FEDERAL MINISTRY OF EDUCATION

National Skills Qualifications FOR

BLACKSMITHING

LEVEL 1, 2 & 3

February, 2025

NATIONAL BOARD FOR TECHNICAL EDUCATION
NBTE

Innovation Development and Effectiveness in the Acquisition of Skills (IDEAS) Project

THE WORLD BANK

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National Board for Technical Education
Plot B, Bida Road, P.M.B. 2239, Kaduna, Nigeria

NATIONAL SKILLS QUALIFICATION

BLACKSMITHING

LEVEL 1-3

FEBRUARY, 2025

Contents

PURPOSE OF THE QUALIFICATION

This qualification is designed for learners interested in pursuing a career in the blacksmithing industry. It provides learners with the fundamental knowledge and skills to perform basic blacksmithing tasks, including forging, shaping, and joining metals. Upon completion, learners will be able to work safely, use basic tools effectively, and support experienced blacksmiths in the industry.

NSQ LEVEL 1: General Objectives

At the end of this Level, the Learner should be able to:

1. Demonstrate safe work practices in a blacksmithing environment.
2. Communicate effectively within a blacksmithing environment.
3. Demonstrate Team work in blacksmithing
4. Use blacksmithing tools
5. Perform simple blacksmithing operations.
6. Carry out blacksmithing tasks using simple blacksmithing techniques.
7. Carry out simple welding operations relevant to blacksmithing.
8. Interpret simple drawings for metal works and blacksmithing operations.
9. Maintain blacksmithing tools and equipment.

NSQ LEVEL 1 – BLAKSMITH ASSISTANT

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
01	ENGG/BS/001/L1	Health and Safety in blacksmithing	2	**20**	Mandatory Unit
02	ENGG/BS/002/L1	Communication in blacksmithing environment	2	**20**	Mandatory Unit
03	ENGG/BS/003/L1	Teamwork in Blacksmithing	2	**20**	Mandatory Unit
04	ENGG/BS/004/L1	Blacksmithing Tools	1	**10**	Mandatory Unit
05	ENGG/BS/005/L1	Blacksmithing operations	3	**30**	Mandatory Unit
06	ENGG/BS/006/L1	Blacksmithing Techniques	3	**30**	Mandatory Unit
07	ENGG/BS/007/L1	Welding for Blacksmithing	**3**	**30**	Mandatory Unit
08	ENGG/BS/008/L1	Drawing for Blacksmithing works	3	**30**	Mandatory Unit
09	ENGG/BS/009/L1	Tools and Equipment Maintenance in Blacksmithing	**2**	**20**	Mandatory Unit
TOTAL			21	210	

Note: No optional courses

The credit value is not up to the bare minimum which is 180hrs

Note: This is a 21-credit unit qualification. To achieve this qualification, learners must complete all credit units. Each credit is equivalent to 10 guided learning hours (GLH). The total learning hours will consist of the GLH plus the independent learning hours, typically 50% – 150% of the GLH. The actual total learning hours for each credit will be a minimum of 15 hours.

GENERAL GUIDE

Unit title	Provides a clear explanation of the content of the unit.
Unit number	The unique number assigned to the unit
Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Skills Qualifications Framework NSQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning Outcome	A statement of what a learner will know, understand or be able to do, as a result of learning process.
Assessment/Performance criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

UNIT 1: Health and Safety in blacksmithing.
Unit Reference Number: ENGG/BS/001/L1
NSQ Level 1: **BLACKSMITH ASSISTANT**
Credit Value: 2
Guided Learning Hour: 20 hours

Unit Purpose: This unit is designed to equip the learner with the intuition to observe health and safety in the work environment.

Objectives:

1. Understand work environment
2. Understand Safety rules and regulations in a workplace
3. Understand first aid procedure

Unit Assessment Requirements/ Evidence Requirements

Learners will be assessed using some of the following methods:

1. Direct Observation (DO)
2. Personal statement/Learning Journal (PS/LJ)
3. Questions and Answers (QA)
4. Witness Testimony (WT)
5. Assignment (ASS)
6. Work Product (WP)

Unit 1: Health and Safety in Blacksmithing

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO 1: Understand work environment	1.1	Explain work environment									
	1.2	Explain workshop layout: • Gangway • Work Area • Store • Changing room • Entrance and Exit points • Muster Point • Emergency Exit									
	1.3	Identify safety signs and symbols in a workshop									
	1.4	Identify the following in the workshop: • First aid box • Fire extinguisher • Sand bucket • Mains switches									
LO 2: Understand Safety rules and regulations in a workplace	2.1	Explain the importance of safety in a blacksmithing work environment									
	2.2	List Personal Protective Equipment (PPE) in blacksmithing operations									
	2.3	Identify the PPE required for various tasks in blacksmithing									
	2.4	Explain the following causes of accident in the workshop: - Horseplay - Spills - Poor housekeeping - Loose electrical fittings - Inappropriate use of tools and equipment									
	2.5	Explain how to prevent hazards in blacksmithing environment									
LO 3: Understand first aid procedure	3.1	Explain first aid									
	3.2	List the items that can be found in the first aid box									
	3.3	Explain how to administer first aid.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Unit 02: Communication in Blacksmithing Environment

Unit Reference Number:	ENGG/BS/002/L1
NSQ Level:	1 (Blacksmith Assistant)
Credit Value:	**2**
Guided Learning Hours:	**20**

Unit Purpose: This unit is designed to equip learners with the knowledge and skills to communicate effectively in the work environment.

Objectives

At the end of this unit, the learner should be able to:.

1. Use verbal and non-verbal communication methods.
2. Follow workplace guides and instructions.
3. Maintain professional etiquette when communicating.
4. Utilize workplace communication tools effectively.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Observing the learner's ability to communicate in the work environment.
2. **Personal Statement/Learning Journal (PS/LJ)** – The learner's reflections on the importance of communication.
3. **Questions and Answers (QA)** – Assessing the learner's understanding through oral or written questions.
4. **Witness Testimony (WT)** – Testimonies from supervisors or trainers on the learner's communication skills.
5. **Assignments (ASS)** – Written tasks demonstrating comprehension of communication principles.

