COMPETENCY STANDARD

FOR

2D & 3D CAD

Level: 3

(Construction Sector)

Competency Standard Code: CS-CON-2D3DCAD-L3-EN-V1

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

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This Competency Standard for 2D & 3D CAD is a document for the development of curricula, teaching and learning materials, and assessment tools. It also serves as the document for providing training consistent with the requirements of industry in order to meet the qualification of individuals who graduated through the established standard via competency-based assessment for a relevant job.

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

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

Introduction

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

Key priority economic growth sectors identified by the government have been targeted by NSDA to improve current job skills along with existing workforce to ensure required skills to industry standards. Training providers are encouraged and supported to work with industry to address identified skills and knowledge to enable industry growth and increased employment through the provision of market responsive inclusive skills training program. "**2D & 3D CAD**" is selected as one of the priority occupations of Construction Sector. This standard is developed to adopt a demand driven approach to training with effective inputs from Industry Skills Councils (ISC's), employer associations and employers.

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

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

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

Overview

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

The purpose of a competency standards is to:

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

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

Competency standards describe the skills, knowledge and attitude needed to perform effectively in the workplace. CS acknowledge that people can achieve technical and vocational competency in many ways by emphasizing what the learner can do, not how or where they learned to do it.

With competency standards, training and assessment may be conducted at the workplace or at training institute or any combination of these.

Competency standards consist of a number of units of competency. A unit of competency describes a distinct work activity that would normally be undertaken by one person in accordance with industry standards.

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

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

Together, all the parts of a unit of competency:

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

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

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

Competency Standards for National Skill Certificate, Level-3 in
2D & 3D CAD in Construction Sector

Level Descriptors of NSQF (BNQF 1-6)

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

List of Abbreviations

CS	Competency Standard
ISC	Industry Skills Council
NSDA	National Skills Development Authority
NSQF	National Skills Qualifications Framework
OSH	Occupational Safety and Health
PPE	Personal Protective Equipment
SCVC	Standards and Curriculum Validation Committee
STP	Skills Training Provider
SOP	Standard Operating Procedure
UoC	Unit of Competency
OSNAP	Object Snap
LWT	Line Weight Text
UCS	Universal Coordinate System

Approval of Competency Standard

Approved By
21st Authority Meeting of NSDA Held on 19.09.2022

Md. Sanlul Ferdous
Deputy Director (Admin)
National Skills Development Authority

Deputy Director (Admin)
and
Officer of Secretarial Duties for Authority Meeting
National Skills Development Authority

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Competency Standards for National Skill Certificate, Level-3 in 2D & 3D CAD in Construction Sector

Course Structure

SL No	Unit code and Title		UOC Level	Nominal (hours)
Generic Units of Competencies				
1.	GU002L2V1	Apply Occupational Safety and Health (OSH) Procedure in the Workplace	2	15
2.	GU005L3V1	Carryout Workplace Interaction in English	3	15
3.	GU003L3V1	Perform Basic IT Skills	3	20
Sub Total				**50**
Sector Specific Units of Competencies				
4.	SUCS001L2V1	Work in the Construction Sector	2	30
5.	SUCS006L2V1	Interpret Drawings, Plans and Specification	2	20
Sub Total				**50**
Occupation Specific Units of Competencies				
6.	OU-CON-2D3DCAD -01-L3-V1	Perform 2D CAD	3	80
7.	OU-CON-2D3DCAD-02-L3-V1	Create 3D Interface, Orbit and Navigate Model	3	40
8.	OU-CON-2D3DCAD-03-L3-V1	Insert Surface	3	30
9.	OU-CON-2D3DCAD-04-L3-V1	Develop Solid Images	3	30
10.	OU-CON-2D3DCAD-05-L3-V1	Merge Flat Objects from 3D Model	3	40
11.	OU-CON-2D3DCAD-06-L3-V1	Perform 3D Rendering	3	20
Sub Total				**240**
Total Duration				**360**

Units & Elements at Glance

Generic Competencies

Code	Unit of competency	Elements of competency	Duration (hours)
GU002L2V1	Apply Occupational Safety and Health (OSH) procedure In the Workplace	1. Identify OSH policies and procedures 2. Follow OSH procedure 3. Report hazards and risks 4. Respond to emergencies 5. Maintain personal well-being	15
GU005L2V1	Carry out Workplace Interaction in English	1. Interpret workplace communication and etiquette 2. Interpret workplace documents 3. Participate in workplace meetings and discussions 4. Practice professional ethics at workplace	15
GU006L2V1	Perform Basic IT Skills	1. Identify and use most commonly used IT Tools 2. Operate Computer. 3. Work with word processing software 4. Use spread sheet to create /prepare worksheets 5. Use presentation packages to create / prepare presentation 6. Print the documents 7. Use the Internet and Access E-Mail	20
		Total hours	**50**

Sector specific competencies

Code	Unit of competency	Elements of competency	Duration (hours)
SUCS001L2V1	Work in the construction sector	1. Identify the organizational structure within the sector 2. Identify work processes and procedures 3. Identify workplace requirements 4. Organize own workload	30
SUCS006L2V1	Interpret drawings, plans and specification	1. Carry out basic engineering drawings applied in construction 2. Access information from manuals, designs and plans 3. Interpret drawings and specifications from manuals, designs and plans 4. Store manuals, designs and plans	20
		Total hours	**50**

Occupation specific competencies

Code	Unit of competency	Elements of competency	Duration (hours)
OU-CON-2D3DCAD-01-L3-V1	Perform 2D CAD	1. Prepare for display in drawings 2. Create basic drawings 3. Draw 2D Solids and 3D Faces 4. Draw edges	80
OU-CON-2D3DCAD-02-L3-V1	Create 3D Interface, Orbit and Navigate Model	1. Develop basic 3D interface 2. Introduce thickness and elevation 3. Visualize model 4. Draw coordinates 5. Develop familiarity with 3D orbit 6. Perform 3D dimensional navigation 7. Operate 3D object	40
OU-CON-2D3DCAD-03-L3-V1	Insert Surface	1. Draw basic 3D surface 2. Create complex 3D surfaces 3. Create 3D surface panel	30
OU-CON-2D3DCAD-04-L3-V1	Develop Solid Images	1. Create images 2. Edit 3D Objects 3. Develop 3D Solid composites	30
OU-CON-2D3DCAD-05-L3-V1	Merge Flat Objects from 3D Model	1. Navigate sectional objects 2. Merge flat objects	40
OU-CON-2D3DCAD-06-L3-V1	Perform 3D Rendering	1. Execute rendering 2. Apply materials and lights 3. Demonstrate presentation	20
		Total Hours	**240**

