Skills for Employment Investment Program (SEIP)

COMPETENCY STANDARD

FOR

CNC MACHINE OPERATION

(LIGHT ENGINEERING SECTOR)

Finance Division, Ministry of Finance
Government of the People's Republic of Bangladesh

Table of Contents

Copyright

This document is available from:

Skills for Employment Investment Program (SEIP) Project
Finance Division
Ministry of Finance
Probashi Kallyan Bhaban (Level – 16)
71-72 Old Elephant Road
Eskaton Garden, Dhaka 1000
Telephone: +8802 551 38598-9 (PABX), +8802 551 38753-5
Facsimile: +8802 551 38752
Website: www.seip-fd.gov.bd

List of Abbreviations

General	
BMET	Bureau of Manpower Employment and Training
B-SEP	Bangladesh Skills for Employment and Productivity
BTEB	Bangladesh Technical Education Board
DTE	Directorate of Technical Education
ILO	International Labor Organization
ISC	Industry Skills Council
NPVC	National Pre-Vocation Certificate
NTVQF	National Technical and Vocational Qualifications Framework
PPP	Public Private Partnership
SCDC	Standards and Curriculum Development Committee
SEIP	Skills for Employment Investment Program
TVET	Technical Vocational Education and Training
UoC	Unit of Competency
Occupation Specific	
RPM	Revolutions per minute
CNC	Computer Numerical Control
NC	Numerical Control
ANSI	American National Standards Institute
CATIA	Computer-aided three-dimensional interactive application
ISO	International Organisation for Standardisation
CAM	Computer aided manufacturing
OHS	Occupational health and safety
PPE	Personal protective equipment
SOP	Standard operating procedure

Introduction

The Skills for Employment Investment Program (SEIP) Project of the Finance Division of the Ministry of Finance has embarked on a project which aims to qualitatively and quantitatively expand the skilling capacity of identified public and private training providers by establishing and operationalising a responsive skill ecosystem and delivery mechanism through a combination of well-defined set of funding triggers and targeted capacity support.

Among the many components of the project, one is to promote a Market Responsive Inclusive Skills Training Delivery programme. Key priority economic growth sectors identified by the government have been targeted by the project to improve current job skills along with up-skilling of the 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 programmes. Priority sectors were identified to adopt a demand driven approach to training with effective inputs from Industry Skills Councils (ISC's), employer associations and employers.

This document 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.

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 national and international subject-matter experts, SEIP, BTEB, ISC, and industry experts to identify the competencies required of an occupation in a particular sector.

Competency standards describe the skills, knowledge and attitude needed to perform effectively in the workplace. Competency standards acknowledge that people can achieve technical and vocational competency in many ways by emphasising 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

Approval Sheet

Identification and validation of units of competency and elements for this occupation were made by experts within this sector. A series of meetings were held to accurately capture industry and employer needs and expectations, and develop the competency framework that would help to enhance the employability of the youth trained. This process started on 18 April 2018 and concluded with a validation workshop with working group on 28 May 2018.

Experts Involved

Industry and subject-matter experts who provided their valuable inputs to develop this competency standard [March – May 2018]:

Name	Organisation	Designation
Md. Abdul Halim	UCEP Mirpur Technical School	Instructor - CNC Unit
Md. Lavlu Mia	UCEP Mirpur Technical School	Instructor - CNC Unit
Md. Masud Rana	BITAC (Dhaka)	Executive Engineer
Md. Abdur Razzaque	Sunrise Engineering (Dhaka)	Chairman - ISC
Rupesh Chandra Roy	BCSIR	Director (In-Charge)
Mozammel Mia	AUST (Dhaka)	Assistant Professor
Dr. N. R. Dhar	British Council - SD03	National Subject Matter Consultant - Light Engineering Sector

Development Workshop

Working group formation and competency standard development workshop participants [held on 30 April 2018]:

Name	Organisation	Designation
Enamul Haque Khan	BEIOA	Co-coordinator (M & E)
Rupak Kanti Biswas	BTEB	Quality Assurance Officer
Md. Abdul Halim	UCEP Mirpur Technical School	Instructor - CNC Unit
Md. Lavlu Mia	UCEP Mirpur Technical School	Instructor - CNC Unit
Md. Masud Rana	BITAC (Dhaka)	Executive Engineer
Md. Abdur Razzaque	Sunrise Engineering (Dhaka)	Chairman - ISC
Uttam Kumar Das	TTC Chittagong	Instructor
Mozammel Mia	AUST (Dhaka)	Assistant Professor

Name	Organisation	Designation
Syed Nasir Ershad	SEIP	AEPD (Public-1)
Md. Ahsan Habib	SEIP	TVET Specialist
Mr. Mohiuzzaman	SEIP	Course Specialist
David King	British Council - SD03	Team Leader
Dr. N. R. Dhar	British Council - SD03	National Subject Matter Consultant - Light Engineering Sector

Validation Workshop

Competency standard validation workshop participants [held on 28 May 2018]:

Name	Organisation	Designation
Enamul Haque Khan	BEIOA	Co-coordinator (M&E)
Rupak Kanti Biswas	BTEB	Quality Assurance Officer
Md. Abdul Halim	UCEP Mirpur Technical School	Instructor - CNC Unit
Md. Lavlu Mia	UCEP Mirpur Technical School	Instructor - CNC Unit
Md. Masud Rana	BITAC (Dhaka)	Executive Engineer
Md. Abdur Razzaque	Sunrise Engineering (Dhaka)	Chairman - ISC
Md. Abdur Razzaque	SEIP	Specialist-1 (Competence Standards)
Uttam Kumar Das	BKTTC - Chittagong	Instructor
Md. Farque Ahmed	BCSIR	Engineer
Syed Nasir Ershad	SEIP	AEPD (Public-1)
Md. Ahsan Habib	SEIP	TVET Specialist
Mr. Mohiuzzaman	SEIP	Course Specialist
David King	British Council - SD03	Team Leader
Dr. N. R. Dhar	British Council - SD03	National Subject Matter Consultant – Light Engineering Sector

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

Committee Workshop

The National competency standards for National Skills Certificate in [**INSERT CS NAME**), **NTVQF Level [INSERT LEVEL]** qualification is a document developed by the Skill for Employment Investment Programme (SEIP), Finance Division, Ministry of Finance. This standard has been developed by an industry expert group under guidance of SEIP. The standard was approved by the SCDC [BTEB to insert date] at NTVQF Cell, BTEB.

Respectable members of the SCDC:

[INSERT CS NAME], Level [INSERT LEVEL]		

Course Structure

SL	Unit Code and Title		Level	Nominal Duration (Hours)
Generic Competencies (4 units of competency required)				
1	SEIP-LE-CNC-01-G	Use basic mathematical concepts		24
2	SEIP-LE-CNC-02-G	Carry out workplace interaction in English		8
3	SEIP-LE-CNC-03-G	Operate in a team environment		16
4	SEIP-LE-CNC-04-G	Apply basic IT skills		12
Sub-Total				**60**
Sector-specific Competencies (4 units of competency required)				
1	SEIP-LE-CNC-01-S	Apply occupational health and safety (OHS) practice in the workplace		12
2	SEIP-LE-CNC-02-S	Read and interpret sketches and drawings		16
3	SEIP-LE-CNC-03-S	Use hand and power tools		16
4	SEIP-LE-CNC-04-S	Apply quality system		16
Sub-Total				**60**
Occupation-specific Competencies (6 units of competency required)				
1	SEIP-LE-CNC-01-O	Perform basic lathe machine operations		20
2	SEIP-LE-CNC-02-O	Perform basic milling machine operations		20
3	SEIP-LE-CNC-03-O	Carry out CNC lathe machine operations		60
4	SEIP-LE-CNC-04-O	Carry out CNC milling machine operations		80
5	SEIP-LE-CNC-05-O	Carry out CNC wire cut machine operations		40
6	SEIP-LE-CNC-06-O	Apply knowledge of CAM		20
Sub-Total				**240**
Total Nominal Learning Hours				**360**

Competency Chart

Units of Competency	Elements		
Generic Specific (Basic) Competencies			
Use basic mathematical concepts SEIP-LE-CNC-01-G	Identify calculation requirements in the workplace	Select appropriate mathematical methods/concepts for the calculation	Use tools and instruments to perform calculations
Carry out workplace interaction SEIP-LE-CNC-02-G	Interpret workplace communication and etiquette	Read and understand workplace documents	Participate in workplace meetings and discussions
	Practice professional ethics at work		
Operate in a team environment SEIP-LE-CNC-03-G	Identify team goals and work processes	Identify own role and responsibilities within team	Communicate and co-operate with team members
	Practice problem solving within the team		
Apply basic IT skills SEIP-LE-CNC-04-G	Identify and use most commonly used IT tools	Understand use of computer	Work with word processing application
	Work with spreadsheets	Access email and search the internet	