Unit 02: Communication in Blacksmithing Environment

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO1: Understand the importance of effective communication in the workplace	1.1	Explain communication in the work environment.									
	1.2	Explain the importance of communication in a blacksmithing workshop.									
	1.3	List factors affecting effective communication									
LO2: Understand verbal and non-verbal communication	2.1	Explain verbal and non-verbal communications									
	2.2	Demonstrate appropriate use of tone and gestures when communicating									
	2.3	Identify communication barriers and how to overcome them									
LO3: Follow workplace guides and instructions	3.1	Respond to instructions in the workplace									
	3.2	Interpret workshop rules									
	3.3	Ask relevant questions to clarify instructions									
LO4: Maintain professional etiquette when communicating	**4.1**	Demonstrate respect and courtesy in workplace conversations									
	4.2	Address colleagues and supervisors appropriately									
	4.3	Follow instruction for a given job									
LO5: Utilize workplace communication tools effectively	**5.1**	Identify common communication tools used in a workshop (e.g., walkie-talkies, notice boards, logs)									
	5.2	Use written communication (e.g., record keeping, message writing) effectively									
	5.3	Use non-written communication (e.g., phone call message, etc) effectively									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Unit 03: Teamwork in Blacksmithing

Unit Reference Number: ENGG/BS/003/L1
NSQ Level: 1 (Blacksmith Assistant)
Credit Value: 2
Guided Learning Hours: 20

Unit Purpose:
This unit is designed to equip learners with the knowledge and skills to work effectively as part of a team in a blacksmithing environment.

Objectives

At the end of this unit, the learner should be able to:

1. Demonstrate teamwork in a blacksmithing workshop.
2. Demonstrate interpersonal skills in a team.
3. Contribute to team tasks and goals.
4. Follow team leadership and instructions.
5. Resolve conflicts and maintain good workplace relationships.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Observing the learner's ability to work in a team.
2. **Personal Statement/Learning Journal (PS/LJ)** – The learner's reflections on teamwork experiences.
3. **Questions and Answers (QA)** – Oral or written questions assessing the learner's understanding of teamwork.
4. **Witness Testimony (WT)** – Feedback from supervisors or trainers on the learner's teamwork skills.
5. **Assignments (ASS)** – Written tasks demonstrating knowledge of teamwork principles.
6. **Work Product (WP)**

Unit 03: Teamwork in Blacksmithing

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO1: Understand the importance of teamwork	**1.1**	Explain teamwork									
	1.2	Explain the importance teamwork in blacksmithing									
	1.3	Explain the challenges of working in a team.									
LO2: Demonstrate interpersonal skills in a team	**2.1**	Communicate with team members.									
	2.2	Show cooperation and respect in team discussions.									
	2.3	Recognize different roles within a team.									
LO3: Contribute to team tasks and goals	**3.1**	Identify personal responsibilities in a team.									
	3.2	Assist team members in achieving common goals.									
	3.3	Work within given timeframes.									
LO4: Follow team leadership and instructions	**4.1**	Explain the characteristics of a good team leader									
	4.2	Follow given instructions									
	4.3	Contribute to decision-making when required.									
LO5: Understand conflict resolution in the workplace	**5.1**	Explain common causes of conflict in teamwork.									
	5.2	Explain conflict resolution strategies.									
	5.3	Maintain professionalism and cooperation in challenging situations.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Unit 04: Blacksmithing Tools

Unit Reference Number: **ENGG/BS/004/L1**
NSQ Level: **1 (Blacksmith Assistant)**
Credit Value: **1**
Guided Learning Hours: **10**

Unit Purpose:
This unit is designed to equip learners with the knowledge and skills to identify, handle, and maintain tools used in blacksmithing.

Objectives

At the end of this unit, the learner should be able to:

1. Identify tools used in blacksmithing.
2. Carryout maintenance of blacksmithing tools
3. Select appropriate tools for specific blacksmithing tasks
4. Demonstrate practical use of blacksmithing tools

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Assessing the learner's ability to handle and use tools correctly.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflection on tool usage experiences.
3. **Questions and Answers (QA)** – Oral or written assessments on tool identification and usage.
4. **Witness Testimony (WT)** – Supervisor or trainer’s feedback on learner's tool-handling skills.
5. **Assignments (ASS)** – Written tasks on tool functions and maintenance.
6. **Work Products (WP)** – Evidence of tools maintained or properly stored.

Unit 04: Blacksmithing Tools

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO1: Identify tools used in blacksmithing	**1.1**	Identify blacksmithing tools such as hammers, anvils, chisels, tongs, scribers, and files.									
	1.2	Explain the function of each tool in 1.1.									
	1.3	Differentiate between cutting, shaping, and holding tools.									
LO2: Understand safety, storage, and maintenance of blacksmithing tools	**2.1**	Explain the importance of maintaining tools.									
	2.2	Explain safety rules for handling blacksmithing tools									
	2.3	Recognize common hazards related to improper tool use									
	2.4	Describe the process of maintaining forging tools									
	2.5	Store forging tools properly after use.									
LO3: Select appropriate tools for specific blacksmithing tasks	**3.1**	Identify the tools used in the following: -Ruling -Marking -Cutting -Heating -Holding -Shaping -Cooling									
	3.2	Select the appropriate tools for a given task									
	3.3	Use appropriate blacksmithing tools in a given task									
LO4: Demonstrate practical use of blacksmithing tools	**4.1**	Use hammers and anvils to shape metal.									
	4.2	Perform cutting operations using chisels and hacksaws.									
	4.3	Demonstrate the use of files for metal finishing.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled)	**Date:**

Unit 05: Blacksmithing Operations

Unit Reference Number:	**ENGG/BS/005/L1**
NSQ Level:	**1 (Blacksmith Assistant**)
Credit Value:	**3**
Guided Learning Hours:	**30**

Unit Purpose:
This unit is designed to equip learners with the knowledge and skills in blacksmithing operations.

Objectives
At the end of this unit, the learner should be able to:

1. Identify different methods of heating metals.
2. Operate forging and heating equipment.
3. Apply appropriate techniques to shape heated metal using various tools.
4. Demonstrate quality control in heating and shaping processes.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Assessing the learner's ability to heat and shape metal.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflection on heating and shaping experiences.
3. **Questions and Answers (QA)** – Oral or written assessments on theory and safety procedures.
4. **Witness Testimony (WT)** – Supervisor or trainer's feedback on learner's practical performance.
5. **Assignments (ASS)** – Written tasks on metal properties and heating techniques.
6. **Work Products (WP)** – Evidence of shaped metal products.