Generic Units of Competencies

Unit Code and Title	**GU002L2V1: Apply Occupational Safety and Health (OSH) Procedure in the Workplace**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to apply occupational safety and health (OSH) procedure in the workplace. It specifically includes identifying OSH policies and procedures, following OSH procedure, reporting hazards and risks, responding to emergencies and maintaining personal well-being.
Nominal Hours	**15 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Identify OSH policies and procedures	1.1. **OSH policies** and **safe operating procedures** are accessed and stated 1.2. **Safety signs and symbols** are identified and followed 1.3. Emergency response, evacuation procedures and other contingency measures are determined according to workplace requirements
2. Follow OSH procedure	2.1 **Personal protective equipment (PPE)** is selected and collected as required 2.2 Personal protective equipment (PPE) is correctly used in accordance with organization OSH procedures and practices 2.3 A clear and tidy workplace is maintained as per workplace standard 2.4 PPE is maintained to keep them operational and compliant with OSH regulations
3. Report hazards and risks	3.1 **Hazards** and risks are identified, assessed and controlled 3.2 Incidents arising from hazards and risks are reported to designated authority
4. Respond to emergencies	4.1 Alarms and warning devices are responded 4.2 Workplace **emergency procedures** are followed 4.3 **Contingency measures** during workplace accidents, fire and other emergencies are recognized and followed in accordance with organization procedures 4.4 First aid procedures are applied during emergency situations
5. Maintain personal well-being	5.1 OSH policies and procedures are adhered to OSH awareness programs are participated in as per workplace guidelines and procedures.

	5.2 Corrective actions are implemented to correct unsafe condition in the workplace 5.3 **"Fit to work" records** are updated and maintained according to workplace requirements
Range of Variables	
Variables	**Range** (may include but not limited to):
1. OSH policies	1.1. Bangladesh standards for OSH 1.2. Fire Safety Rules and Regulations 1.3. Code of Practice 1.4. Industry Guidelines
2. Safe operating procedures	2.1 Orientation on emergency exits, fire extinguishers, fire escape, etc. 2.2 Emergency procedures 2.3 First Aid procedures 2.4 Tagging procedures 2.5 Use of PPE 2.6 Safety procedures for hazardous substances
3. Safety signs and symbols	3.1 Direction signs (exit, emergency exit, etc.) 3.2 First aid signs 3.3 Danger Tags 3.4 Hazard signs 3.5 Safety tags 3.6 Warning signs
4. Personal Protective Equipment (PPE)	4.1 Gas Mask 4.2 Gloves 4.3 Safety boots 4.4 Face mask 4.5 Overalls 4.6 Goggles and safety glasses 4.7 Sun block 4.8 Chemical/Gas detectors
5. Hazards	5.1 Chemical hazards 5.2 Biological hazards 5.3 Physical Hazards 5.4 Mechanical and Electrical Hazard 5.5 Mental hazard 5.6 Ergonomic hazard
6. Emergency procedures	6.1 Fire fighting 6.2 Earthquake 6.3 Medical and first aid 6.4 Evacuation

7. Contingency measures	7.1 Evacuation 7.2 Isolation 7.1 Decontamination
8. "Fit to Work" records	8.1 Medical Certificate every year 8.2 Accident reports, if any 8.3 Eye vision certificate
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 stated OSH policies and safe operating procedures 1.2 followed safety signs and symbols 1.3 used personal protective equipment (PPE) 1.4 maintained workplace clear and tidy 1.5 assessed and Controlled hazards 1.6 followed emergency procedures 1.7 followed contingency measures 1.8 implemented corrective actions
2. Underpinning knowledge	2.1 Define OSH 2.2 OSH Workplace Policies and Procedures 2.3 Work Safety Procedures 2.4 Emergency Procedures 2.5 Hazard control procedure 2.6 Different types of Hazards 2.7 PPE and there uses 2.8 Personal Hygiene Practices 2.9 OSH Awareness
3. Underpinning skills	3.1 Accessing OSH policies 3.2 Handling of PPE 3.3 Handling cleaning tools and equipment 3.4 Writing report 3.5 Responding to emergency procedures
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Workplace

	5.2 Equipment and outfits appropriate in applying safety measures 5.3 Tools, equipment, materials and documentation required 5.4 OSH Policies and Procedures
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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

Unit Code and Title	**GU005L3V1: Carryout Workplace Interaction in English**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to carry out workplace interaction. It specifically includes interpreting workplace communication and etiquette; reading and understand workplace documents; participating in workplace meetings and discussions; and practicing professional ethics at workplace.
Nominal Hours	**15 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Interpret workplace communication and etiquette	1.1 Workplace code of conducts are interpreted as per organizational 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 Questions about routine **workplace procedures and matters** are asked and responded as required
2. Interpret Workplace Documents	2.1 Workplace documents are interpreted as per standard. 2.2 Assistance is taken to aid comprehension when required from peers / supervisors 2.3 Visual information / symbols / signage's are understood and followed 2.4 Specific and relevant information are accessed from **appropriate sources** 2.5 Appropriate medium is used to transfer information and ideas
3. Participate in workplace meetings and discussions	3.1 Team meetings are attended on time and followed meeting procedures and etiquette 3.2 Own opinions are expressed and listened to those of others without interruption 3.3 Inputs are provided consistent with the meeting purpose and interpreted and implemented meeting outcomes
4. Practice professional ethics at workplace	4.1 Responsibilities as a team member are demonstrated and kept promises and commitments made to others 4.2 Tasks are performed in accordance with workplace procedures 4.3 Confidentiality is respected and maintained 4.4 Situations and actions considered inappropriate or which present a conflict of interest are avoided

Range of Variables	
Variables	**Range** (may include but not limited to):
1. Courteous Manner	1.1 Effective questioning 1.2 Active listening 1.3 Speaking skills
2. Workplace Procedures and Matters	2.1 Notes 2.2 Agenda 2.3 Simple reports such as progress and incident reports 2.4 Job sheets 2.5 Operational manuals 2.6 Brochures and promotional material 2.7 Visual and graphic materials 2.8 Standards 2.9 OSH information 2.10 Signs
3. Appropriate Sources	3.1 HR Department 3.2 Managers 3.3 Supervisors
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 followed workplace code of conducts is as per organizational guidelines 1.2 maintained workplace documents as per standard 1.3 followed workplace instructions and symbols 1.1 followed and implemented meeting outcomes
2. Underpinning knowledge	2.1 Workplace communication and etiquette 2.2 Workplace documents, signs and symbols 2.3 Meeting procedure and etiquette
3. Underpinning skills	3.1 Interpreting performance of workplace communication and etiquette 3.2 Interpreting workplace instructions and symbol 3.3 Interpreting workplace code of conducts is as per organizational guidelines 3.4 Interpreting workplace documents as per standard 3.5 Interpreting and implementing meeting outcomes