Sector-specific (Common) Competencies

Apply occupational health and safety (OHS) practice in the workplace SEIP-LE-CNC-01-S	Identify OHS policies and procedures	Apply personal health and safety practices	Report hazards and risks
	Respond to emergencies		
Read and interpret sketches and drawings SEIP-LE-CNC-02-S	Interpret information and specifications	Read and interpret sketches and drawings	
Use hand and power tools SEIP-LE CNC-03-S	Identify and inspect hand and power tools	Use hand tools properly and safely	Operate power tools properly and safely
	Clean and maintain hand and power tools		
Apply quality system SEIP-LE-CNC-04-S	Work within a quality system	Apply and monitor a quality system	Apply standard procedures for each job

Occupation-specific (Core) Competencies

Perform basic lathe machine operations SEIP-LE-CNC-01-O	Identify and prepare work requirements	Prepare for lathe operations	Perform basic lathe machine operations
	Clean and store machinery, tools and equipment		
Perform basic milling machine operations SEIP-LE-CNC-02-O	Identify and prepare work requirements	Prepare for milling operations	Perform basic milling machine operations
	Clean and store machinery, tools and equipment		
Carry out CNC lathe machine operations SEIP-LE-CNC-03-O	Set-up CNC lathe machine	Download and input program	Cut model and sample work piece
	Perform CNC lathe machine operations	Check and measure work piece	Maintain tools, equipment, machinery and systems
Carry out CNC milling machine operations SEIP-LE-CNC-04-O	Set-up CNC milling machine	Download and input program	Cut model and sample work piece
	Perform CNC milling machine operations	Check and measure work piece	Maintain tools, equipment, machinery and systems
Carry out CNC wire cut machine operations SEIP-LE-CNC-05-O	Prepare for CNC wire cut machine operations	Set- up machine, wire and work piece	Download and input program
	Perform CNC wire cut operations in auto mode	Clean and store machinery, tools and equipment	
Apply knowledge of CAM SEIP-LE-CNC-06-O	Prepare for CAM program	Import CAD model	Edit program
	Load and run program		

Units and Elements Table

Generic – Compulsory (4 units of competency required)

Code	Unit of Competency	Elements of Competency	Duration (hours)
SEIP-LE-CNC-01-G	Use basic mathematical concepts	1. Identify calculation requirements in the workplace. 2. Select appropriate mathematical methods/concepts for the calculation. 3. Use tools and instruments to perform calculations.	24
SEIP-LE-CNC-02-G	Carry out workplace interaction	1. Interpret workplace communication and etiquette. 2. Read and understand workplace documents. 3. Participate in workplace meetings and discussions. 4. Practice professional ethics at work.	8
SEIP-LE-CNC-03-G	Operate in a team environment	1. Identify team goals and work processes. 2. Identify own role and responsibilities within team. 3. Communicate and co-operate with team members. 4. Practice problem solving within the team.	16
SEIP-LE-CNC-04-G	Apply basic IT skills	1. Identify and use most commonly used IT tools. 2. Understand use of computer. 3. Work with word processing application. 4. Work with spreadsheets. 5. Access email and search the internet.	12
Total Hours			**60**

Sector-specific – Compulsory (4 units of competency required)

Code	Unit of Competency	Elements of Competency	Duration (hours)
SEIP-LE-CNC-01-S	Apply occupational health and safety (OHS) practice in the workplace	**1.** Identify OHS policies and procedures. **2.** Apply personal health and safety practices. **3.** Report hazards and risks. **4.** Respond to emergencies.	12
SEIP-LE-CNC-02-S	Read and interpret sketches and drawings	**1.** Interpret information and specifications. **2.** Read and interpret sketches and drawings.	16
SEIP-LE-CNC-03-S	Use hand 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.	16
SEIP-LE-CNC-04-S	Apply quality systems	**1.** Work within a quality system. **2.** Apply and monitor a quality system. **3.** Apply standard procedures for each job.	16
Total Hours			**60**

Occupation-specific – Compulsory (6 units of competency required)

Code	Unit of Competency	Elements of Competency	Duration (hours)
SEIP-LE-CNC-01-O	Perform basic lathe machine operations	1. Identify and prepare work requirements. 2. Prepare for lathe operations. 3. Perform basic lathe machine operations. 4. Clean and store machinery, tools and equipment.	20
SEIP-LE-CNC-02-O	Perform basic milling operations	1. Identify and prepare work requirements. 2. Prepare for milling operations. 3. Perform basic milling machine operations. 4. Clean and store machinery, tools and equipment.	20
SEIP-LE-CNC-03-O	Carry out CNC lathe machine operations	1. Set-up CNC lathe machine. 2. Download and input program. 3. Cut model and sample work piece. 4. Perform CNC lathe machine operations. 5. Check and measure work piece. 6. Maintain tools, equipment, machinery and systems.	60
SEIP-LE-CNC-04-O	Carry out CNC milling machine operations	1. Set-up CNC milling machine. 2. Download and input program. 3. Cut model and sample work piece. 4. Perform CNC milling machine operations. 5. Check and measure work piece. 6. Maintain tools, equipment, machinery and systems.	80
SEIP-LE-CNC-05-O	Carry out CNC wire cut machine operations	1. Prepare for CNC wire cut machine operations. 2. Set- up machine, wire and work piece. 3. Download and input program. 4. Perform CNC wire cut operations in auto mode. 5. Clean and store machinery, tools and equipment.	40
SEIP-LE-CNC-06-O	Apply knowledge of CAM	1. Prepare for CAM program. 2. Import CAD model. 3. Edit program. 4. Load and run program.	20

Code	Unit of Competency	Elements of Competency	Duration (hours)
Total Hours			**240**

Generic Competencies

Unit Title:	Use basic mathematical concepts
Unit Code:	SEIP-LE-CNC-01-G
Nominal Hours:	24 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to perform computations using basic mathematical concepts in the workplace. It specifically includes identifying general calculation requirements, selecting appropriate mathematical method/concept, and forming and solving mathematical problems in the workplace using appropriate tools and instruments.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify calculation requirements in the workplace	**1.1.** **Calculation requirements** are identified from **workplace information.** **1.2.** Mathematical problems are constructed from workplace information.
2. Select appropriate mathematical methods/concepts for the calculation	**2.1.** **Appropriate method** is selected to carry out calculation requirements. **2.2.** Constructed mathematical problems are solved with appropriate method.
3. Use tools and instruments to perform calculations	**3.1.** **Tools and instruments** required for computation are identified. **3.2.** Calculation is performed using appropriate tools and instruments accurately.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Calculation requirements	**1.1.** Unit **1.2.** Area **1.3.** Height/ length/ breadth/ thickness **1.4.** Diameter **1.5.** Weight **1.6.** Capacity **1.7.** Time **1.8.** Temperature **1.9.** Material/data usage **1.10.** Speed **1.11.** Costing

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
2. Workplace information	**2.1.** Floor environment **2.2.** Design sheet **2.3.** Specification sheet **2.4.** Working chart/drawing **2.5.** Standard operating procedure (SOP) **2.6.** Job order
3. Appropriate method	**3.1.** Addition **3.2.** Subtraction **3.3.** Division **3.4.** Multiplication **3.5.** Conversion **3.6.** Percentage and ratio calculation **3.7.** Simple equation
4. Tools and instruments	**4.1.** Calculator **4.2.** Cell phone **4.3.** Computer **4.4.** Ruler

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 must evidence that the candidate: **1.1.** Identified calculation requirements from workplace information **1.2.** Selected appropriate method to carry out the calculation requirements **1.3.** Completed calculations using appropriate tools and instruments
2. Underpinning knowledge	**2.1.** Numerical concepts **2.2.** Basic mathematical methods such as addition, subtraction, multiplication, division and percentage **2.3.** Mathematical language, symbols and terminology **2.4.** Measuring units
3. Underpinning skills	**3.1.** Constructing simple problems from workplace information **3.2.** Solving problems using appropriate method, tools and instruments **3.3.** Using appropriate tools and instruments