Unit 05: Blacksmithing Operations

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO1: Identify different methods of heating metals	**1.1**	Explain the following metal heating methods: - Coal forge - Gas forge - Electric induction.									
	1.2	Describe the advantages and limitations of each heating method in 1.1.									
	1.3	Identify appropriate heating methods for different types of metal.									
LO2: Understand the properties of metals when heated	**2.1**	Explain the colour changes of metal as it heats.									
	2.2	Describe the effects of over-heating and under-heating of metal.									
	2.3	Explain the impact of rapid and slow cooling on strength of metal.									
LO3: Operate forging and heating equipment	**3.1**	Identify hazards when using a forge.									
	3.2	Demonstrate the proper use of protective equipment (PPE).									
	3.3	Maintain correct forging temperature for different metals.									
LO4: Apply appropriate techniques to shape heated metal	**4.1**	Demonstrate basic hammering techniques on heated metal.									
	4.2	Use anvils, hammers, and tongs for shaping operations.									
	4.3	Use pullers and flatters for shaping operations.									
	4.4	Perform basic bending, twisting, and flattening techniques.									
LO5: Demonstrate quality control in heating and shaping processes	**5.1**	Assess the accuracy and uniformity of shaped metal pieces using appropriate measuring instruments and techniques.									
	5.2	Identify common									

		shaping defects and how to correct them.									
	5.3	Ensure that shaped metal meets given specifications.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled):	**Date:**

Unit 06: Blacksmithing Techniques
Unit Reference Number: ENGG/BS/006/L1
NSQ Level: 1 (Blacksmith)
Credit Value: 3
Guided Learning Hours: 30

Unit Purpose:
This unit provides learners with the knowledge and skills of fundamental forging techniques used in blacksmithing.

Objectives
At the end of this unit, the learner should be able to:

1. Apply forging techniques such as drawing out, bending, twisting, and upsetting.
2. Apply the principles of forging and metal deformation.
3. Use basic forging tools correctly.
4. Apply safety measures when working with hot metal.
5. Produce simple forged components with accuracy and consistency.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Assessing the learner's forging techniques in a workshop.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflection on forging experiences and skills gained.
3. **Questions and Answers (QA)** – Oral or written assessments on forging principles and safety.
4. **Witness Testimony (WT)** – Trainer or supervisor feedback on learner's practical performance.
5. **Assignments (ASS)** – Written tasks on forging methods and metalworking concepts.
6. **Work Products (WP)** – Evidence of forged components made by the learner.

Unit 06: Basic Forging Techniques

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO1: Understand the principles of forging and metal deformation	**1.1**	Explain how metal deforms under hammering and compression.									
	1.2	Describe the importance of heat in forging processes.									
	1.3	Identify different forging temperatures and their effects on metal.									
LO2: Demonstrate fundamental forging techniques	**2.1**	Perform drawing down to lengthen metal.									
	2.2	Bend metal using anvil and hammer.									
	2.3	Apply twisting techniques to achieve decorative and functional designs.									
	2.4	Demonstrate fullering and flattening techniques									
	2.5	Demonstrate upsetting techniques to increase the thickness of a metal.									
	2.6	Demonstrate punching and drifting techniques									
LO3: Apply safety measures when working with metal	**3.1**	Use appropriate personal protective equipment (PPE).									
	3.2	Maintain proper posture and hammer grip to prevent injury.									
	3.3	Follow workshop safety protocols when handling hot metal and tools.									
LO4: Produce simple forged components with accuracy and consistency	**4.1**	Forge simple items (e.g., hooks, nails, simple scrolls).									
	4.2	Assess the accuracy, uniformity, and quality of forged products.									
	4.3	Identify common forging defects.									
	4.4	Correct common forging defects.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled):	**Date:**

Unit 07: Basic Welding Techniques in Blacksmithing
Unit Reference Number: ENGG/BS/007/L1
NSQ Level: 1 (Blacksmith Assistant)
Credit Value: 3
Guided Learning Hours: 30

Unit Purpose:
This unit provides learners with knowledge and skills of basic welding techniques applicable in blacksmithing. It covers fundamental welding principles, equipment handling, safety measures, and practical welding applications for joining and repairing metalwork in blacksmithing operations.

Objectives

At the end of this unit, the learner should be able to:

1. Understand the principles of welding and its application in blacksmithing.
2. Use basic welding tools and equipment.
3. Demonstrate fundamental welding techniques such as arc welding, forge welding, and gas welding.
4. Apply safety precautions when handling welding tools and materials.
5. Produce simple welded joints and repairs used in blacksmithing.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Assessment of the learner's practical welding skills in a workshop.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflection on welding processes and experiences.
3. **Questions and Answers (QA)** – Oral or written assessments on welding principles, equipment, and safety.
4. **Witness Testimony (WT)** – Trainer or supervisor feedback on learner's welding proficiency.
5. **Assignments (ASS)** – Written tasks related to welding methods, defects, and safety measures.
6. **Work Products (WP)** – Evidence of welded joints and metal repair work completed by the learner.

Unit 07: Basic Welding Techniques in Blacksmithing

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO1: Understand the principles of welding and its application in blacksmithing	**1.1**	Explain the role of welding in blacksmithing.									
	1.2	Identify common welding methods used in blacksmithing (e.g., arc welding, forge welding, gas welding).									
	1.3	Describe the properties of weldable metals.									
LO2: Use basic welding tools and equipment	**2.1**	Identify common arc welding equipment, accessories, and their applications (e.g., welding machine, electrodes, clamps etc.).									
	2.2	Identify common Gas welding equipment, accessories, and their applications (e.g., Oxyacetylene cylinders, filler rod, gas torches, and clamps etc.).									
	2.3	Sketch items listed in 2.1 and 2.2									
LO3: Demonstrate fundamental welding techniques	3.1	Perform basic arc welding to create simple joints.									
	3.2	Apply forge welding to join heated metal pieces.									
	3.3	Use gas welding for small-scale blacksmithing repairs and metal cuttings.									
	3.4	Demonstrate proper electrode selection and welding technique for different metals.									
LO4: Apply safety precautions when handling welding tools and materials	**4.1**	Identify appropriate personal protective equipment (PPE) for welding.									
	4.2	Follow correct procedures for handling									

		hot metal and welding fumes.									
	4.3	List common welding hazards (e.g., electric shock, burns, fire risks).									
	4.4	Describe prevention of above									
LO5: Produce simple welded joints and repairs used in blacksmithing	**5.1**	Create basic weld joints (e.g., butt, lap, fillet joints).									
	5.2	Repair broken or cracked metal components using welding techniques.									
	5.3	Assess the strength and quality of welded components.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled):	**Date:**

Unit 08: Drawing for Blacksmithing Works

Unit Reference Number: ENGG/BS/008/L1
NSQ Level: 1 (Blacksmith Assistant)
Credit Value: 2
Guided Learning Hours: 20

Unit Purpose:
This unit equips learners with the foundational skills needed to read and interpret technical drawings related to blacksmithing works. It covers blueprint reading, symbols, measurement interpretation, and translating drawings into practical blacksmithing projects.

Objectives
At the end of this unit, the learner should be able to:

1. Understand the importance of technical drawings in blacksmithing.
2. Identify common drawing types, views, and symbols used in blacksmithing works.
3. Interpret dimensions, scales, and tolerances in technical drawings.
4. Create simple sketches for blacksmithing projects.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Learner's ability to interpret and apply drawings in workshop tasks.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflection on drawing interpretation and its application.
3. **Questions and Answers (QA)** – Oral or written assessment on drawing components and symbols.
4. **Witness Testimony (WT)** – Supervisor or trainer confirmation of the learner’s competency.
5. **Assignments (ASS)** – Written or drawn exercises to demonstrate understanding.
6. **Work Products (WP)** – Learner-generated sketches and interpreted drawings applied to projects.