4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Relevant tools, Equipment, software and facilities needed to perform the activities. 5.2 Required learning materials
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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

Unit Code and Title	GU006L3V1: Perform Basic IT Skills
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to perform basic IT skills. It specifically includes identifying and using most commonly used IT tools, operating computer, working with word processing software, using spread sheet to create/ prepare worksheets, using presentation packages to create/ prepare presentation, printing the documents and using the Internet and Access E-Mail.
Nominal Hours	**20 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Identify and use most commonly used IT Tools	1.1 Context of IT is interpreted 1.2 Commonly used **IT tools** are identified 1.3 Safe work practice and OSH Standards are followed
2. Operate Computer.	2.1 **Peripherals** are checked and connected with computer as per standard 2.2 Power cords / adapter are connected with computer and power outlets socket safely. 2.3 Computer is switched on gently. 2.4 PC **desktop / GUI** settings are arranged and customized as per requirement. 2.5 Files and folders are created, opened, copied, renamed, deleted and sorted as per requirement. 2.6 Properties of files and folders are viewed and searched. 2.7 Disks are defragmented, formatted as per requirement.
3. Work with word processing software.	3.1 Word Processing software is selected and started 3.2 Basic typing technique is demonstrated 3.3 **Documents** are created as per requirement in personal use and office environment 3.4 **Contents** are entered. 3.5 Documents are **formatted**. 3.6 Paragraph and page settings are completed 3.7 Saving and retrieving technique of a document are interpreted
4. Use spread sheet to create /prepare worksheets	4.1 Spreadsheet are selected and started. 4.2 Worksheets are created as per requirement in Personal use and office environment. 4.3 Data are entered

	4.4 **Functions** are used for calculating and editing logical operation 4.5 Sheets are formatted as per requirement. 4.6 Charts are created. 4.7 Charts/ Sheets are previewed
5. Use presentation packages to create / prepare presentation	5.1 Appropriate presentation software packages are selected and started 5.2 Presentation is created as per requirement in personal use and office environment 5.3 Image, Illustrations, text, table, symbols and media are entered as per requirements. 5.4 Presentations are formatted and animated. 5.5 Presentations are previewed.
6. Print the documents	6.1 Printer is connected with computer and power outlet properly. 6.2 Power is switched on at both the power outlet and printer. 6.3 Printer is installed and added. 6.4 Correct printer settings are selected and document is printed.
7. Use the Internet and Access E-Mail	7.1 Appropriate internet **browsers** are selected 7.2 Search engines are used to access information 7.3 Video / Information are Shared /downloaded / uploaded from / to web site/social media. 7.4 Web based resources are used 7.5 Email services are identified and selected to create a new email address 7.6 Document is prepared, attached and sent to different types of recipients. 7.7 Email is read, forwarded, replied and deleted as per requirement. 7.8 Custom email folders are created and manipulated. 7.9 Email message is printed.
Range of Variables	
Variables	**Range** (may include but not limited to):
1. IT tools	1.1 Phone 1.2 Cell Phone 1.3 TABs 1.4 Radio 1.5 Television 1.6 Computers 1.7 Laptops 1.8 Notebooks

	1.9 Internet 1.10 Software 1.11 Satellite
2. Peripherals	2.1. Monitor 2.2. Keyboard 2.3. Mouse 2.4. Modem 2.5. Scanner 2.6. Printer
3. Desktop / GUI settings	3.1 Icons 3.2 Taskbar 3.3 View 3.4 Resolutions
4. Documents	4.1 Word documents 4.2 Standard CV / Bio-Data with different text & fonts, image and table. 4.3 Application / Official letter with proper paragraph and indenting, spacing, styles, Illustrations, Tables, Header & Footers and symbols. 4.4 Standard report / newspaper items with column, footnote and endnote, drop cap, indexing and page numbering.
5. Contents	5.1 Illustrations and styles 5.2 Text 5.3 Table 5.4 Symbols 5.5 Header & Footer
6. Formatted.	6.1 Bold 6.2 Italic 6.3 Underline 6.4 Font size, colour, 6.5 Change case 6.6 Alignment and intend
7. Functions	7.1. Mathematics 7.2. Logical 7.3. Simple Statistical
8. Browsers	8.1 Internet Explorer 8.2 Firefox 8.3 Google Chrome 8.4 Opera 8.5 Safari 8.6 Omni Web

Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 created, opened, copied, renamed, deleted and sorted files and folders as per requirement. 1.2 completed application software Installations as per standard 1.3 performed simple trouble shooting with Computer 1.4 created email accounts. 1.5 used email account for online platforms purpose
2. Underpinning knowledge	2.1 Basic competent of PC 2.2 IT and IT Tools 2.3 Different type of software and application packages 2.4 Use of word processor, spread sheet and presentation software 2.5 Different type of math and logical functions 2.6 Computer Trouble Shooting 2.7 Techniques to access internet
3. Underpinning skills	3.1 Identifying and use IT Tools 3.2 Demonstrating typing on word processing software 3.3 Saving and retrieving documents on Word Processing software. 3.4 Demonstrated ability to create email accounts 3.5 Opening an email account and use it for different purpose. 3.6 Configured appropriate printer settings and printed the document 3.7 Used functions for calculating and editing logical operation in spread sheet
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Workplace (simulated or actual) 5.2 IT Tools 5.3 Computers with word processing application 5.4 Internet connection 5.5 Presentations 5.6 Learning manuals

6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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Sector Specific Units of Competencies