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.	
4. Underpinning attitudes	**4.1.** Prompt in carrying out activities **4.2.** Tidy and punctual **4.3.** Respectful of peers, subordinates and seniors in the workplace **4.4.** Safely use tools and equipment **4.5.** Sincere and honest concerning duties
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Calculator **5.3.** Cell phone **5.4.** Computer/laptop/notebook **5.5.** Measuring tape **5.6.** Ruler **5.7.** Projector **5.8.** Stationary **5.9.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Carry out workplace interaction
Unit Code:	SEIP-LE-CNC-02-G
Nominal Hours:	8 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to carry out workplace interaction. It specifically includes workplace communication, etiquette, understanding workplace documents, workplace meetings and discussions, and professional ethics at work.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Interpret workplace communication and etiquette	**1.1.** Workplace codes of conduct are interpreted as per organisational guidelines. **1.2.** Appropriate lines of communication are maintained with supervisors and colleagues. **1.3.** Workplace interactions are conducted in a **courteous manner** to gather and convey information. **1.4.** **Workplace procedures and matters** are comprehended.
2. Read and understand workplace documents	**2.1.** Workplace documents are interpreted correctly. **2.2.** Visual information/symbols/signage are understood correctly and followed. **2.3.** Specific and relevant information are accessed from **appropriate sources.** **2.4.** Appropriate medium is used to transfer information and ideas.
3. Participate in workplace meetings and discussions	**3.1.** Team meetings are attended on time. **3.2.** Meeting procedures and etiquette are followed. **3.3.** Active participation is ensured, opinions are expressed and heard. **3.4.** Inputs are provided and interpreted in line with the meeting purpose.
4. Practice professional ethics at work	**4.1.** Responsibilities as a team member are performed. **4.2.** Tasks are performed in accordance with workplace procedures. **4.3.** Confidentiality is maintained. **4.4.** Inappropriate and conflicting situations are avoided.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Courteous manner	**1.1.** Effective questioning **1.2.** Active listening **1.3.** Speaking skills **1.4.** Writing skill **1.5.** Email etiquette
2. Workplace procedures and matters	**2.1.** Notes **2.2.** Arranging a meeting **2.3.** Agenda **2.4.** Simple reports such as progress and incident reports **2.5.** Job sheets **2.6.** Operational manuals **2.7.** Brochures and promotional material **2.8.** Visual and graphic materials **2.9.** Standards **2.10.** OHS information **2.11.** Signs
3. Appropriate sources	**3.1.** Human Resources (HR) Department **3.2.** Managers **3.3.** Supervisors **3.4.** Management Information System (MIS)

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 must evidence that the candidate: **1.1.** Interpreted workplace communication and etiquette **1.2.** Interpreted workplace instructions and symbols **1.3.** Performed active participation in workplace meetings
2. Underpinning knowledge	**2.1.** Workplace communication and etiquette **2.2.** Workplace documents, signs and symbols **2.3.** Meeting procedure and etiquette **2.4.** Professional ethics
3. Underpinning skills	**3.1.** Demonstrating workplace communication and etiquette **3.2.** Interpreting workplace instructions and symbols **3.3.** Demonstrating active participation in workplace meeting **3.4.** Applying professional ethics at work

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.	
4. Underpinning attitudes	**4.1.** Prompt in carrying out activities **4.2.** Tidy and punctual **4.3.** Respectful of peers, subordinates and seniors in the workplace **4.4.** Concerned about the work environment **4.5.** Sincere and honest concerning duties
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Workplace procedures **5.3.** Standard operating procedure **5.4.** Workplace documents, signs and symbols **5.5.** Codes of conduct **5.6.** Projector **5.7.** Stationary **5.8.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.
Accreditation Requirements Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.	

Unit Title:	Operate in a team environment
Unit Code:	SEIP-LE-CNC-03-G
Nominal Hours:	16 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to operate in a team environment. It specifically includes team goals and work processes, roles and responsibilities, team communication and problem solving within the team.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify team goals and work processes	**1.1.** Roles and objectives of the team are identified and interpreted. **1.2.** Roles and responsibilities of team members are identified and interpreted.
2. Identify own role and responsibilities within team	**2.1.** Personal role and responsibilities are identified within the team environment. **2.2.** Reporting relationships are interpreted within team and external to team.
3. Communicate and co-operate with team members	**3.1.** Other teammates' tasks are identified and support provided when requested. **3.2.** The team is encouraged through **sharing information** or expertise, working together to solve problems, and putting team success first. **3.3.** Views and opinions of other team members are interpreted and respected.
4. Practice problem solving within the team	**4.1.** Problems faced at the individual and team level are identified and showed insight into the root-causes of the problems. **4.2.** A range of solutions and courses of action are identified together with benefits, costs, and risks associated with each. **4.3.** The good ideas of others to help develop solutions are recognised and advice sought from those who have solved similar problems. **4.4.** It is looked beyond the obvious and not stopped at the first answers.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Sharing information	**1.1.** Agenda **1.2.** Minutes **1.3.** Progress and incident reports **1.4.** Operational manuals **1.5.** Visual and graphic materials **1.6.** Emails and SMS **1.7.** Phone directory **1.8.** Policy, procedure and standards **1.9.** OHS information

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 must evidence that the candidate: **1.1.** Identified own role and responsibilities within team **1.2.** Communicated and co-operated with team members **1.3.** Demonstrated problem solving within the team
2. Underpinning knowledge	**2.1.** Team goals and work processes **2.2.** Roles and responsibilities **2.3.** Finding problems and solving them
3. Underpinning skills	**3.1.** Identifying own role and responsibilities within team **3.2.** Communicating and co-operating with team members **3.3.** Demonstrating problem solving within the team
4. Underpinning attitudes	**4.1.** Active on teamwork **4.2.** Prompt in carrying out activities **4.3.** Tidy and punctual **4.4.** Respectful of peers, subordinates and seniors in the workplace **4.5.** Sincere and honest concerning duties
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Projector **5.3.** Stationary **5.4.** Learning manual

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.	
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Apply basic IT skills
Unit Code:	SEIP-LE-CNC-04-G
Nominal Hours:	12 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to apply basic IT skills in the workplace. It specifically includes identifying common IT tools, using computer, using word processing and spreadsheet applications, emailing and searching on internet.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify and use most commonly used IT tools	**1.1.** History of information technology (IT) is identified and summarised. **1.2.** Commonly used **IT tools** are identified and described.
2. Understand use of computer	**2.1.** Basic parts of a computer are identified. **2.2.** Turning on and off technique of a computer is performed. **2.3.** Working environment, functions and features of operating system is interpreted. **2.4.** Simple trouble-shooting techniques are applied.
3. Work with word processing application	**3.1.** Word processing application appropriate to perform activity is operated. **3.2.** Basic typing technique to document is applied. **3.3.** Word processing techniques to document are employed. **3.4.** Personal CV writing using suitable word processing techniques is practiced. **3.5.** Saving and retrieving technique of a document is used.
4. Work with spreadsheets	**4.1.** Spreadsheet working environment, functions and features are identified and interpreted. **4.2.** Data entry on spreadsheet appropriate to perform activity is performed. **4.3.** **Data manipulation techniques** to spreadsheet document are applied. **4.4.** Spreadsheet document is created and saved.
5. Access email and search the internet	**5.1.** Use of email account in online environment is explained. **5.2.** Writing and sending of workplace emails is completed. **5.3.** Different **browsers** to work online are identified and selected. **5.4.** Browse different web portals and apply proper search techniques.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. IT tools	**1.1.** Cell phone **1.2.** Tablets **1.3.** Computers, laptops, notebooks **1.4.** Internet **1.5.** Software **1.6.** Satellite
2. Data manipulation techniques	**2.1.** Sum **2.2.** Average **2.3.** Count **2.4.** Max **2.5.** Min **2.6.** If **2.7.** Sort **2.8.** Fill **2.9.** Header **2.10.** Footer **2.11.** Print
3. Browsers	**3.1.** Internet Explorer **3.2.** Firefox **3.3.** Google Chrome **3.4.** Opera **3.5.** Safari **3.6.** Omni Web **3.7.** Microsoft Edge

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 must evidence that the candidate: **1.1.** Identified commonly used IT tools **1.2.** Performed simple trouble-shooting with computer **1.3.** Performed typing on word processing software, saved and retrieved documents **1.4.** Performed data entry with spreadsheet **1.5.** Used email account for different online purposes
2. Underpinning knowledge	**2.1.** IT and IT tools **2.2.** Computer trouble-shooting **2.3.** Techniques to access internet

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.	
3. Underpinning skills	**3.1.** Demonstrating simple trouble-shooting with computer **3.2.** Demonstrating typing on word processing software **3.3.** Demonstrating data entry with spreadsheet **3.4.** Opening email account and using it for different purposes
4. Underpinning attitudes	**4.1.** Active on teamwork **4.2.** Prompt in carrying out activities **4.3.** Tidy and punctual **4.4.** Respectful of peers, subordinates and seniors in the workplace **4.5.** Sincere and honest concerning duties
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** IT tools **5.3.** Computer/Laptop **5.4.** Word processing software **5.5.** Internet connection **5.6.** Stationary **5.7.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.
Accreditation Requirements Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.	