Unit 08: Drawing Interpretation for Metalworks

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO1: Understand the importance of technical drawings in blacksmithing	1.1	Explain the term technical drawing									
	1.2	List the instruments used in technical drawing									
	1.3	Explain why technical drawing is important in blacksmithing.									
	1.4	Describe how technical drawings are applied in blacksmithing operations.									
LO2: Identify common drawing types, views, and symbols used in blacksmithing works	**2.1**	Explain the following types of technical drawing views: - Orthographic - Isometric - Sectional									
	2.2	Identify common drawing symbols (e.g., weld symbols, weld type, dimensions, material indications).									
	2.3	Explain common drawing symbols (e.g., weld symbols, weld type, dimensions, material indications).									
LO3: Interpret dimensions, scales, and tolerances in technical drawing	**3.1**	Explain the importance of measurement accuracy in blacksmithing operations.									
	3.2	Interpret dimensions and scale ratios on a given drawing.									
	3.3	Recognize tolerance levels and their impact on fabrication.									
LO4: Create sketches for simple blacksmithing projects	**4.1**	Draw a simple metalwork design with dimensions.									
	4.2	Label key components in a hand-drawn or software-generated sketch.									

	4.3	Modify an existing drawing to suit specific blacksmithing requirements									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled):	**Date:**

Unit 09: Tools Maintenance in Blacksmithing
Unit Reference Number: ENGG/BS/009/L1
NSQ Level: 1 (Blacksmith Assistant)
Credit Value: 2
Guided Learning Hours: 20

Unit Purpose:
This unit equips learners with the knowledge and skills to properly maintain blacksmithing tools.

Objectives

At the end of this unit, the learner should be able to:

1. Understand the importance of tools maintenance in blacksmithing.
2. Identify different types of maintenance strategies for blacksmithing tools and equipment.
3. Perform routine cleaning and sharpening of blacksmithing tools.
4. Conduct minor repairs on damaged tools.
5. Implement safe storage practices for blacksmithing tools and equipment.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Practical demonstration of tool maintenance.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflection on maintenance procedures.
3. **Questions and Answers (QA)** – Oral or written assessment on maintenance techniques.
4. **Witness Testimony (WT)** – Supervisor or trainer confirmation of the learner's competency.
5. **Assignments (ASS)** – Documentation of tool maintenance procedures.
6. **Word Product (WP)**

Unit 09: Tool Maintenance in Blacksmithing

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO1: Understand the importance of tool maintenance in blacksmithing	1.1	Explain the importance of tools maintenance for blacksmithing									
	1.2	Explain common tool defects in blacksmithing									
	1.3	Explain the factors responsible for tool defects in blacksmithing									
	1.4	Identify remedial actions for defects highlighted in 1.3.									
LO2: Perform routine cleaning and sharpening of blacksmithing tools	2.1	Demonstrate appropriate procedures for cleaning tools after use.									
	2.2	Sharpen cutting tools (e.g. chisels, punches) using appropriate techniques.									
	2.3	Apply protective coatings (e.g. oiling, anti-rust treatment) on tools to prevent corrosion.									
LO3: Conduct minor repairs on damaged tools	**3.1**	Explain common tool damages (e.g., chipped edges, loose handles, deformations).									
	3.2	Explain common repair techniques (e.g., regrinding edges, replacing handles, straightening deformed tools etc).									
	3.3	Demonstrate common repair techniques (e.g., regrinding edges, replacing handles, straightening deformed tools).									
LO4: Implement safe storage practices for blacksmithing tools and materials	**4.1**	Arrange tools in designated storage spaces.									
	4.2	Apply safety measures such as proper handling to prevent damage									
	4.3	Maintain proper storage and documentation of tools and equipment.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled):	**Date:**

NATIONAL SKILLS QUALIFICATION

BLACKSMITHING

LEVEL 2

FEBRUARY, 2025

PURPOSE OF THE QUALIFICATION

This qualification is intended for learners who wish to advance their careers in blacksmithing. It focuses on building on the foundational skills acquired at Level 1 and further developing competencies in blacksmithing tasks. Learners will gain expertise in forging techniques, tool making, welding, and working with various metals. At the end of this level, learners will be capable of performing a range of blacksmithing operations independently and efficiently.

General Objectives

At the end of this level, the learner should be able to:

1. Demonstrate safe work practices in a blacksmithing environment.
2. Communicate effectively in the blacksmithing environment.
3. Select and prepare metals for different blacksmithing operations.
4. Perform metal heating, shaping, and forging techniques.
5. Develop and fabricate simple tools and components using blacksmithing methods.
6. Execute simple welding and joining operations for blacksmithing projects.
7. Produce simple drawings and specifications for blacksmithing work.
8. Carry out simple repair and maintenance of blacksmithing tools and equipment.

NSQ LEVEL 2 – BLAKSMITH ASSISTANT

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
01	ENGG/BS/001/L2	Health, Safety, and Environment	2	20	Mandatory unit
02	ENGG/BS/002/L2	Communication and Work Practices	2	20	Mandatory unit
03	ENGG/BS/003/L2	Metal Preparation and Shaping	3	30	Mandatory unit
04	ENGG/BS/004/L2	Forging Techniques	4	40	Mandatory unit
05	ENGG/BS/005/L2	Fabrication and Toolmaking	3	30	Mandatory unit
06	ENGG/BS/006/L2	Welding and Joining Operations	4	40	Mandatory unit
07	ENGG/BS/007/L2	Drawing for Blacksmithing	3	30	Mandatory unit
08	ENGG/BS/008/L2	Tools and Equipment Maintenance	2	20	Mandatory unit
TOTAL			**23**	**230**	

Unit 01: Health, Safety and Environment

Unit Reference Number: ENGG/BS/001/L2
NSQ Level: 2
Credit Value: 2
Guided Learning Hours (GLH): 20

Unit Purpose:
This unit aims to provide learners with solid understanding of occupational health and safety practices in blacksmithing.

Objectives

At the end of this unit, learners should be able to:

1. Understand the importance of health, safety, and environmental management in blacksmithing.
2. Identify workplace hazards and implement proactive measures.
3. Demonstrate safe handling and storage of tools, materials, and waste.
4. Respond to workplace accidents and emergencies.
5. Apply environmental conservation practices in blacksmithing.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Practical demonstration of safety procedures.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflection on safety practices.
3. **Questions and Answers (QA)** – Oral or written assessment on safety knowledge.
4. **Witness Testimony (WT)** – Supervisor or trainer confirmation of the learner's competency.
5. **Assignments (ASS)** – Documentation of safety protocols and emergency response.