Unit Code and Title	SUCS001L2V1: Work in the Construction Sector
Unit Descriptor	This unit covers the skills, knowledge and attitude to work in the construction sector. It includes identifying the organizational structure within the sector, identifying work processes and procedures, identifying workplace requirements and organizing own workload.
Nominal Hours	**30 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Identify the organizational structure within the sector	1.1. Profile of the construction sector in Bangladesh is explained. 1.2. Scope, nature and **major fields** of the construction sector are identified. 1.3. **Occupations** or trade names of the construction sector are identified. 1.4. Changes in the trends and technologies relevant to the sector are explained. 1.5. **Employment conditions** are identified in line with the construction sector of Bangladesh. 1.6. Relevant policies and guidelines are identified and interpreted.
2. Identify work processes and procedures	2.1 **Instructions** as to procedures in achieving quality are obtained, understood, and clarified. 2.2 Construction processes are identified, described and explained. 2.3 Work activities are correctly identified.
3. Identify workplace requirements	3.1 **Workplace requirements** are identified and clarified. 3.2 Role, responsibilities and duties are identified and related to jobs and career paths. 3.3 Workplace's practices are identified. 3.4 **Problem-solving strategies** are used to address bottlenecks, inconsistencies and other concerns.
4. Organize own workload	4.1 Own work activities are planned and progress of work is communicated to relevant staff. 4.2 Work activities are completed according to the work plan. 4.3 Difficulties and bottlenecks are identified, and solutions are put forward.

	4.4 Own work is monitored against workplace standards and areas for improvement identified and acted upon.
Range of Variables	
Variables	**Range** (may include but not limited to):
1. Major Fields	1.1. Residential Construction 1.2. Industrial Construction 1.3. Roads & Highway construction 1.4. Bridge & Calvert Construction 1.5. Railway Construction 1.6. Foundation Works (Anchoring & Piling) 1.7. Pipe laying 1.8. Tunnel/Marine Construction
2. Occupations	2.1 Masonry 2.2 Finishing carpentry 2.3 Shuttering 2.4 Painting 2.5 Residential Electrical Wiring and Cabling 2.6 Dogging 2.7 Rigging 2.8 Scaffolding 2.9 Rod Binding 2.10 Plumbing 2.11 Tile and Marble Setting
3. Employment conditions	3.1 Code of Practice 3.2 Salary/Wage System 3.3 Labor Practices 3.4 Anti-Discrimination Policy 3.5 Gender Issues 3.6 Collective Bargaining and Other Practices 3.7 Awards 3.8 Grievance management
4. Instructions	4.1 Specifications and requirements 4.2 Standard operating procedures 4.3 Manuals of Instruction 4.4 Environmental Guidelines 4.5 Gender and Develop Guidelines
5. Workplace requirements	5.1 Goals and objectives 5.2 Strategic and Operational Plans 5.3 Systems and Processes 5.4 Monitoring and Evaluation 5.5 Reports and Documentation

6. Problem-solving strategies	6.1 Asking questions 6.2 Feedback and feed forward system 6.3 Reference to Standard Operating Procedures 6.4 Accessing Information 6.5 Reviews 6.6 Brainstorming
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 identified the major fields of the construction sector 1.2 explained trends of technologies to the sector 1.3 identified, described and explained construction processes 1.4 demonstrated knowledge in working in the construction sector 1.5 identified the job roles and job descriptions of each personnel working in the construction sector
2. Underpinning knowledge	2.1 Scope and major fields of the construction sector of Bangladesh 2.2 Relevant policies and guidelines for the construction sector 2.3 Manuals used in the Construction Sector 2.4 Relevant Terminologies and Acronyms 2.5 Workplace practices and requirements
3. Underpinning skills	3.1. Describing construction sector of Bangladesh. 3.2. Describing organization structure within the sector. 3.3. Identifying construction processes and procedures 3.4. Identifying workplace practices and requirements 3.5. Organizing own workload
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Pens 5.2 Telephone 5.3 Computer 5.4 Writing materials

	5.5 Online communication
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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Unit Code and Title	**SUCS006L2V1: Interpret Drawings, Plans and Specifications**
Unit Descriptor	This unit covers the knowledge, skill and attitude required to interpret drawings, plans and specifications. It includes
Nominal Hours	**20 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Carry out basic engineering drawings applied in construction	1.1 Basic **shapes and objects** are sketched. 1.2 Skills to properly use **manual drafting equipment** is demonstrated. 1.3 **Geometric shapes** utilizing manual drafting equipment is created. 1.4 Communication through manual lettering is clearly demonstrated.
2. Access information from manuals, designs and plans	2.1 Appropriate **manuals** are identified and accessed. 2.2 Version and date of the manual are checked to ensure up-to-date specifications of tools, equipment, materials and procedures.
3. Interpret drawings and specifications from manuals, designs and plans	3.1 Relevant **drawings** and **specifications** are correctly recognized from manuals, designs and plans. 3.2 Terms and abbreviations are recognized. 3.3 Signs and symbols are interpreted.
4. Store manuals, designs and plans	4.1 Manuals, designs and plans are collected and packed. 4.2 Manuals, designs and plans are stored to prevent damage, and ready access and updating of information when required.
Range of Variables	
Variables	**Range** (may include but not limited to):
1. Shapes and objects	1.1 Lines 1.2 Geometrical shapes 1.3 Projections 1.4 Pictorial drawings 1.5 Isometric drawings
2. Manual drafting equipment	2.1 Pencils 2.2 Compass 2.3 Divider 2.4 Set square 2.5 T-square 2.6 French curve

	2.7 Protractor 2.8 Eraser
3. Geometric shapes	3.1 Circle 3.2 Oval 3.3 Ellipse 3.4 Square 3.5 Rectangle 3.6 Polygons
4. Manuals	4.1 Manufacturer's Specification Manual 4.2 Repair Manual 4.3 Maintenance Procedure Manual 4.4 Periodic Maintenance Manual 4.5 Quality Manual 4.6 Instruction Manual
5. Drawings	5.1 Technical drawings 5.2 Sketches
6. Specifications	6.1 Product specifications 6.2 Performance specifications 6.3 Method specifications
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 Sketched shapes and objects using manual drafting equipment 1.2 Checked version and date of manual to ensure up-to-date specifications of tools, equipment, materials and procedures 1.3 Identified relevant drawings and specifications correctly 1.4 Identified terms and abbreviations 1.5 Identified signs and symbols 1.6 Interpreted construction drawings and specifications 1.7 Interpreted schedules, dimensions and specifications contained in the drawings
2. Underpinning knowledge	2.1 Methods and techniques of sketching/drawing of basic shapes and objects 2.2 Types and use of manual drafting equipment 2.3 Types of geometric shapes 2.4 Techniques of sketching using manual drafting equipment 2.5 Standard technical/engineering lettering 2.6 Types of construction manuals 2.7 Identification of signs and symbols 2.8 Identification of units of measurement 2.9 Identification of units of conversion 2.10 Drawings and specifications