Sector-specific Competencies

Unit Title:	Apply occupational health and safety (OHS) practice in the workplace
Unit Code:	SEIP-LE-CNC-01-S
Nominal Hours:	12 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to apply occupational health and safety (OHS) practices in the workplace. It specifically includes identifying OHS policies and procedures, applying personal health and safety practices, reporting hazards and risks, and responding to emergencies.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify OHS policies and procedures	**1.1.** **OHS policies** and safe operating procedures are interpreted. **1.2.** Safety signs and symbols are identified and followed. **1.3.** Response, evacuation procedures and other contingency measures are interpreted correctly.
2. Apply personal health and safety practices	**2.1.** OHS policies and procedures are applied in the workplace including personal protective equipment (PPE). **2.2.** Common health issues are recognised. **2.3.** Common safety issues are identified.
3. Report hazards and risks	**3.1.** Hazards and risks are identified. **3.2.** Hazards and risks assessment and controls are interpreted.
4. Respond to emergencies	**4.1.** Respond to alarms and warning devices. **4.2.** **Emergency response plans and procedures** are responded to. **4.3.** **First aid procedures** during emergency situations are identified.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. OHS policies	**1.1.** Organisational OHS polices **1.2.** International OHS requirements **1.3.** Fire safety rules and regulations
2. Emergency response plans and procedures	**2.1.** Firefighting procedures **2.2.** Earthquake response procedures **2.3.** Emergency response plans and procedures **2.4.** Medical and first aid

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
3. First aid procedure	**3.1.** Washing of open wound **3.2.** Washing chemically infected area **3.3.** Applying bandage **3.4.** Taking appropriate medicine
4. Personal protective equipment	**4.1.** Safety glasses **4.2.** Ear plugs **4.3.** Gloves **4.4.** Apron **4.5.** Helmet **4.6.** Mask **4.7.** Safety shoes

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 must evidence that the candidate: **1.1.** Identified OHS policies and procedures **1.2.** Applied personal health and safety practices (including PPE) **1.3.** Reported hazards and risks **1.4.** Responded to emergencies
2. Underpinning knowledge	**2.1.** Workplace OHS policies and procedures **2.2.** Work safety procedures **2.3.** Emergency response procedures: **2.3.1.** Fire fighting **2.3.2.** Earthquake response **2.3.3.** Accident response **2.4.** Types of hazards (biological, chemical and physical) and their effects **2.5.** OHS awareness **2.6.** Personal protective equipment (PPE)
3. Underpinning skills	**3.1.** Identifying OHS policies and procedures **3.2.** Applying personal health and safety practices **3.3.** Reporting hazards and risks **3.4.** Responding to emergencies

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.	
4. Underpinning attitudes	**4.1.** Committed to occupational health and safety practices **4.2.** Communicates well with peers, subordinates and seniors in workplace **4.3.** Prompt in carrying out activities **4.4.** Tidy and punctual **4.5.** Sincere and honest concerning duties **4.6.** Responsible during emergencies
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Personal protective equipment (PPE) **5.3.** Firefighting equipment **5.4.** Emergency response manual **5.5.** First aid kits **5.6.** Stationary **5.7.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Read and interpret sketches and drawings
Unit Code:	SEIP-LE-CNC-02-S
Nominal Hours:	16 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to read and interpret sketches and drawings. It specifically includes interpreting information and specifications, and reading and interpreting sketches and drawings.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Interpret information and specifications	**1.1.** Appropriate **manuals** for work activity are identified and collected. **1.2.** Information and **specifications** in the manuals is interpreted and applied.
2. Read and interpret sketches and drawings	**2.1.** Relevant **sketches and drawings** are identified for job requirement. **2.2.** Key **terms and abbreviations** are identified and interpreted. **2.3.** **Signs and symbols** are identified and interpreted. **2.4.** Schedules, dimensions, sketches, drawings and specifications are correctly read and interpreted.

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
3. Specifications	**3.1.** Product **3.2.** Performance **3.3.** Method
4. Terms and abbreviations	**4.1.** Refers to all terms and abbreviations associated with the Light Engineering Sector
5. Signs and symbols	**5.1.** Include all signs and symbols associated with the Light Engineering Sector

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 must evidence that the candidate: **1.1.** Identified information and specifications **1.2.** Read and interpreted sketches and drawings
2. Underpinning knowledge	**2.1.** Manuals **2.2.** Units of measurement **2.3.** Units of conversion **2.4.** Sketch, drawings and specifications
3. Underpinning skills	**3.1.** Reading and identifying information and specifications (from manual) **3.2.** Reading and interpreting sketches and drawings
4. Underpinning attitudes	**4.1.** Eager to learn **4.2.** Tidy and punctual **4.3.** Concerned about proper use of computer and peripherals **4.4.** Concerned for other's rights **4.5.** Sincere and honest concerning duties
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
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Use hand and power tools
Unit Code:	SEIP-LE CNC-03-S
Nominal Hours:	16 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to use hand and power tools in the workplace. It specifically includes identifying and inspecting hand and power tools for usability, using and operating tools properly and safely, and cleaning and maintaining hand and power tools after use.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify and inspect hand and power tools	**1.1.** Appropriate hand and power tools are identified. **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. **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.** **Measuring tools** are checked and calibrated before use. **2.5.** Use hand tools properly and safely to perform work activity.
3. Operate power tools properly and safely	**3.1.** Appropriate **power tools** are selected. **3.2.** Power supply outlet and electrical cord are inspected and confirmed safe for use in accordance with established workplace safety requirements. **3.3.** Safety precautions are ensured before using power tools in accordance with manufacturer's operating specification. **3.4.** Proper sequence of operation applied for using power tools. **3.5.** Unsafe or faulty power tools are identified and marked for repair. **3.6.** Operate power tools properly and safely to perform work activity.
4. Clean and maintain hand and power tools	**4.1.** Dust and foreign matter is removed from hand and power tools in accordance to workplace standards. **4.2.** Condition of hand and power tools is checked after use and reported. **4.3.** Appropriate lubricant is applied after use and prior to storage. **4.4.** **Measuring tools** are checked and calibrated after use. **4.5.** Defective hand and power tools are inspected and repaired or replaced. **4.6.** Hand and power tools are stored and secured in accordance with workplace requirements.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Hand tools	**1.1.** Hammer **1.2.** Bench vice **1.3.** Files **1.4.** Punches **1.5.** Chisels **1.6.** Wrenches **1.7.** Pliers **1.8.** Scriber **1.9.** Screwdrivers **1.10.** Hacksaw **1.11.** Socket spanners **1.12.** Spanners **1.13.** Vice grip **1.14.** Wire cutters **1.15.** Drill **1.16.** Grinder **1.17.** Clamps **1.18.** Jacks
2. Power tools	**2.1.** Drills **2.2.** Rivet gun **2.3.** Grinders **2.4.** Saws **2.5.** Glue guns **2.6.** Soldering iron
3. Measuring tools	**3.1.** Meters **3.2.** Testers **3.3.** Megger **3.4.** Measuring tape **3.5.** Hose level **3.6.** Water level **3.7.** Calliper **3.8.** Steel rule **3.9.** Protractor **3.10.** Tri-square

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 must evidence that the candidate: **1.1.** Identified and selected appropriate hand and power tools for work to be performed **1.2.** Identified and used measuring and testing tools appropriate to work activity **1.3.** Followed safety precautions when using hand and power tools **1.4.** Operated power tools safely and pursuant to manufacturer's operating specification **1.5.** Performed cleaning and maintenance of hand and power tools after use and prior to storing
2. Underpinning knowledge	**2.1.** Information on types of hand and power tools, their functions and use **2.2.** Procedures for safely using hand and power tools
3. Underpinning skills	**3.1.** Identifying hand, power and measuring tools **3.2.** Following safety precautions when using hand, power and measuring tools **3.3.** Using hand and measuring tools correctly and safely in accordance with manufacturer's operating specification **3.4.** Operating power tools correctly and safely in accordance with manufacturer's operating specification **3.5.** Cleaning and maintaining hand and power tools after use **3.6.** Applying appropriate lubricant on hand and power tools after use and prior to 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.** Tidiness and timeliness **4.6.** Concerned for proper use of tools
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Hand tools **5.3.** Power tools **5.4.** Measuring tools **5.5.** Projector **5.6.** Stationary **5.7.** Learning manual