UNIT 1 Health, Safety & Environment

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO1: Understand the importance of health, safety, and environment in blacksmithing	1.1	Explain health, safety, and environment (HSE) in blacksmithing.									
	1.2	Explain the benefits of maintaining a safe and healthy work environment.									
	1.3	Discuss the consequences of poor safety management in blacksmithing environment									
LO2: Identify workplace hazards and implement preventive measures	2.1	Explain common workplace hazards (e.g., fire, sharp tools, toxic fumes, heavy lifting, etc).									
	2.2	Explain safety procedures when working with high temperatures and heavy equipment									
	2.3	Demonstrate proper use of personal protective equipment (PPE) (e.g., gloves, goggles, aprons, respirators).									
	2.4	Conduct risk assessment in a blacksmithing environment.									
LO3: Demonstrate safe handling and storage of tools, materials, and waste	3.1	Explain the importance of tools and material handling in blacksmithing									
	3.2	Implement safe material handling practices (e.g., lifting techniques, storage of flammable materials, etc).									
	3.3	Apply proper waste disposal methods (e.g., scrap metal recycling, disposal of hazardous materials, etc).									

LO4: Respond to workplace accidents and emergencies	**4.1**	Explain the following workplace emergencies **1.** Fires **2.** Injuries **3.** Chemical spills									
	4.2	Demonstrate basic first aid procedures (e.g., treating burns, cuts, fractures, etc).									
	4.3	Follow emergency response protocols (e.g., fire safety drills, evacuation procedures, emergency exit doors, muster points, etc.).									
LO5: Apply environmental conservation practices in blacksmithing	**5.1**	Explain the impact of blacksmithing activities on the environment.									
	5.2	Describe methods of reducing environmental pollution (e.g., emission control, waste management, etc.).									
	5.3	Implement eco-friendly practices in blacksmithing (e.g., energy efficiency, responsible sourcing of materials, etc).									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Unit 02: Communication and Work Practices

Unit Reference Number: ENGG/BS/002/L2
NSQ Level: 2
Credit Value: 2
Guided Learning Hours (GLH): 20

Unit Purpose:
This unit aims to equip learners with effective communication skills and professional work practices essential for a blacksmithing environment.

Objectives

At the end of this unit, learners should be able to:

1. Understand the importance of effective communication in blacksmithing.
2. Apply verbal and written communication techniques in the workplace.
3. Demonstrate active listening and teamwork skills.
4. Maintain professional workplace behaviour and ethics.
5. Resolve workplace conflicts using effective strategies.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Demonstration of communication and workplace etiquette.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflection on communication experiences.
3. **Questions and Answers (QA)** – Oral or written assessment on communication and work practices.
4. **Witness Testimony (WT)** – Supervisor or trainer confirmation of communication skills.
5. **Assignments (ASS)** – Case studies and role-playing activities on communication and teamwork.
6. **Work Products (WP)** – Documentation of workplace communication practices (e.g., reports, meeting minutes).

UNIT 2 Communication and Work Practices in Blacksmithing

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO1: **Understand the importance of effective communication in blacksmithing**	1.1	Explain the importance of communication in the work environment									
	1.2	Explain the consequences of poor communication in the workplace.									
	1.3	Explain different types of workplace communication (verbal, non-verbal, written).									
LO2: Apply verbal, non-verbal, and written communication techniques in the workplace	2.1	Demonstrate clear and professional verbal (e.g., giving instructions, discussing tasks) and non-verbal communication.									
	2.2	Write simple workplace reports, notes, and instructions.									
	2.3	Use workplace communication tools effectively (e.g., emails, phone calls, fire alarming, messages, etc).									
LO3: Demonstrate active listening and teamwork skills	3.1	Explain the importance of active listening in workplace interactions.									
	3.2	Participate in group discussions and team projects.									
	3.3	Show respect to colleagues and superiors through communication.									
LO4: Maintain professional workplace behaviour and ethics	4.1	Describe acceptable workplace behaviour in a blacksmithing workshop.									
	4.2	Follow workplace ethics and professional conducts and guidelines.									
	4.3	Apply ethical standards in workplace communication.									

LO5: Resolve workplace conflicts using effective strategies	**5.1**	Explain common causes of workplace conflicts.									
	5.2	Apply conflict resolution techniques (e.g., negotiation, mediation, collaboration, etc).									
	5.3	Demonstrate appropriate responses to workplace disagreements.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Unit 3: Metal Preparation and Shaping

Unit Reference Number: ENGG/BS/003/L2
NSQ Level: 2
Credit Value: **3**
Guided Learning Hours (GLH): 30

Unit Purpose:
This unit equips learners with the skills and knowledge to prepare and shape metals in blacksmithing.

Objectives

At the end of this unit, learners should be able to:

1. Understand metal preparation and shaping processes.
2. Select the appropriate tools and equipment for metal preparation and shaping.
3. Perform metal shaping operations (e.g., bending, twisting, and forming).
4. Demonstrate precision in measuring and marking out materials for shaping.
5. Apply different blacksmithing processes to achieve desired shapes.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Practical demonstration of advanced metal preparation and shaping.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflection on experiences in preparing and shaping metals.
3. **Questions and Answers (QA)** – Written or oral assessments on metal preparation and shaping techniques.
4. **Witness Testimony (WT)** – Confirmation from an assessor or supervisor of learners' competence in metal preparation.
5. **Assignments (ASS)** – Case studies or reports demonstrating understanding and application of techniques.
6. **Work Products (WP)** – Finished metal pieces that demonstrate shaping skills.

Unit 03: Metal Preparation and Shaping

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO1: Understand metal preparation and shaping processes	1.1	Explain the importance of proper metal preparation before shaping.									
	1.2	Explain shaping techniques and their applications.									
	1.3	Demonstrate metal preparation in blacksmithing (e.g., filing, grinding etc.)									
LO2: Select the appropriate tools and equipment for metal preparation and shaping	2.1	Identify the tools and equipment required for metal preparation.									
	2.2	Demonstrate the safe use of shaping tools and equipment.									
	2.3	Select the appropriate tools for specific metal types and shaping tasks.									
LO3: Perform metal shaping operations	3.1	Explain bending techniques (e.g., hot bending and cold bending).									
	3.2	Demonstrate twisting and coiling metal techniques.									
	3.3	Demonstrate forming techniques using hammering, pressing, and stretching.									
LO4: Demonstrate precision in measuring and marking out materials for shaping	**4.1**	Use measurement tools (e.g., callipers, micrometres, measuring tapes) to accurately measure metal.									
	4.2	Mark out shapes and patterns on metal surfaces using appropriate tools.									
	4.3	Apply correct tolerances and allowances precise shaping.									
LO5: Apply different blacksmithing	**5.1**	Explain the following blacksmithing processes									

processes to achieve desired shapes		4. Forging 5. Rolling 6. Casting etc.									
	5.2	Apply blacksmithing processes to achieve the required shape and finish.									
	5.3	Use heat treatment processes (e.g., hardening, annealing etc) to alter metal properties before shaping.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled)	**Date:**

Unit 04: Forging Techniques

Unit Reference Number: ENGG/BS/004/L2
NSQ Level: 2
Credit Value: 4
Guided Learning Hours (GLH): 40

Unit Purpose:
This unit focuses on providing learners with the skills and knowledge required to perform forging techniques in blacksmithing.