	2.11 Terms and abbreviations used
3. Underpinning skills	3.1 Sketching/drawing of basic shapes and objects 3.2 Using of manual drafting equipment 3.3 Sketching using manual drafting equipment 3.4 Lettering using standard technical/engineering lettering 3.5 Checking version and date of the manual to ensure up-to-date specifications of tools, equipment, materials and procedures 3.6 Identifying relevant drawings and specifications correctly 3.7 Identifying terms and abbreviations 3.8 Identifying signs and symbols 3.9 Interpreting drawings and specifications 3.10 Interpreting schedules, dimensions and specifications contained in the drawings 3.11 Storing manuals
1. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
2. Resource implications	5.1. Work instructions 5.2. Relevant Documents 5.3. Measuring instruments & other tools, equipment and physical facilities appropriate to perform activities. 5.4. Materials to be measured
3. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
4. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

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Occupation Specific Units of Competencies

Unit Code and Title	OU-CON-2D3DCAD-01-L3-V1: Perform 2D CAD
Unit Descriptor	This unit covers the skills, knowledge and attitude required to perform 2D CAD. It includes preparing for CAD, creating basic drawings, drawing 2D solids and 3D faces and drawing edges.
Nominal Hours	**80 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Prepare for CAD	1.1 **CAD Software** is installed as per standard operating procedure 1.2 Drawing files are created using CAD 1.3 Drawing files are saved as per required format 1.4 **Visual reference commands** are operated
2. Create basic drawings	2.1 **Tools bar** is identified 2.2 **Draw tools bar commands** are used 2.3 **Modify commands** are used 2.4 **Dimension commands** are used 2.5 **Basic drawings** in 2D are created 2.6 Drawings are saved and printed as per requirements
3. Draw 2D Solids and 3D Faces	3.1 SOLID" command with points to be filled is executed 3.2 "3D FACE" command with points to be filled is used 3.3 A three-dimensional poly face mesh vertex using "PFACE" command and pick points is created
4. Draw edges	4.1 The **"EDGE" command** is executed 4.2 3D faces with invisible edges are drawn
Range of Variables	
Variables	**Range** (may include but not limited to):
1. CAD software	1.1 Auto CAD 1.2 Sketch up
2. Visual reference commands	2.1 Drawing unit 2.2 Dimension style 2.3 Drawing limits 2.4 Layer 2.5 Grid set and display
3. Tools bar	3.1 Draw 3.2 Modify 3.3 Dimension 3.4 Layer 3.5 View port

	3.6 Insert
4. Draw tools bar commands	4.1 Line 4.2 Construction line 4.3 Polyline 4.4 SP line 4.5 Rectangle 4.6 Polygon 4.7 Circle 4.8 Make block 4.9 Hatch 4.10 Arc 4.11 Grid 4.12 Radios 4.13 Angular line 4.14 Text 4.15 D-text 4.16 Point 4.17 Cloud
5. Modify commands	5.1 Erase 5.2 Copy 5.3 Move 5.4 Offset 5.5 Mirror 5.6 Trim 5.7 Extend 5.8 Stretch 5.9 Break 5.10 Chamfer 5.11 Divided 5.12 Explode 5.13 Fillet 5.14 Array 5.15 Rotate 5.16 Ellipse 5.17 Donut
6. Dimension commands	6.1 Quick dimension 6.2 Linear 6.3 Align 6.4 Arc length 6.5 Radius 6.6 Diameter 6.7 Angular

	6.8 Baseline 6.9 Continues 6.10 Tolerance 6.11 Center marks
7. Basic drawings	7.1 Structural drawings 7.1.1 Columns center line 7.1.2 Footing 7.1.3 Slab details 7.1.4 Beam details 7.2 Architectural Drawings 7.2.1 Plan 7.2.2 Elevation 7.2.3 Section 7.2.4 Working drawing 7.2.5 Furniture layout plan 7.3 Electrical drawings 7.3.1 Points details 7.3.2 Circuit diagram 7.3.3 Fixture arrangement plan 7.4 Plumbing drawings 7.4.1 Fixture and faucet arrangement plan 7.4.2 Pipe lines diagram
8. "EDGE" command	8.1 Toggle visibility 8.2 Hidden edges
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 operated visual reference commands 1.2 used draw tool bar commands 1.3 used modify commands 1.4 used dimension commands 1.5 created basic drawings in 2D 1.6 created PFACE" command and pick points 1.7 used EDGE commands
2. Underpinning knowledge	2.1 Tools bars 2.2 CAD visual reference commands 2.3 Dimension commands 2.4 Various line commands 2.5 Modify command 2.6 Required circle command 2.7 Function of OSNAP

	2.8 Function of Ortho 2.9 Function of LWT 2.10 Function of zoom 2.11 Functions of UCS 2.12 Functions of dynamic input 2.13 Draw menu 2.14 Layer commands 2.15 Inquiry tool bar 2.16 Properties 2.17 View ports 2.18 Method of describing selection window 2.19 Procedure of creating basic drawings in 2D
3. Underpinning skills	3.1 Operating computer 3.2 Installing computer peripheral devices 3.3 Handling tools and devices 3.4 Communicating in the workplace 3.5 Interpreting drawings and sketches 3.6 Planning for own activities
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Well-equipped computer lab 5.2 Printer and plotter 5.3 CAD software 5.4 Learning materials 5.5 Paper
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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Unit Code and Title	**OU-CON-2D3DCAD-02-L3-V1: Create 3D Interface, Orbit and Navigate Model**
Unit Descriptor	This unit covers the skills, knowledge and attitude required to create 3D interface, orbit and navigate model. It includes developing basic 3D interface, introducing values for thickness and elevation, drawing coordinates, developing familiarity with 3D orbit, performing 3D dimensional navigation and operating 3Dobject.
Nominal Hours	**40 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Develop basic 3D interface	1.1 **Modelling tool bar commands** are applied 1.2 **Solid editing tool bar command** is applied
2. Introduce values for thickness and elevation	2.1 **View tool bar commands** are applied 2.2 Thickness command at command prompt with different values is applied
3. Visualize model	3.1 **Visual styles tool bar commands** are applied 3.2 Different **visual functions** are applied 3.3 Models are visualized in required styles
4. Draw coordinates	4.1 Basic terminologies of Z coordinates are explained. 4.2 **User Coordinates System (UCS)** command with multiple switches is applied. 4.3 3D user and Z Cartesian (X,Y,Z) coordinates system is drawn.
5. Develop familiarity with 3D orbit	5.1 3D orbit in **various command** is defined 5.2 Different **visual aids** are selected. 5.3 3D view while in the orbit command using pre- set views is set 5.4 Free and Continuous orbit is differentiated highlighting the use of "Esc" key 5.5 **Other navigational modes** is discovered
6. Perform 3D dimensional navigation	6.1 **Functions of camera** is dealt with. 6.2 Parallel projection or perspective views is performed by using a camera and target with the help of "DVIEW" command. 6.3 Walking and flying through a 3D drawing and their setting is Simulated. 6.4 "ANIPATH" command for animation paths executed.
7. Operate 3D object	7.1 Wireframe models is created by positioning 2D objects anywhere in 3D space. 7.2 Faceted surfaces is drawn using a polygonal mesh.