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.	
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Apply quality system
Unit Code:	SEIP-LE-CNC-04-S
Nominal Hours:	16 hours
Unit Descriptor:	This unit covers the knowledge, skills and attitudes required to apply a quality system and procedures in the workplace. It specifically includes the tasks of identifying general quality procedures within a manufacturing environment, applying and monitoring improvement and the application of standard procedures to each job tasks.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Work within a quality system	**1.1.** Instructions and procedures are strictly followed in accordance with **quality improvement system**. **1.2.** Duties are performed in accordance with demand of quality improvement system. **1.3.** Defects are detected and reported according to standard operating procedures. **1.4.** Quality service is ensured and delivered to customer in providing a product or service.
2. Apply and monitor quality system improvement	**2.1.** Performance measurement systems are identified. **2.2.** Specifications and standard operating procedure are identified and established. **2.3.** Performance is assessed at regular intervals. **2.4.** Defects are detected and reported to authority according to standard operating procedure. **2.5.** Process improvement procedures are contributed to and implemented. **2.6.** Improvement of internal/external customer and supplier relationships is contributed to. **2.7.** Performance of operation or quality of product or service is monitored to ensure customer satisfaction.
3. Apply standard procedures for each job	**3.1.** Concept of supplying product or service to meet the customer's requirements is understood and applied accordingly. **3.2.** Responsibility is taken for quality of own work. **3.3.** Quality system procedures for each job are followed. **3.4.** Conformance to specification is ensured in every case at all situations.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Quality improvement system	**1.1.** Quality inspection **1.2.** Quality control **1.3.** Quality improvement **1.4.** Total quality control **1.5.** Quality assurance
2. Customer	**2.1.** Person or organisation receiving the product or service

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 must evidence that the candidate: **1.1.** Used personal protective equipment (PPE) **1.2.** Maintained proper specification and standard of product **1.3.** Checked product for quality assurance as per drawing and specification **1.4.** Detected defects and take corrective and/or quality improvement actions **1.5.** Ensured customer satisfaction
2. Underpinning knowledge	**2.1.** Quality improvement systems **2.2.** Common defects and procedure for addressing defects **2.3.** Performance measurement systems **2.4.** Implementation process of quality improvement system **2.5.** Process improvement procedures **2.6.** Factors affecting customer relationships and satisfaction
3. Underpinning skills	**3.1.** Identifying the role of self and others within the equality improvement system **3.2.** Identifying product and process specifications and tolerance limits **3.3.** Detecting defects, taking corrective and/or quality improvement action **3.4.** Keeping records in accordance with standard operating procedure **3.5.** Identifying customer requirements and always meeting those requirements
4. Underpinning attitudes	**4.1.** Active on team work **4.2.** Tidy and punctual **4.3.** Prompt in carrying out duties **4.4.** Sincere and honest concerning duties **4.5.** Respectful of peers, subordinates and seniors in the workplace **4.6.** Concerned about the occupational health and safety

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.	
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Tools and equipment **5.3.** Measuring instruments **5.4.** Drawings and specifications **5.5.** Manuals, codes, standards and reference material **5.6.** Projector **5.7.** Stationary **5.8.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Occupation-specific Competencies

Unit Title:	Perform basic lathe machine operations
Unit Code:	SEIP-LE-CNC-01-O
Nominal Hours:	20 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to perform basic lathe machine operations. It specifically includes identifying and preparing work requirements, preparing for lathe operations and performing simple lathe operations such as facing, straight and contour turning, cutting grooves, drilling, boring, and thread cutting.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify and prepare work requirements	**1.1.** Drawings are read and interpreted to grind tools conforming to job specifications **1.2.** Tool holding devices are selected according to the job requirements. **1.3.** Cutting tools are selected according to job requirements. **1.4.** Job materials are selected and collected in accordance with the job requirements.
2. Prepare for lathe operations	**2.1.** Appropriate **type of lathe machine** is selected for lathe operations. **2.2.** Different parts of lathe machine are identified. **2.3.** Lathe accessories are selected and used in accordance with job requirements. **2.4.** Cutting speed and feed rate are selected in accordance with job specification. **2.5.** Drawings are read and interpreted to produce component in accordance to the job specification. **2.6.** Sequence of operation is determined to produce products to meet job specification.
3. Perform basic lathe machine operations	**3.1.** RPM, cutting speed, feed rate and depth of cut are calculated in accordance with the job requirement. **3.2.** Machine performance is checked in conformance with standard operating procedure. **3.3.** Coolant is applied to prevent over heating of work piece and cutting tool. **3.4.** **Basic lathe operations** are performed to produce component

	3.5. **Corrective measures and/or adjustments** are performed, if necessary. **3.6.** Workpiece is checked and measured in conformance to job specification using appropriate methods, **measuring tools** and equipment.
4. Clean and store machinery, tools and equipment	**4.1.** Tools, equipment and milling machine is cleaned. **4.2.** Workplace is cleaned. **4.3.** Waste materials are disposed of correctly. **4.4.** Tools, equipment and finished product are stored safely pursuant to workplace guidelines.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Types of lathe machine	**1.1.** Centre **1.2.** Engine **1.3.** Bench **1.4.** Tool room **1.5.** Turret **1.6.** Capstan **1.7.** Multi spindle **1.8.** CNC
2. Basic lathe operations	**2.1.** Facing and straight turning **2.2.** Contour turning (circular, taper) **2.3.** Recess, shoulders, grooves, fillets and chamfers, drilling, boring **2.4.** Thread cutting **2.5.** Parting-off
3. Corrective measures and/or adjustments	**3.1.** Replacement of cutting tools **3.2.** Adjustment of tool offset **3.3.** Adjustment of cutting speed and feed rate
4. Measuring tools	**4.1.** Vernier calliper (digital or read out) **4.2.** Micrometre (digital or read out) **4.3.** Gages (thread, drill, surface comparator/roughness tester, radius, screw pitch, taper)

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 must evidence that the candidate: **1.1.** Cantered and clamped the work piece on chuck **1.2.** Calculated and set RPM, cutting speed, feed rate and depth of cut **1.3.** Performed different turning operations using appropriate cutting tools **1.4.** Cleaned and stored machinery, tools and equipment safely and correctly
2. Underpinning knowledge	**2.1.** Drawing and job specifications **2.2.** Different types of lathe machine **2.3.** Different parts of lathe machine **2.4.** Lathe operations process **2.5.** Cutting speed, RPM, feed rate and depth of cut **2.6.** Types of basic turning operations **2.7.** Tools and equipment
3. Underpinning skills	**3.1.** Reading and interpreting drawings **3.2.** Setting and clamping to required level of accuracy **3.3.** Selecting cutting tools for various lathe operations **3.4.** Computing feed, cutting speed and machine RPM **3.5.** Performing basic turning operations using various lathe tools **3.6.** Using measuring instruments to make necessary adjustments **3.7.** Cleaning and storing machinery, tools and equipment
4. Underpinning attitudes	**4.1.** Prompt in carrying out activities **4.2.** Tidy and punctual **4.3.** Eager to learn **4.4.** Active on teamwork **4.5.** Sincere and honest concerning duties **4.6.** Concerned for proper use of tools **4.7.** Concerned about the work environment **4.8.** Committed to occupational health and safety practices **4.9.** Respectful of peers, subordinates and seniors in the workplace **4.10.** Communicates well with peers, subordinates and seniors in workplace **4.11.** Responsible during emergencies

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.	
5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Personal protective equipment (PPE) **5.3.** Tools and equipment **5.4.** Lathe machine **5.5.** Materials **5.6.** Drawings, manuals, codes, standards and reference material **5.7.** Projector **5.8.** Stationary **5.9.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Perform basic milling operations
Unit Code:	SEIP-LE-CNC-02-O
Nominal Hours:	20 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to perform basic lathe machine operations. It specifically includes identifying and preparing work requirements, preparing for milling operation and performing simple milling operations such as plain and side, face, gang, straddle, slot and end milling operations.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Identify and prepare work requirements	**1.1.** Drawings are read and interpreted to grind tools conforming to job specifications **1.2.** Tool holding devices are selected according to the job requirements. **1.3.** Cutting tools are selected according to job requirements. **1.4.** Job materials are selected and collected in accordance with the job requirements.
2. Prepare for milling operations	**2.1.** Appropriate **type of milling machine** is selected for milling operations. **2.2.** Different parts of milling machine are identified. **2.3.** Milling accessories are selected and used in accordance with job requirements. **2.4.** Cutting speed and feed rate are selected in accordance with job specification. **2.5.** Drawings are read and interpreted to produce component in accordance to the job specification. **2.6.** **Milling cutters** are selected in accordance with the requirements of the operation. **2.7.** Sequence of operation is determined to produce products to meet job specification.
3. Perform basic milling machine operations	**3.1.** **Operating parameters** of milling machine are identified in accordance with job requirement. **3.2.** Machine performance is checked in conformance with standard operating procedure. **3.3.** Coolant is applied to prevent over heating of work piece and cutting tool. **3.4.** **Basic milling operations** are performed to produce component. **3.5.** **Corrective measures and/or adjustments** are performed, if necessary. **3.6.** Workpiece is checked and measured in conformance to job specification using appropriate methods, **measuring tools** and equipment.