Objectives

At the end of this unit, learners should be able to:

1. Understand the principles of forging and their applications.
2. Select appropriate tools and materials for different forging tasks.
3. Perform forging operations, including shaping, bending, and drawing.
4. Use different heating methods to achieve the desired forging temperature.
5. Apply safety measures and correct handling techniques during forging.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Practical demonstration of advanced forging techniques.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflective account of the forging processes learned and practiced.
3. **Questions and Answers (QA)** – Written or oral tests assessing knowledge of forging techniques.
4. **Witness Testimony (WT)** – Confirmation from an assessor or supervisor of the learner's competence in forging.
5. **Assignments (ASS)** – Reports or practical assessments demonstrating knowledge and practical skills in forging.
6. **Work Products (WP)** – Finished forged items demonstrating the application of advanced forging techniques.

Unit 04: Forging Techniques

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO1: **Understand the principles of forging and their applications**	1.1	Explain the principles of forging, including material properties under heat and stress.									
	1.2	Identify various types of forging operations used in blacksmithing.									
	1.3	Explain the benefits and limitations of different forging techniques.									
	1.4	Explain where each of the forging techniques can be applied									
LO2: Select appropriate tools and materials for forging tasks	2.1	Select the appropriate tools required for forging									
	2.2	Select the appropriate materials based on forging requirements (e.g., steel, iron, alloys etc.)									
	2.3	Set up heating method for a given material (e.g., gas forge, coal forge, induction heating)									
LO3: Perform forging operations	3.1	Demonstrate the process of drawing down (lengthening) of metal by hammering.									
	3.2	Perform bending operations to form simple shapes.									
	3.3	Perform upset forging to increase the thickness of the metal at specific points.									
	3.4	Demonstrate punch and drift forging techniques.									
	3.5	Use forging techniques to produce items such as hooks, hinges, or decorative items.									
LO4: Use heating methods to achieve desired forging	**4.1**	Use various heating methods (e.g., gas forge, coal forge, induction heating) to achieve desired forging									

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
temperature		temperatures.									
	4.2	Control the temperature of metal during the forging process.									
	4.3	Explain the importance of heating control and temperature range in achieving quality forged products.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Unit 05: Fabrication and Toolmaking

Unit Reference Number: ENGG/BS/005/L2
NSQ Level: 2
Credit Value: 3
Guided Learning Hours (GLH): 30

Unit Purpose:
This unit is designed to equip learners with the essential skills and knowledge to fabricate tools and components through blacksmithing processes.

Objectives

At the end of this unit, learners should be able to:

1. Understand the principles of toolmaking and component fabrication.
2. Understand different types of metals and their alloys used in blacksmithing operation
3. Select appropriate materials for toolmaking and component fabrication.
4. Demonstrate finishing techniques to ensure high-quality fabrication.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Practical demonstration of toolmaking and component fabrication skills.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflective account of the fabrication processes learned and practiced.
3. **Questions and Answers (QA)** – Written or oral assessments related to toolmaking techniques and fabrication.
4. **Witness Testimony (WT)** – Confirmation of competence from an assessor or supervisor regarding fabricated tools and components.
5. **Assignments (ASS)** – Practical tasks or projects that demonstrate the learner's ability to fabricate components and tools.
6. **Work Products (WP)** – Finished tools and fabricated components that meet the required standards.

Unit 05: Fabrication and Toolmaking

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO1: Understand the principles of tool making and component fabrication	1.1	Explain the principles of toolmaking and component fabrication in blacksmithing (e.g., proper material selection, design and planning, heat treatment, tolerancing, surface finishing, quality control, etc.).									
	1.2	Discuss the types of tools and components commonly fabricated in blacksmithing.									
	1.3	Apply the principles of tool making and component fabrication in blacksmithing.									
LO2: Understand different types of metals and their alloys used in blacksmithing operation	2.1	Explain different types of metals (ferrous and nonferrous) and their alloys (aluminium alloys, bronze, brass, high carbon steel, tungsten, etc.) used in blacksmithing operations									
	2.2	Select appropriate metals for a given blacksmithing operation									
	2.3	Use appropriate metals for a given blacksmithing operation									
LO3: Demonstrate finishing techniques for fabricated components	3.1	Explain the importance of finishing in blacksmithing operations									
	3.2	Explain the finishing techniques used in tool making and component fabrication, such as grinding, polishing, sharpening, etc.									
	3.3	Apply appropriate finishing techniques to ensure that tools and components meet the required specifications.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Unit 6: Welding and Joining Operations

Unit Reference Number: ENGG/BS/006/L2
NSQ Level: 2
Credit Value: 4
Guided Learning Hours (GLH): 40
Unit Type: Mandatory Course

Unit Purpose:

This unit is designed to equip learners with the knowledge and practical skills necessary for performing welding and joining operations in blacksmithing.

Objectives
At the end of this unit, learners should be able to:

1. Understand the principles of welding and joining operations in blacksmithing.
2. Prepare materials and workpieces for welding and joining operations.
3. Demonstrate proficiency in various welding and joining operations.
4. Apply finishing techniques to welded and joined components.
5. Follow safety guidelines and best practices in welding and joining operations.

Unit Assessment Requirements/Evidence Requirements

1. **Direct Observation (DO)** – Practical demonstration of welding and joining techniques.
2. **Personal Statement/Learning Journal (PS/LJ)** – Written reflection on the learning process and challenges encountered.
3. **Questions and Answers (QA)** – Written or oral assessments to test theoretical understanding.
4. **Witness Testimony (WT)** – Assessor's verification of the learner's ability to perform welding and joining tasks.
5. **Assignments (ASS)** – Hands-on projects to assess competency in welding and joining.
6. **Work Products (WP)** – Finished welded and joined components that meet set specifications.