	7.3 Different simple shapes are combined to create more complex solids by joining or subtracting them or finding their intersecting (over- lapping) volume.
Range of Variables	
Variables	**Range** (may include but not limited to):
1. Modelling tool bar commands	1.1 Box 1.2 Wedge 1.3 Cone 1.4 Sphere 1.5 Cylinder 1.6 Polysolid 1.7 Torus 1.8 Pyramid 1.9 Helix 1.10 Planer surface 1.11 Extrude 1.12 Press pulls 1.13 Sweep 1.14 Revolve 1.15 Loft union 1.16 Subtract 1.17 Intersect 1.18 3D Move 1.19 3D Rotate 1.20 3D Align
2. Solid editing tool bar command	2.1 Union 2.2 Subtract 2.3 Intersect 2.4 Exclude faces 2.5 Move faces 2.6 Offset faces 2.7 Relate faces Rotate faces 2.8 Taper faces 2.9 Copy faces 2.10 Color faces 2.11 Copy edges Color edges 2.12 Imprint 2.13 Clean 2.14 Separate 2.15 Shell 2.16 Check

3.	View tool bar commands	3.1	Name view
		3.2	Top view
		3.3	Bottom view
		3.4	Left view
		3.5	Right view
		3.6	Front view
		3.7	Back view
		3.8	South West (SW) Isometric
		3.9	South East (SE) Isometric
		3.10	North East (NE) Isometric
		3.11	North West (NW) Isometric
		3.12	Create camera
4.	Visual styles tool bar commands	4.1	2D Wireframe
		4.2	3D Wireframe visual style
		4.3	3D hidden visual style
		4.4	Realistic visual style
		4.5	Conceptual visual style
		4.6	Mange visual style
5.	Visual functions	5.1	Regenerate a three-dimensional model with hidden lines using HIDE command.
		5.2	Set the grid with DSETTINGS command
6.	User Coordinates System (UCS)	6.1	Create UCS
		6.2	Face
		6.3	Named
		6.4	Object
		6.5	Previous
		6.6	New
		6.7	View
		6.8	World
		6.9	X/Y/Z.
7.	Various command	7.1	“3D orbit” for constrained orbit on selected object
		7.2	Developing zoom
		7.3	Pan facility
		7.4	Projection mode by selecting “Perspective”
		7.5	Select different visual styles i.e. 3D Hidden, 3D
		7.6	Wireframe, Conceptual, and Realistic.
8.	Visual aids	8.1	Compass
		8.2	Grid and
		8.3	UCS Icon
9.	Other navigational modes	9.1	Walk,
		9.2	Fly
		9.3	Swivel
		9.4	Adjust distance

10. Functions of camera	10.1 Creation 10.2 View 10.3 Preview 10.4 Properties 10.5 Plotting 10.6 Display 10.7 Adjust 10.8 Swiveling 10.9 Distance
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 applied ling tool bar commands 1.2 applied Solid editing tool bar command 1.3 applied View tool bar commands 1.4 applied Visual styles tool bar commands 1.5 drawn 3D user and Z Cartesian (X, Y, Z) coordinates system 1.6 discovered navigational modes 1.7 dealt with Functions of camera 1.8 executed ANIPATH command for animation paths
2. Underpinning knowledge	2.1 Method of drawing 3D Basic Ribbons using different tools 2.2 Different options of Pulldown menus 2.3 3D Modelling interface (Panels, Pulldown menus). 2.4 Different options on 3D Modelling Pulldown menus 2.5 Different Viewport options 2.6 Different techniques to track the cursor (Steering Wheel) 2.7 V point 2.8 DDV point 2.9 Plan View techniques 2.10 Method of executing the “Thickness” command at command prompt 2.11 Method of setting the elevation of object 2.12 Definition of different styles 2.13 Explain how to manage different styles using different options 2.14 Different visual functions (hide, grid) 2.15 Basic terminologies of Z coordinates 2.16 The user coordinates system 2.17 3D user and Z Cartesian (X,Y,Z) coordinates system

3. Underpinning skills	3.1 Operating computer 3.2 Installing computer peripheral devices 3.3 Handling tools and devices 3.4 Communicating in the workplace 3.5 Interpreting drawings and sketches 3.6 Planning for own activities 3.7 Creating co-ordinate systems
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Respect of peers and seniors in workplace 4.6 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Well-equipped computer lab 5.2 Printer and plotter 5.3 CAD software 5.4 Learning materials 5.5 Paper
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

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Unit Code and Title	**OU-CON-2D3DCAD-03-L3-V1: Insert Surface**
Unit Descriptor	This unit covers the skills, knowledge and attitude required to insert surfaces. It includes drawing basic 3D surface, creating complex 3D surfaces and 3D surface panel.
Nominal Hours	**30 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Draw basic 3D surface	1.1 Smoothness and refinement are applied using mesh commands 1.2 **Mesh editing commands** are used to enable mesh editing. 1.3 CONVTOSURFACE command is used to convert meshes.
2. Create complex 3D surfaces	2.1 Surfaces are developed using **surface commands.** 2.2 Surface network is built. 2.3 **Editing commands** are used to edit existing surfaces. 2.4 Surface **analysis tools** are used 2.5 Surface associativity is developed 2.6 **Complex 3D surfaces** are created
3. Create 3D surface panel	3.1 A blend surface is created between two existing surfaces using "SURFBLEND" command 3.2 New surface or cap is created to close an open edge of an existing surface using "SURFPATCH" command 3.3 Parallel surface is created at a specified distance from the original surface using "SURFOFFSET" command
Range of Variables	
Variables	**Range** (may include but not limited to):
1. Mesh editing commands	1.1 MESHEXTRUDE 1.2 MESHSPLIT (mid point) 1.3 MESHMERGE 1.4 MESHCAP (close hole)
2. Surface commands	2.1 Revolved Surface (REVSURF) 2.2 Tabulated Surface (TABSURF) 2.3 Ruled Surface (RULESURF) using "Surftab" variables 2.4 Edge Surface (EDGESURF) 2.5 Plane Surface (PLANESURF) 2.6 Extrude Surface (EXTRUDE)
3. Editing commands	3.1 Fillet 3.2 Trim 3.3 Untrim

