8 Surface plate 2.9 Personal computer/laptop 2.10 Printer
3. CAD Software	3.1 SolidWorks /CATIA/Fusion 360/Siemens NX/ Master CAM
4. System parameter	4.1 Metric 4.2 English
5. Interface	5.1 Menus 5.2 Toolbars
6. Drafting Software tools	6.1 2D sketch ▪ Points ▪ Lines ▪ Circle ▪ Arcs ▪ Rectangles ▪ Splines ▪ Ellipses ▪ Polygons ▪ Poly line ▪ Slots ▪ Text ▪ Chamfer and fillet 6.2 Edit and modify ▪ Trim ▪ Extend ▪ Mirror ▪ Offset ▪ Copy ▪ Move ▪ Delete 6.3 Relation ▪ Parallel ▪ perpendicular ▪ horizontal ▪ Vertical ▪ Coincide

	▪ Colinear ▪ Tangent ▪ Fix 6.4 Modifying tools 6.5 Pattern tools
7. Feature tools	7.1 Extrude boss 7.2 Extrude Cut 7.3 Revolve boss and cut 7.4 to be included to level 4Mirror 7.5 Hole wizard
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. Determined job requirements 1.2. Created/imported CAD drawing 1.3. Set CAD parameters 1.4. Created and edited 2D sketch 1.5. Created 3D model 1.6. ModifiedCAD model 1.7. Exported the drawing with the appropriate dimension
2. Underpinning knowledge	2.1. Common software packages 2.2. Computer hardware safety 2.3. Software maintenance and virus protection 2.4. Workpiece orientation 2.5. Feature tools 2.6. Drafting software tools 2.7. Drawing interpretation: ▪ Standard drawing scales, symbols, and abbreviations ▪ Orthographic projection (1st and3rd angle) ▪ Perspective projection ▪ Section view ▪ Dimensioning ▪ Measurements tolerances ▪ Surface condition (surface finish/texture) ▪ Limits and fits ▪ Clearance
3. Underpinning skills	3.1 Performing measurement 3.2 Drafting and designing 3.3 Determining workpiece specifications 3.4 Using coordinate system 3.5 Performing geometry and calculation

	3.6 Using measuring tools 3.7 Computer skill
4. Underpinning attitudes	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
5. Resource implications	5.1 Workplace (simulated or actual) 5.2 Computer/laptop/notebook 5.3 Software 5.4 Printer/plotter 5.5 Internet 5.6 Sample part/model 5.7 Measuring instruments 5.8 Job specifications, drawings, or work instructions 5.9 Projector 5.10 Stationary 5.11 Learning manual
6. Methods of assessment	Competency should be assessed by: 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 workplace after completion of the training module. 7.2 Assessment should be done by NSDA certified/ nominated assessor

Accreditation Requirements

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Unit Code and Title	**OU-LE-CNCLCDM-05-L3-V1: Apply CAM Software for Machining**
Unit Descriptor	This unit covers the skills, knowledge and attitudes required to apply CAM software machining. It specifically includes preparing for computer aided machining operation, identifying the sequence of tool path and machining strategy and creating turning tool paths.
Nominal Hours	**70 Hours**
Elements of Competency	**Performance Criteria** **Bold and Underlined** terms are elaborated in the Range of Variables.
1. Prepare for computer-aided machining operation	1.1 **CAM software** is identified and verify the system requirement 1.2 CAM software installation is carried out as per requirement 1.3 **Basic parameter** is set of the CAM software 1.4 **Menu functions** are identified 1.5 Appropriate tools and equipment are used to produce a drawing as per job requirements 1.6 CAD files are imported as required 1.7 CAD models are created as required
2. Identify the sequence of tool path and machining strategy	2.1. workpiece is verified and required machines are identified 2.2. Appropriate tool path sequence is selected for a model-specific machining operation 2.3. Appropriate tool is selected as per job requirement 2.4. **Work holding & clamping** is prepared to avoid tool clash 2.5. Appropriate **cutting parameter** is selected
3. Create turning tool paths	3.1 **Planes** are identified 3.2 Machine definition and post-processor is selected 3.3 Origin & stock setup is defined 3.4 **Turning tool paths** are executed 3.5 Tool paths are verified 3.6 Programs are generated using G&M codes
Range of Variables	
Variables	**Range** (may include but not limited to):
1. CAM software	1.1 Mastercam/Solid CAM/Siemens NX/Fusion 360/CATIA
2. Basic parameter	2.1 Inch 2.2 Metric

3. Manu function	3.1 File 3.2 Edit 3.3 View 3.4 Analyze 3.5 Create 3.6 Solids 3.7 X form 3.8 Machine type 3.9 Toolpaths 3.10 Setting 3.11 Wireframe
4. Work holding & clamping	4.1 Chuck 4.2 Clamping
5. Cutting parameter	5.1 Feed 5.2 Spindle speed (RPM) 5.3 Depth of cut 5.4 Plunge 5.5 Cutting speed 5.6 Chip load
6. Planes	6.1 Construction plane 6.2 WCS plane 6.3 Tool plane
7. Turning tool paths	7.1 Facing 7.2 Rough turning 7.3 Finishing 7.4 Grooving/Parting 7.5 External Threading 7.6 Drilling
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 Set Basic parameter is set of the CAM software 1.2 Identified menu functions 1.3 Selected appropriate tool path sequence for a model-specific machining operation 1.4 Prepared Work holding & clamping to avoid tool clash 1.5 Executed Turning tool paths 1.6 Identified cutting tools 1.7 Determined cutting speed, feed rate, and depth of cut 1.8 G & M code generated and transferred to the machine

	1.9 Executed the generated program on the machine
2. Underpinning Knowledge	2.1 Basic geometry 2.2 Basic drawing 2.3 Machine operating system 2.4 G & M code 2.5 Tool selection procedure 2.6 Computer-aided machining software 2.7 Basic parameter 2.8 Manu function 2.9 Work holding & clamping 2.10 Cutting parameter 2.11 Planes 2.12 Turning tool paths 2.13 Relevant thread calculations
3. Underpinning skills	3.1 Applying Work holding mechanism 3.2 Planning and sequencing of operations 3.3 Selecting cutting tools 3.4 Acknowledging of CAM parameters 3.5 Using measuring instruments 3.6 Calculating cutting speed, feed rate, and depth of cut 3.7 Simulating and editing program 3.8 Saving and downloading program 3.9 Writing CNC program 3.10 Determining the sequence of operations 3.11 Setting basic parameter of the CAM software 3.12 Identifying Menu functions 3.13 Preparing work holding & clamping to avoid tool clash 3.14 Executing turning tool paths
4. Underpinning attitudes	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
5. Resource implications	5.1 Workplace (simulated or actual) 5.2 Personal protective equipment (PPE) 5.3 CNC milling machine and accessories 5.4 Tools and equipment 5.5 Materials 5.6 Software
6. Methods of assessment	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 center or in an actual or simulated workplace after completion of the training module. 7.2 Assessment should be done by NSDA certified/ nominated 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.	

Development of Competency Standard

The Competency Standards for National Skills Certificate Level-3 in **CNC Lathe Operation with CAD & CAM** is Developed by NSDA on 22-23 April, 2024.

List of Members of the Development Workshop

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Validation of Competency Standard

The Competency Standards for National Skills Certificate Level-3 in CNC Lathe Operation with CAD and CAM is Validated by NSDA on 12 May 2024.

List of Members of the Validation Workshop

Sl. No.	Name and Address	Position in the committee	Signature
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