Unit 6 Welding and Joining Operations

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO1: Understand the principles of welding and joining operations in blacksmithing	**1.1**	Explain the different welding and joining operations used in blacksmithing.									
	1.2	Explain different welding and joining techniques									
	1.3	State tools and equipment used for welding and joining in blacksmithing									
	1.4	Describe the advantages and limitations of forge welding, arc welding, gas welding, riveting, brazing, etc, in blacksmithing operations.									
LO2: Prepare materials and work pieces for welding and joining operations	**3.1**	Prepare metal surfaces for welding and joining operations.									
	3.2	Set up work pieces before welding or joining operations.									
	3.3	Apply appropriate heat and pressure control techniques for effective welding and joining operations.									
LO3: Demonstrate proficiency in various welding and joining operations	**3.1**	Perform forge welding, arc welding, and gas welding operations.									
	3.2	Demonstrate different joining methods such as riveting and brazing.									
	3.3	Assess the strength and quality of welded and joined components.									
LO4: Apply finishing techniques to welded and joined components	**4.1**	Explain the types of finishing operations required in blacksmithing.									
	4.2	Use grinding, filing, and polishing techniques to improve welded joints.									
	4.3	Inspect welded and joined components for structural integrity.									
LO5: Follow safety guidelines and	**5.1**	Identify common hazards and risks associated with welding and joining.									

best practices in welding and joining operations	**5.2**	Demonstrate the proper use of PPE and welding safety equipment in compliance with safety regulations.									
	5.3	Apply fire prevention and other safety measures as well as first-aid measures in case of accidents in welding and joining operations.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Unit 7: Drawing for Blacksmithing
Unit Reference Number: ENGG/BS/007/L2
NSQ Level: 2
Credit Value: 3
Guided Learning Hours (GLH): 30

Unit Type: Mandatory Unit

Unit Purpose:
This unit is designed to equip learners with the knowledge and skills to read, interpret, and create technical drawings and specifications for blacksmithing projects.

Objectives
At the end of this unit, the learner should be able to:

1. Understand the importance of technical drawings/sketches in blacksmithing.
2. Identify different types of drawings used in metal fabrication.
3. Interpret symbols, dimensions, and tolerances in technical drawings.
4. Create simple freehand sketches and technical drawings for blacksmithing projects.
5. Use appropriate instruments in drafting and interpretation of drawings.
6. Understand material specifications and their relevance to blacksmithing projects.

Unit Assessment Requirements / Evidence Requirements

Learners must demonstrate competence through the following assessment methods:

1. **Direct Observation (DO):** Instructor observation of practical applications.
2. **Personal Statement/Learning Journal (PS/LJ):** Reflective documentation on learning experiences.
3. **Questions and Answers (QA):** Oral or written questions to assess understanding.
4. **Assignment (ASS):** Individual projects requiring drawing and interpretation.
5. **Work Products (WP):** Submission of completed drawings and specifications.
6. **Witness Statement (WS)**

Unit 7: Drawing for Blacksmithing

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO1: **Understand Technical Drawings/sketches in Blacksmithing**	1.1	Explain the importance of technical drawings/sketches in blacksmithing									
	1.2	Identify different types of drawings (e.g., orthographic, isometric, sectional).									
	1.3	Explain the key elements of technical drawings (lines, symbols, dimensions)									
LO2: Interpret Symbols and Specifications in Drawings	2.1	Interpret standard symbols and specifications used in blacksmithing drawings.									
	2.2	Read allowances, tolerances, and material specifications.									
	2.3	Explain the significance of scale and proportion in metalwork designs.									
LO3: Develop Simple Sketches and Technical Drawings	3.1	Create freehand sketches of blacksmithing designs.									
	3.2	Use measuring instruments (e.g., callipers, rulers) for accurate drawings.									
	3.3	Produce technical drawings based on given specifications.									
LO4: Apply Drawing Interpretation in Blacksmithing Projects	**4.1**	Plan a blacksmithing project based on technical drawings.									
	4.2	Interpret fabrication and assembly instructions from drawings.									
	4.3	Modify or adapt existing designs to meet specific requirements									
LO5: Use appropriate instruments in drafting and interpreting drawings.	**5.1**	Identify drawing instruments, such as meter rule, square, compass, protractor, etc, used in carrying out blacksmithing drawing									
	5.2	Carry out measurement using instruments in 5.1 above on a given task									

	5.3	Interpret the measurements in 5.2 into the real product									
LO6: Understand material specifications and their relevance to blacksmithing projects.	**6.1**	Explain material specifications.									
	6.2	Explain types of materials used by blacksmith such as carbon steel, alloy steel, stainless steel etc.									
	6.3	Explain the relevance of material specification to the blacksmith project.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Unit 8: Tools and Equipment Maintenance
Unit Reference Number: ENGG/BS/008/L2
NSQ Level: 2
Credit Value: 2
Guided Learning Hours (GLH): 20

Unit Type: Mandatory Unit

Unit Purpose:
This unit is designed to equip learners with the knowledge and skills for the proper maintenance, servicing, and safe handling of blacksmithing tools and equipment.

Objectives:
At the end of this unit, the learner should be able to:

1. Understand the importance of regular maintenance of tools and equipment in blacksmithing.
2. Identify maintenance requirements for blacksmithing tools and equipment.
3. Apply proper cleaning and storage techniques.
4. Perform simple troubleshooting and minor repairs on blacksmithing equipment.
5. Implement safety procedures while maintaining tools and equipment.
6. Develop a maintenance schedule for blacksmithing tools and machinery.

Unit Assessment Requirements / Evidence Requirements

Learners must demonstrate competence through the following assessment methods:

1. **Direct Observation (DO):** Instructor observation of maintenance tasks.
2. **Personal Statement/Learning Journal (PS/LJ):** Reflective documentation on maintenance experiences.
3. **Questions and Answers (QA):** Oral or written questions to assess theoretical understanding.
4. **Assignment (ASS):** Individual projects requiring maintenance scheduling and tool analysis.
5. **Work Products (WP):** Submission of maintenance logs and reports.
6. **Witness Statement (WS) (by Qualified Persons)**

Unit 8: Tools and Equipment Maintenance

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO1: Understand the importance of regular maintenance of tools and equipment in blacksmithing	**1.1**	Explain the role of maintenance in improving efficiency and tools longevity.									
	1.2	Identify common issues arising from poor tools maintenance.									
	1.3	Explain the cost implications of improper tools handling and maintenance									
LO2: Perform simple Troubleshooting and Minor Repairs on blacksmithing tools and equipment	**2.1**	Identify faults in blacksmithing tools and equipment.									
	2.2	Carry out minor repair (e.g., sharpening chisels, fixing loose handles, etc.) on blacksmithing tools and equipment.									
	2.3	Explain when to seek professional repairs of tools and equipment.									
LO 3: Develop a Maintenance Schedule for Blacksmithing Tools and Equipment	**3.1**	Create a routine maintenance schedule for different tools and equipment.									
	3.2	Maintain a logbook to track tools servicing and repairs.									
	3.3	Review and update maintenance schedules based on tool usage.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled):	**Date:**

NATIONAL SKILLS QUALIFICATION

BLACKSMITHING

LEVEL 3

FEBRUARY, 2025

NSQ: LEVEL 3: BLACKSMITH

QUALIFICATION PURPOSE

This qualification is intended for learners seeking to enhance their career as skilled blacksmith or blacksmithing technician. It focuses on developing advanced technical skills and a deeper understanding of blacksmithing operations.