	3.4 Extend 3.5 Sculpt
4. Analysis tools	4.1 Analysis Zebra 4.2 Analysis Curvature 4.3 Analysis Draft
5. Complex 3D surfaces	5.1 3d elevation 5.2 Animation 5.3 Rendering 5.4 Clear presentation
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 used mesh editing commands to enable mesh editing. 1.2 developed surfaces using surface commands. 1.3 used editing commands to edit existing surfaces. 1.4 used surface analysis tools. 1.5 create complex 3D surfaces. 1.6 created new surface or cap to close an open edge of an existing surface using "SURFPATCH" command 1.7 created parallel surface at a specified distance from the original surface using "SURFOFFSET" command
2. Underpinning knowledge	2.1 Different types of mesh primitive options 2.2 Methods of creating smooth and refine Meshes 2.3 Process of editing existing Meshes 2.4 Procedure of converting Meshes 2.5 Method of identifying different surfaces 2.6 Surfaces editing procedures 2.7 Surface Network 2.8 Method of applying NURB controls on surfaces 2.9 Surfaces analysis 2.10 Surface associativity 2.11 Procedures and techniques in creating Complex 3D surfaces
3. Underpinning skills	5.1 Operating computer 5.2 Installing computer peripheral devices 5.3 Handling tools and devices 5.4 Communicating in the workplace 5.5 Interpreting drawings and sketches 5.6 Planning for own activities 5.7 Creating co-ordinate systems 5.8 Using tool bars 5.9 Applying commands

4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Well-equipped computer lab 5.2 Printer and plotter 5.3 CAD software 5.4 Learning materials 5.5 Paper
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

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Unit Code and Title	**OU-CON-2D3DCAD-04-L3-V1: Develop Solid Images**
Unit Descriptor	This unit covers the skills, knowledge and attitude required to develop solid images. It includes creating images, editing 3D objects and developing 3D solid composites
Nominal Hours	**30 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Create images	1.1 **Solid** primitives tab is launched from 3D Modeling drop down option of solids panel 1.2 Unique solid primitives are created by extruding existing two-dimensional objects using "Extrude" command with taper and path
2. Edit 3D Objects	2.1 Edges of a 3D object using "xedges" command are extracted. 2.2 The smoothness of shaded and rendered objects are adjusted using "FACETRES" command with valid values range. 2.3 "ISOLINES" and "REGEN" command are applied to regenerate the 3D drawing in 3D view.
3. Develop 3D Solid composites	3.1 3D solid is created by thickening a surface using "THICKEN" command. 3.2 3D solids that overlap are highlighted using "INTERFERE" command.
Range of Variables	
Variables	**Range** (may include but not limited to):
1. Solid	1.1 3D Move 1.2 3D Rotate 1.3 3D Align 1.4 3D Mirror 1.5 3D Rectangular Array 1.6 3D Polar Array
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 launched solid primitives tab from 3D modeling dropdown option of solids panel.

	1.2 created unique solid primitives by extruding existing two-dimensional objects using "Extrude" command with taper and path 1.3 applied "ISOLINES" and "REGEN" command to regenerate the 3D drawing in 3D view 1.4 created 3D solid by thickening a surface using "thicken" command. 1.5 highlighted 3D solids that overlap using "INTERFERE" command.
2. Underpinning knowledge	2.1 Principles of solid primitives and extrude 2.2 Procedure of executing commands 2.3 Different methods to convert the object/drawing to Solid or Surface. 2.4 Method of editing solids 2.5 Differentiating edge effects or extract edges 2.6 Regenerating the 3D drawing in 3D view 2.7 Different composite functions applicable to solids 2.8 Method of thickening the solids. 2.9 Interference on solid objects.
3. Underpinning skills	3.1 Operating computer 3.2 Installing computer peripheral devices 3.3 Handling tools and devices 3.4 Communicating in the workplace 3.5 Interpreting drawings and sketches 3.6 Planning for own activities 3.7 Creating co-ordinate systems 3.8 Using tool bars 3.9 Applying commands
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Well-equipped computer lab 5.2 Printer and plotter 5.3 CAD software 5.4 Learning materials 5.5 Paper
6. Methods of assessment	Competency should be assessed by: 6.1 Written test

	6.2 Demonstration 6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

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Unit Code and Title	**OU-CON-2D3DCAD-05-L3-V1: Merge Flat Objects From 3D Model**
Unit Descriptor	This unit covers the skills, knowledge and attitude required to merge flat objects from 3D model. It includes navigating sectional objects and merging flat objects.
Nominal Hours	**40 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Navigate sectional objects	1.1 Section object that exposes the interior details of a model is created with 3D objects using "SECTIONPLANE" command. 1.2 Options are applied to manipulate Section using **Grips.** 1.3 Different **commands** are applied on Section. 1.4 2D and **3D Sections** are generated using option of right click button of mouse. 1.5 Intersection of plane and solids is used to create a region using "Section" command. 1.6 "Slice" command on the 3D object is applied
2. Merge flat objects	2.1 "SOLVIEW" command is executed. 2.2 Generate profiles and sections in viewports are created with SOLVIEW using "SOLDRAW" command. 2.3 3D view using UCS is developed 2.4 "SOLPROF" command is run
Range of Variables	
Variables	**Range** (may include but not limited to):
1. Grips	1.1 Base grip 1.2 Directional arrow grip 1.3 Segment end grip 1.4 Menu grip
2. Commands	2.1 Erase 2.2 Move 2.3 Copy 2.4 Scale 2.5 Rotate 2.6 Draw order
3. 3D Sections	3.1 Stair case 3.2 Sunshade 3.3 Beam 3.4 Cornish 3.5 Roof