4. Clean and store machinery, tools and equipment	**4.1.** Tools, equipment and milling machine is cleaned. **4.2.** Workplace is cleaned **4.3.** Waste materials are disposed of correctly. **4.4.** Tools, equipment and finished product are stored safely pursuant to workplace guidelines.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Types of milling machine	**1.1.** Bed **1.2.** Column and knee **1.3.** Plainer **1.4.** Tracer controlled **1.5.** Thread cutting **1.6.** CNC
2. Milling cutters	**2.1.** Side and face **2.2.** Slotting **2.3.** Single and double angle **2.4.** Slitting saw **2.5.** End and face mill **2.6.** Involute gear **2.7.** Gear hob **2.8.** Slab milling **2.9.** Slot drill
3. Operating parameters	**3.1.** RPM **3.2.** Cutting speed **3.3.** Feed rate **3.4.** Depth of cut
4. Basic milling operations	**4.1.** Plain and side **4.2.** Face **4.3.** Gang **4.4.** Straddle **4.5.** Slot **4.6.** End
5. Corrective measures and/or adjustments	**5.1.** Replacement of cutting tools **5.2.** Adjustment of tool offset **5.3.** Adjustment of cutting speed and feed rate
6. Measuring tools	**6.1.** Vernier calliper (digital or read out) **6.2.** Micrometre (digital or read out) **6.3.** Gages (thread, drill, surface comparator / roughness tester, radius, screw pitch, taper)

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 must evidence that the candidate: **1.1.** Set-up horizontal/vertical machine with a vice **1.2.** Set-up cylindrical plain, side milling, end milling, face-milling cutter on the horizontal/vertical arbour **1.3.** Calculated and set RPM, cutting speed, feed rate and depth of cut **1.4.** Performed different milling operations using appropriate cutting tools **1.5.** Cleaned and stored machinery, tools and equipment safely and correctly
2. Underpinning knowledge	**2.1.** Drawing and job specifications **2.2.** Different types of milling machine **2.3.** Different parts of milling machine **2.4.** Lathe operations process **2.5.** Cutting speed, RPM, feed rate and depth of cut **2.6.** Types of basic milling operations **2.7.** Tools and equipment **2.8.** Setting process of tools **2.9.** Milling cutters
3. Underpinning skills	**3.1.** Reading and interpreting drawings **3.2.** Setting and clamping to required level of accuracy **3.3.** Selecting cutting tools for various milling operations **3.4.** Computing feed, cutting speed and machine RPM **3.5.** Performing basic milling operations using various milling cutters **3.6.** Using measuring instruments to make necessary adjustments **3.7.** Cleaning and storing machinery, tools and equipment
4. Underpinning attitudes	**4.1.** Prompt in carrying out activities **4.2.** Tidy and punctual **4.3.** Eager to learn **4.4.** Active on teamwork **4.5.** Sincere and honest concerning duties **4.6.** Concerned for proper use of tools **4.7.** Concerned about the work environment **4.8.** Committed to occupational health and safety practices **4.9.** Respectful of peers, subordinates and seniors in the workplace **4.10.** Communicates well with peers, subordinates and seniors in workplace **4.11.** Responsible during emergencies

5. Resource implications	The following resources must be provided: **5.1.** Workplace (simulated or actual) **5.2.** Personal protective equipment (PPE) **5.3.** Tools and equipment **5.4.** Milling machine **5.5.** Materials **5.6.** Drawings, manuals, codes, standards and reference material. **5.7.** Projector **5.8.** Stationary **5.9.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Carry out CNC lathe machine operations
Unit Code:	SEIP-LE-CNC-03-O
Nominal Hours:	60 hours
Unit Descriptor:	This unit of competency covers the skills, knowledge and attitudes required to carry out CNC lathe machine operations. It specifically includes setting-up CNC lathe machine, downloading and inputting program, cutting model and sample work piece, performing CNC lathe machine operations, checking and measuring work piece and maintaining CNC lathe machine, tools and equipment.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Set-up CNC lathe machine	**1.1.** Oil and coolant is checked as per manufacturer's specification. **1.2.** Air and hydraulic pressure is checked as per manufacturer's specification. **1.3.** Machine zero point is set to the required position. **1.4.** **Cutting tools** are set according to required sequence of operation. **1.5.** **Clamping devices** are set and tightened according to standard operating procedures. **1.6.** **Tool set-up** is performed as per standard operating procedures. **1.7.** Work piece is mounted and centred on clamping device to required level of accuracy as per workplace procedures.
2. Download and input program	**2.1.** Program is downloaded and inputted into the machine using appropriate device. **2.2.** Program is simulated to determine the correctness of the tool path and other work parameters.
3. Cut model and sample work piece	**3.1.** Dry run is performed in accordance with the desired tool movement. **3.2.** Work piece is cut as programmed. **3.3.** Work piece is checked and measured using appropriate **measuring tools**. **3.4.** Program is edited and tool parameters are corrected as required.
4. Perform CNC lathe machine operations	**4.1.** Work piece is mounted as per standard operating procedures. **4.2.** **CNC lathe operations** are carried out to produce component as per program. **4.3.** **Corrective measures** are performed, if necessary.

5. Check and measure work piece	**5.1.** Work piece is checked and measured against specification using appropriate methods and measuring tools. **5.2.** Defective work pieces are marked, recorded and reported for proper action.
6. Maintain tools, equipment, machinery and systems	**6.1.** Proper shutdown is carried out in accordance with standard operating procedure. **6.2.** Ensure security of data, including regular back-ups and virus checks are performed as per standard operating procedure. **6.3.** Basic file maintenance procedures are carried out in line with the standard operating procedure. **6.4.** Systems and workplace is cleaned according to worksite procedures. **6.5.** CNC lathe machine is cleaned and maintained as per standard operating procedure. **6.6.** Tools, equipment, machinery and **materials** are cleaned and stored safely.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Cutting tools	**1.1.** Turning **1.2.** Grooving **1.3.** Drilling **1.4.** Threading **1.5.** Parting-off **1.6.** Boring **1.7.** Taping **1.8.** Finishing
2. Clamping devices	**2.1.** Three jaw chuck **2.2.** Collect chuck **2.3.** Live centre **2.4.** Bar feeder **2.5.** Part catcher **2.6.** Tool centre
3. Tool set-up	**3.1.** Scratch method **3.2.** Tool-setting device method

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
4. CNC lathe operations	**4.1.** Facing (transversal) **4.2.** Straight turning (longitudinal/plain) **4.3.** Contour turning (circular, taper) **4.4.** Recess, shoulders, grooves, fillets and chamfers **4.5.** Thread cutting **4.6.** Parting-off **4.7.** Drilling **4.8.** Boring **4.9.** Taping
5. Corrective measures	**5.1.** Replacement of cutting tools **5.2.** Adjustment of tool offset **5.3.** Adjustment of cutting speed and feed rate
6. Measuring tools	**6.1.** Vernier calliper (digital or read out) **6.2.** Micrometre (digital or read out) **6.3.** Gages (thread, drill, surface comparator / roughness tester, radius, screw pitch, taper)
7. Materials	**7.1.** Aluminium **7.2.** Brass **7.3.** Copper **7.4.** Steel **7.5.** Titanium **7.6.** Nickel **7.7.** Thermoset plastics

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 must evidence that the candidate: **1.1.** Established job requirements and work piece specifications **1.2.** Identified and selected correct tools and equipment **1.3.** Set-up work using appropriate tools, equipment and clamping device **1.4.** Selected, calculated and used appropriate speed, feed rate and depth of cut **1.5.** Carried out CNC lathe machine operations **1.6.** Checked and measured work piece against specifications **1.7.** Performed any necessary corrective measures to work piece **1.8.** Carried out proper shutdown procedure **1.9.** Carried out basic file maintenance and data security **1.10.** Performed cleaning and maintenance procedures
2. Underpinning knowledge	**2.1.** Job requirements and work piece specifications **2.2.** Tools, equipment and materials **2.3.** Set-up of CNC lathe machine **2.4.** Setting of cutting tools **2.5.** Procedure for checking oil and coolant **2.6.** Procedure for checking air and hydraulic pressure **2.7.** Procedure for setting machine zero point **2.8.** CNC lathe machine operations **2.9.** Measuring tools and corrective measures **2.10.** Quality assurance processes **2.11.** Shutdown procedure **2.12.** Data security and basic file maintenance **2.13.** Cleaning and maintenance procedures