	3.6 Column 3.7 Overhead water tank 3.8 Parapet wall 3.9 Floor section 3.10 Water tank section 3.11 Septic tank
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 defined section plane 1.2 configured of solid profile 1.3 learnt to deal with sections. 1.4 created with 3D objects using "SECTIONPLANE" command 1.5 generated 2D and 3D Sections using option of right click button of mouse defined section commands (slice, etc.) 1.6 applied slice command on the 3D object 1.7 executed SOLVIEW" command 1.8 developed 3D view using user coordinate system. 1.9 discovered configuration of solid profile
2. Underpinning knowledge	2.1 Definition of section plane. 2.2 Dealing with sections 2.3 Generation of 2D and 3D sections 2.4 Section commands (slice, etc.) Definition 2.5 Method of label flat representation of the 3D objects 2.6 Recognition of 3D view using user coordinate system. 2.7 Configuration of solid profile
3. Underpinning skills	3.1 Operating computer 3.2 Installing computer peripheral devices 3.3 Handling tools and devices 3.4 Communicating in the workplace 3.5 Interpreting drawings and sketches 3.6 Planning for own activities 3.7 Creating co-ordinate systems 3.8 Using tool bars 3.9 Applying commands 3.10 Defining Section plane 3.11 Learning to deal with Sections. 3.12 Discovering Configuration of solid profile
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities

	4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Well-equipped computer lab 5.2 Printer and plotter 5.3 CAD software 5.4 Learning materials 5.5 Work instruction sheet 5.6 Worksheets/Instruction sheet
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral Questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

Accreditation Requirements

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

Unit Code and Title	**OU-CON-2D3DCAD-06-L3-V1: Perform 3D Rendering**
Unit Descriptor	This unit covers the skills, knowledge and attitude required to perform 3D rendering. It includes executing rendering, applying materials and lights and demonstrating presentation.
Nominal Hours	**20 Hours**
Elements of Competency	**Performance Criteria** **Bold & Underlined** terms are elaborated in the Range of Variables
1. Execute rendering	1.1 Photorealistic or realistically shaded image of a three-dimensional wireframe or solid model using **"Render" commands** are Created. 1.2 Parts of the model that gets processed during rendering is controlled by following **three settings.**
2. Apply materials and lights	2.1 Material to drawing is added using "Materials" or "Marbrowseropen" commands. 2.2 Material layers are applied using "MATERIALATTACH". 2.3 **Own material** is create as required 2.4 "LIGHTSLIST" command is modified 2.5 Sun properties are adjusted used the "SUNPROPERTIES" command
3. Demonstrate presentation	3.1 **Drawings** are prepared 3.2 Setback rules and floor area ration (FAR) calculations are interpreted as per Bangladesh national building codes (BNBC) 3.3 Sheet presentation is demonstrated 3.4 Documents are printed in various scale as per requirements
Range of Variables	
Variables	**Range** (may include but not limited to):
1. "Render" commands.	1.1 Destination 1.2 Quality 1.3 Selection 1.4 Crop 1.5 File.
2. Three settings.	2.1 View 2.2 Crop 2.3 Selected
3. Own material	3.1 Photo 3.2 Shapes
4. Drawings	4.1 Plans

	4.2 Section 4.3 Elevation 4.4 Isometric view
Evidence Guide The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 described geographic location settings for a particular object 1.2 handed procedure of the sun properties for light issues 1.3 executed rendering 1.4 explained “diagnostic” and “processing” features 1.5 applied/configured materials 1.6 explained how to purge materials from objects. 1.7 applied lights 1.8 prepared Drawings 1.9 printed documents in various scale as per requirements
2. Underpinning knowledge	2.1 Render command 2.2 Environmental features 2.3 Advance features of rendering as sampling, shadow, ray tracing, illumination, diagnostic processing 2.4 Effects illuminate scene 2.5 “Diagnostic” and “processing” features 2.6 Different methods to add/edit materials to 3d drawings 2.7 Adjusting procedure of material scale/layer 2.8 Material mapping (photo, shapes) 2.9 Method of purging materials from objects 2.10 Categorizing point and spot lights 2.11 Lights tool palette 2.12 Geographic location settings for a particular object 2.13 Handling procedure of the sun properties for light issues 2.14 Calculation of FAR as per Bangladesh national building codes (BNBC)
3. Underpinning skills	3.1 Operating computer 3.2 Installing computer peripheral devices 3.3 Handling tools and devices 3.4 Communicating in the workplace 3.5 Interpreting drawings and sketches 3.6 Planning for own activities 3.7 Creating co-ordinate systems 3.8 Using tool bars 3.9 Applying commands 3.10 Defining Section plane

	3.11 Learning to deal with Sections. 3.12 Discovering Configuration of solid profile
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
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Development of Competency Standard

The Competency Standards for National Skills Certificate in 2D & 3D CAD, Level-3 is developed by SEIP.

List of Members

1.	Md. Abdul Mannan, Instructor (Auto Cad), Bangladesh-German Technical Training Center	Member
2.	Jannati Sultana, Architect, Royal CNC Training Institute	Member
3.	Engr. Faridul Islam, Instructor, Montage Training Center	Member
4.	Engr. Md. Alauddin Khelze, Chief Instructor, MAWTS, Pallabi Mirpur	Member
5.	Mr. Moniruzzaman Sani, Master Aluminum Fabricator/Installer, Montage Training Center	Member
6.	Md. Rakibul Hassan, Asst. Instructor, MAWTS, Pallbi, Mirpur	Member
7.	Md Ahasan Habib, TVET Specialist, SEIP	Member
8.	Md. Mohiuzzaman, Course Specialist, SEIP	Member
9.	Emeterio Cedillo, Jr., International Specialist, SEIP	Member
10.	Md. Nuruzzaman, National Specialist, SEIP	Member

Validation of Competency Standard

The Competency Standards for National Skills Certificate in 2D & 3D CAD, Level- 3 is validated by NSDA on 14th September 2022.

List of Members

Sl No	Name and Address	Position in the committee	Signature
1.	Engr. Shafiqul Alam Bhuiyan, CISC	Chairperson	
2.	Mr. Zillur Rahman Khan, Instructor (Civil), Dhaka Polytechnic Institute, Dhaka, Cell: 01711158084, zillurznf99@gmail.com, zillurassaignment18@gmail.com	Member	
3.	Ms. Jannaty Sultana, Architecture, (Individual consultant), Uttara, Dhaka, Cell: 01937125792, Email: amritanoni@gmail.com	Member	
4.	Ms. Jesmin Akter, Architecture, Proprietor, IRA Construction, Cell: 01630884771, Email: jesmin4771@gmail.com	Member	
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