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.	
3. Underpinning skills	**3.1.** Establishing job requirements and work piece specifications **3.2.** Identifying and selecting correct tools and equipment **3.3.** Setting-up work to using appropriate tools, equipment and clamping device **3.4.** Setting work to avoid distortion on release of clamping devices **3.5.** Selecting, calculating and using appropriate speed, feed and depth of cut **3.6.** Planning and sequencing of operations **3.7.** Checking conformance to specifications **3.8.** Carrying out CNC lathe machine operations using precision measuring equipment **3.9.** Checking and measuring work piece against specifications within specified tolerances **3.10.** Performing any necessary corrective measures **3.11.** Carrying out proper shutdown procedure **3.12.** Carrying out basic file maintenance and data security **3.13.** Performing cleaning and maintenance procedures
4. Underpinning attitudes	**4.1.** Prompt in carrying out activities **4.2.** Tidy and punctual **4.3.** Eager to learn **4.4.** Active on teamwork **4.5.** Sincere and honest concerning duties **4.6.** Concerned for proper use of tools **4.7.** Concerned about the work environment **4.8.** Committed to occupational health and safety practices **4.9.** Respectful of peers, subordinates and seniors in the workplace **4.10.** Communicates well with peers, subordinates and seniors in workplace **4.11.** Responsible during emergencies

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.	
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.** Internet **5.5.** Drawings, specifications and work instructions **5.6.** Personal protective equipment (PPE) **5.7.** Tools and equipment **5.8.** Lathe machine **5.9.** Materials **5.10.** Projector **5.11.** Stationary **5.12.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Carry out CNC milling machine operations
Unit Code:	SEIP-LE-CNC-04-O
Nominal Hours:	80 hours
Unit Descriptor:	This unit of competency covers the skills, knowledge and attitudes required to carry out CNC milling machine operations. It specifically includes setting-up CNC milling machine, downloading and inputting program, cutting model/sample work piece, performing CNC milling machine operation, checking and measuring work piece and maintaining CNC milling machine, tools and equipment.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Set-up CNC milling machine	**1.1.** Oil and coolant is checked as per manufacturer's specification. **1.2.** Air and hydraulic pressure is checked as per manufacturer's specification. **1.3.** Machine zero point is set to the required position. **1.4.** **Cutting tools** are set according to required sequence of operation. **1.5.** **Clamping devices** are set and tightened according to standard operating procedures. **1.6.** **Tool set-up** is performed as per standard operating procedures. **1.7.** Work piece is mounted and centred on clamping device to required level of accuracy as per workplace procedures.
2. Download and input program	**2.1.** Program is downloaded and inputted into the machine using appropriate device. **2.2.** Program is simulated to determine the correctness of the tool path and other work parameters.
3. Cut model and sample work piece	**3.1.** Dry run is performed in accordance with the desired tool movement. **3.2.** Work piece is cut as programmed. **3.3.** Work piece is checked and measured using appropriate **measuring tools**. **3.4.** Program is edited and tool parameters are corrected as required.
4. Perform CNC milling machine operations	**4.1.** Work piece is mounted as per standard operating procedures. **4.2.** **CNC milling operations** are carried out to produce component as per program. **4.3.** **Corrective measures** are performed, if necessary.

5. Check and measure work piece	**5.1.** Work piece is checked and measured against specification using appropriate methods and measuring tools. **5.2.** Defective work pieces are marked, recorded and reported for proper action.
6. Maintain tools, equipment, machinery and systems	**6.1.** Proper shutdown is carried out in accordance with standard operating procedure. **6.2.** Ensure security of data, including regular back-ups and virus checks are performed as per standard operating procedure. **6.3.** Basic file maintenance procedures are carried out in line with the standard operating procedure. **6.4.** Systems and workplace is cleaned according to worksite procedures. **6.5.** CNC lathe machine is cleaned and maintained as per standard operating procedure. **6.6.** Tools, equipment, machinery and **materials** are cleaned and stored safely.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Cutting tools	**1.1.** Face milling **1.2.** End milling **1.3.** Drilling **1.4.** Boring **1.5.** Threading **1.6.** Side milling **1.7.** Form milling **1.8.** Profile milling
2. Clamping devices	**2.1.** Angle plate **2.2.** V-Block, U-Clamp and C-Clamp **2.3.** Step-Block **2.4.** Bent-Tail machine clamp **2.5.** Finger machine clamp **2.6.** Machine strap clamp **2.7.** T-Slot bolt **2.8.** Machine vice **2.9.** Toggle clamps **2.10.** Pneumatic fastening clamps **2.11.** Jig and fixtures
3. Tool set-up	**3.1.** Scratch method **3.2.** Tool-setting device method

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
4. CNC milling operations	**4.1.** Face (transversal) **4.2.** Side **4.3.** Shoulder facing **4.4.** Recess, shoulders, grooves, fillets and chamfers **4.5.** Gear cutting **4.6.** Sprocket **4.7.** Profile **4.8.** Form relieved **4.9.** Staggered tooth **4.10.** Double angle
5. Materials	**5.1.** Aluminium **5.2.** Brass **5.3.** Copper **5.4.** Steel **5.5.** Titanium **5.6.** Nickel **5.7.** Thermoset plastics

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 must evidence that the candidate: **1.1.** Established job requirements and work piece specifications **1.2.** Identified and selected correct tools and equipment **1.3.** Set-up work using appropriate tools, equipment and clamping device **1.4.** Selected, calculated and used appropriate speed, feed rate and depth of cut **1.5.** Carried out CNC milling machine operations **1.6.** Checked and measured work piece against specifications **1.7.** Performed any necessary corrective measures to work piece **1.8.** Carried out proper shutdown procedure **1.9.** Carried out basic file maintenance and data security **1.10.** Performed cleaning and maintenance procedures

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.	
2. Underpinning knowledge	**2.1.** Job requirements and work piece specifications **2.2.** Tools, equipment and materials **2.3.** Set-up of CNC milling machine **2.4.** Setting of cutting tools **2.5.** Procedure for checking oil and coolant **2.6.** Procedure for checking air and hydraulic pressure **2.7.** Procedure for setting machine zero point **2.8.** CNC milling machine operations **2.9.** Measuring tools and corrective measures **2.10.** Quality assurance processes **2.11.** Shutdown procedure **2.12.** Data security and basic file maintenance **2.13.** Cleaning and maintenance procedures
3. Underpinning skills	**3.1.** Establishing job requirements and work piece specifications **3.2.** Identifying and selecting correct tools and equipment **3.3.** Setting-up work to using appropriate tools, equipment and clamping device **3.4.** Setting work to avoid distortion on release of clamping devices **3.5.** Selecting, calculating and using appropriate speed, feed and depth of cut **3.6.** Planning and sequencing of operations **3.7.** Checking conformance to specifications **3.8.** Carrying out CNC milling machine operations using precision measuring equipment **3.9.** Applying 4th axis operation **3.10.** Checking and measuring work piece against specifications within specified tolerances **3.11.** Performing any necessary corrective measures **3.12.** Carrying out proper shutdown procedure **3.13.** Carrying out basic file maintenance and data security **3.14.** Performing cleaning and maintenance procedures

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.	
4. Underpinning attitudes	**4.1.** Prompt in carrying out activities **4.2.** Tidy and punctual **4.3.** Eager to learn **4.4.** Active on teamwork **4.5.** Sincere and honest concerning duties **4.6.** Concerned for proper use of tools **4.7.** Concerned about the work environment **4.8.** Committed to occupational health and safety practices **4.9.** Respectful of peers, subordinates and seniors in the workplace **4.10.** Communicates well with peers, subordinates and seniors in workplace **4.11.** Responsible during emergencies
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.** Internet **5.5.** Drawings, specifications and work instructions **5.6.** Personal protective equipment (PPE) **5.7.** Tools and equipment **5.8.** Milling machine **5.9.** Materials **5.10.** Projector **5.11.** Stationary **5.12.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

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.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Carry out CNC wire cut machine operations
Unit Code:	SEIP-LE-CNC-05-O
Nominal Hours:	40 Hours
Unit Descriptor:	This unit of competency covers the knowledge, skills and attitudes required to carry out CNC wire cut machine operations. It specifically includes preparing for CNC wire cut machine operation, setting-up machine ,wire and work piece, downloading/inputting simulate program, performing CNC wire cut operation in auto mode, Cleaning and storing tools and equipment
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Prepare for CNC wire cut machine operations	**1.1.** Tools and **wire (electrode)** for CNC wire cut operations are selected as per job requirement. **1.2.** **Routine maintenance** is performed to prepare machine for operation. **1.3.** Drawings are read and interpreted to produce component to job specification.
2. Set- up machine, wire and work piece	**2.1.** Machine zero position is set according as per job specification (offset setting). **2.2.** Wire and feed roller are set according to sequence of operations. **2.3.** Clamping device is tightened as per standard operating procedure. **2.4.** Work piece is mounted on clamping device using tools and instruments as per workplace guidelines.
3. Download and input program	**3.1.** Engineering drawings are read and interpreted to define optimum tool path geometry. **3.2.** **Program** is downloaded and inputted into machine using appropriate device. **3.3.** Program is simulated to determine the correctness of tool path and work parameters. **3.4.** Program is stored as per standard operating procedure. **3.5.** Operation sheet is completed as per standard operating procedure.

4. Perform CNC wire cut operations in auto mode	**4.1.** Door is closed to ensure safe operation. **4.2.** Machining parameters including wire offset, wire speed, and power settings are selected. **4.3.** Machine is prepared, work piece is loaded and aligned, and data and reference points are established as per standard operating procedures. **4.4.** Program is reset to ensure start position from the first program block. **4.5.** Machine is operated to test program and work piece positioning. **4.6.** Finished component is checked for conformance with job specification and drawing.
5. Clean and store machinery, tools and equipment	**4.5.** Tools, equipment and machinery is cleaned. **4.6.** Workplace is cleaned. **4.7.** Waste materials are disposed of correctly. **4.8.** Tools, equipment and finished product are stored safely pursuant to workplace guidelines.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. Wire (electrode)	**1.1.** Titanium/chromium-coated **1.2.** Brass wire **1.3.** Diffusion-annealed
2. Routine maintenance	**2.1.** Checking and adjusting machine guards **2.2.** Checking and using coolant and lubricant **2.3.** Checking and adjusting air and hydraulic pressure **2.4.** Checking and adjusting chips extraction devices **2.5.** Checking machine performance
3. Program	**3.1.** Absolute **3.2.** Incremental **3.3.** Nesting tool paths **3.4.** Chained linear tool paths **3.5.** Differential profiles

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 must evidence that the candidate: **1.1.** Performed machine set-up with multiple axis **1.2.** Performed tool electrode and wheel dram setting **1.3.** Downloaded and inputted program **1.4.** Performed work piece set-up **1.5.** Conducted program simulation **1.6.** Performed CNC wire cut operations **1.7.** Checked and measured work piece **1.8.** Carried out routine maintenance
2. Underpinning knowledge	**2.1.** Tool paths **2.2.** Sequencing of operations **2.3.** Procedure for setting zero position **2.4.** Canned cycles and sub-routines **2.5.** Machining parameters **2.6.** Procedure for clamping work and tools **2.7.** Machine safety features **2.8.** CNC wire cut machine operations **2.9.** Shutdown procedure **2.10.** Maintenance procedure
3. Underpinning skills	**3.1.** Reading and interpreting drawings and job specifications **3.2.** Calculating coordinates of all relevant points on the part or product to be produced **3.3.** Downloading, inputting and storing program **3.4.** Producing CNC wire cut operation sheet **3.5.** Selecting appropriate wires to be mounted to machine **3.6.** Setting desired machining parameters **3.7.** Performing wire reference setting **3.8.** Mounting work piece on clamping device **3.9.** Testing CNC wire cut program to ensure correctness and suitable for job task **3.10.** Checking and measuring work pieces against specifications within specified tolerances **3.11.** Carrying out routine maintenance

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.	
4. Underpinning attitudes	**4.1.** Prompt in carrying out activities **4.2.** Tidy and punctual **4.3.** Eager to learn **4.4.** Active on teamwork **4.5.** Sincere and honest concerning duties **4.6.** Concerned for proper use of tools **4.7.** Concerned about the work environment **4.8.** Committed to occupational health and safety practices **4.9.** Respectful of peers, subordinates and seniors in the workplace **4.10.** Communicates well with peers, subordinates and seniors in workplace **4.11.** Responsible during emergencies
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.** Internet **5.5.** Drawings, specifications and work instructions **5.6.** Personal protective equipment (PPE) **5.7.** Tools and equipment **5.8.** CNC wire cut machine **5.9.** Materials **5.10.** Projector **5.11.** Stationary **5.12.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

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.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.

Unit Title:	Apply knowledge of CAM
Unit Code:	SEIP-LE-CNC-06-O
Nominal Hours:	40 hours
Unit Descriptor:	This unit covers the skills, knowledge and attitudes required to apply knowledge of CAM programs. It specifically includes preparing for CAM program, importing CAD model, editing program, and loading and running program.
Elements of Competency	**Performance Criteria** (**bold and underlined** terms are elaborated in the Range of Variables)
1. Prepare for CAM program	**1.1.** Work piece, drawing, model or concept of a new design are analysed to produce CAM program. **1.2.** **CNC parameters** are identified and selected according to the job requirement. **1.3.** Tools and equipment are gathered to produce drawing as per job requirement. **1.4.** Relevant materials, instructions, manuals and operating procedures are obtained according to job requirement.
2. Import CAD model	**2.1.** Basic parameters of CNC machine are set pursuant to instruction manual. **2.2.** Drawing reference point is established based on job requirement and work piece to be produced. **2.3.** Profile, shape, and contour of work piece is imported using CAD as per job requirement and **drawing standards**. **2.4.** Imported drawings are edited according to drawing standards.
3. Edit program	**3.1.** **CAM parameters** are identified and set as per job requirement. **3.2.** Tools are identified, selected and loaded based on job requirement. **3.3.** Coordinates are set for tool path or machining functions based on CNC machine. **3.4.** Work piece zero position is identified based on the CNC machine. **3.5.** Tool paths generated in accordance with appropriate **software** used. **3.6.** Tool paths are simulated and correctness of tool movements determined and other work parameters. **3.7.** CNC program generated through post processor in accordance with selected CNC **machine control** standard.

4. Load and run program	**4.1.** Program is loaded using appropriate device. **4.2.** Dry run/simulation is performed as per standard operating procedure. **4.3.** Program is executed to produce work piece. **4.4.** **Production issues** are recorded and reported to appropriate authority. **4.5.** Tools, equipment and machinery is cleaned and stored as per standard operating procedure.

Range of Variables	
Variable	**Range** ***(may include but not limited to)***
1. CNC parameters	**1.1.** CNC machine preparation **1.2.** CNC machine coordinate system **1.3.** Tool position
2. Drawing standards	**2.1.** ISO **2.2.** American (ANSI)
3. CAM parameters	**3.1.** G–code: **3.1.1.** Preparatory function **3.1.2.** Axis movement (X, Y, Z) etc. **3.2.** M–code: **3.2.1.** Miscellaneous function
4. Software	**4.1.** Master CAM **4.2.** Edge CAM **4.3.** CATIA
5. Machine control	**5.1.** Fanuc **5.2.** Sinumerik **5.3.** Mitsubishi
6. Production issues	**6.1.** Incorrect machine set-up **6.2.** Incorrect parameter setting **6.3.** Defective raw materials

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 must evidence that the candidate: **1.4.** Established job requirements **1.5.** Imported CAD drawing **1.6.** Set CNC parameters **1.7.** Edited CNC program **1.8.** Loaded and ran program on CNC machine
2. Underpinning knowledge	**2.1.** CAD software and equipment **2.2.** CAD drawings **2.3.** Page set-up and scaling procedure **2.4.** Basic parameters of CNC machine **2.5.** Identify of system parameters **2.6.** Procedure for saving drawing files **2.7.** Procedure for printing drawing files
3. Underpinning skills	**3.1.** Performing page set-up and scaling **3.2.** Creating, reviewing and modifying CAD drawings **3.3.** Using CAD software **3.4.** Identifying basic parameters of CNC machine **3.5.** Identifying system parameters based on job requirements **3.6.** Reviewing and modifying CAD drawings **3.7.** Loading and running program **3.8.** Performing saving and printing of drawing files **2.8.** Recording and reporting production issues
4. Underpinning attitudes	**4.1.** Prompt in carrying out activities **4.2.** Tidy and punctual **4.3.** Eager to learn **4.4.** Active on teamwork **4.5.** Sincere and honest concerning duties **4.6.** Concerned for proper use of tools **4.7.** Concerned about the work environment **4.8.** Committed to occupational health and safety practices **4.9.** Respectful of peers, subordinates and seniors in the workplace **4.10.** Communicates well with peers, subordinates and seniors in workplace **4.11.** Responsible during emergencies

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.** Internet **5.5.** Drawings, specifications and work instructions **5.6.** Projector **5.7.** Stationary **5.8.** Learning manual
6. Methods of assessment	Methods of assessment may include but is not limited to: **6.1.** Written test **6.2.** Oral test **6.3.** Observation **6.4.** Demonstration **6.5.** Portfolio
7. Context of assessment	**7.1.** Competency assessment must be done in a training institute or an actual or simulated workplace after completion of this unit of competency. **7.2.** Assessment must be done by a suitably qualified/certified assessor.

Accreditation Requirements

Training Providers must be accredited by Bangladesh Technical Education Board (BTEB), 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 any NTVQF qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by BTEB.