General Objectives

At the end of this level, the learner should be able to:

1. Carry out Metal Shaping and Forging Techniques
2. Carry out Welding and Metal Joining using different Techniques
3. Carry out Toolmaking and Component Fabrication
4. Conduct Quality Control in Blacksmithing
5. Understand Drawing and Specifications Interpretation
6. Carry out Metal Treatments and Finishing
7. Manage Blacksmithing Operations

Unit Assessment Requirements/Evidence Requirements

Learners will be assessed using some of the following methods:

1. **Direct Observation (DO)** – Assessing the learner's forging techniques in a workshop.
2. **Personal Statement/Learning Journal (PS/LJ)** – Reflection on forging experiences and skills gained.
3. **Questions and Answers (QA)** – Oral or written assessments on forging principles and safety.
4. **Witness Testimony (WT)** – Trainer or supervisor feedback on learner's practical performance.
5. **Assignments (ASS)** – Written tasks on forging methods and metalworking concepts.
6. **Work Products (WP)** – Evidence of forged components made by the learner.

NSQ LEVEL 3 – BLACKSMITH ASSISTANT

Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
01	ENGG/BS/001/L3	Metal Shaping and Forging Techniques	6	60	Mandatory Unit
02	ENGG/BS/002/L3	Welding and Metal Joining Techniques	6	60	Mandatory Unit
03	ENGG/BS/003/L3	Toolmaking and Component Fabrication	6	60	Mandatory Unit
04	ENGG/BS/004/L3	Quality Control in Blacksmithing	5	50	Mandatory Unit
05	ENGG/BS/005/L3	Drawing and Specifications Interpretation	5	50	Mandatory Unit
06	ENGG/BS/006/L3	Metal Treatments and Finishing	6	60	Mandatory Unit
		TOTAL	**34**	**340**	

Unit 1: Metal Shaping and Forging Techniques

Unit Reference Number: ENGG/BS/001/L3
NSQ Level: 3
Credit Value: 6
Guided Learning Hours (GLH): 60
Unit Type: Mandatory Unit

Purpose of the Unit
This unit equips learners with knowledge and skills in metal shaping and forging.

Objectives:
At the end of this unit, the learner should be able to:

1. Understand the principles of metal shaping and forging.
2. Identify different metal properties and their behaviours under heat and pressure.
3. Apply various forging techniques such as fullering, swaging, and upsetting.
4. Use specialized blacksmithing tools for precision shaping and forging.
5. Create metalwork designs through controlled forging processes.
6. Maintain safety standards while performing shaping and forging tasks.

Unit Assessment Requirements/Evidence Requirements

Learners will be assessed using some of the following methods:

1. **Direct Observation (DO):** Evaluating learners' performance while shaping and forging metal.
2. **Product of Work (PW):** Collection of completed forged pieces with detailed process documentation.
3. **Practical Demonstration (PD):** Hands-on assessment of advanced forging techniques.
4. **Oral/Written Questions (QA):** Testing theoretical understanding of metal properties and forging processes.
5. **Workplace Project (WP):** Application of acquired skills in a real or simulated blacksmithing environment.
6. **Assignments (ASS).**
7. Reflective Journal (RJ)

Unit 1: Metal Shaping and Forging Techniques

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO 1: Understand the Principles of Metal Shaping and Forging	**1.1**	Explain the concepts of metal shaping and forging.									
	1.2	List common metals used in forging.									
	1.3	Describe the importance of precision in forging									
LO 2: Know Metal Properties and Their Behaviors under Heat and Pressure	**2.1**	Explain the effects of heat and pressure on different metals.									
	2.2	Explain how temperature affects metal properties such as malleability, ductility and strength.									
	2.3	Carry out various heat treatment methods (E.g., annealing, tempering, normalizing, etc.) and their applications.									
LO3: Apply various forging techniques such as fullering, swaging, and upsetting	**3.1**	Explain forging techniques such as fullering, swaging, twisting, scrolling, upsetting, etc.									
	3.2	Demonstrate the forging techniques explained in 3.1.									
	3.3	Use modern tools and equipment such as power hammers and presses for efficient metal shaping.									
LO4: Use Specialized Blacksmithing Tools and Equipment for Precision Shaping and Forging	**4.1**	Select appropriate tools and equipment for forging.									
	4.2	Demonstrate the correct use of anvils, tongs, and chisels with precision.									
	4.3	Calibrate tools and equipment to ensure accuracy and efficiency.									
LO 5: Create metalwork designs through	**5.1**	Design a piece for forging.									
	5.2	Produce the designed									

controlled forging processes.		piece in 5.1.									
	5.3	Evaluate the quality of finished products against set standards									
LO 6: Maintain safety standards while performing shaping and forging tasks	**6.1**	Identify potential hazards in shaping and forging process.									
	6.2	Use appropriate personal protective equipment (PPE) during metal shaping.									
	6.3	Follow standard practices for maintaining a safe work environment.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled):	**Date:**

Unit 02: Welding and Metal Joining Techniques
Unit Reference Number: ENGG/BS/002/L3
NSQ Level: 3
Credit Value: 6
Guided Learning Hours (GLH): 60

Unit Type: Mandatory Unit

Purpose of the Unit
This unit aims to equip learners with welding and metal joining techniques, ensuring they can fabricate, repair, and assemble metal components to meet industry standards.

Objectives
By the end of this unit, learners should be able to:

1. Understand the principles of welding and metal joining.
2. Apply different welding and metal joining techniques used in blacksmithing.
3. Select appropriate materials and tools for welding and joining metals.
4. Perform high-quality welding and joining tasks.
5. Demonstrate safety measures in welding and metal joining operations.
6. Evaluate the strength and quality of welded and joined metal components.

Unit Assessment Requirements/Evidence Requirements

Learners will be assessed using some of the following methods:

1. **Direct Observation (DO):** Assessing the learner's practical welding skills.
2. **Work Product (WP):** Collection of completed welded and joined metal components.
3. **Practical Demonstration (PD):** Hands-on application of welding and joining techniques.
4. **Oral/Written Questions (QA):** Evaluating theoretical knowledge on welding and metal joining.
5. **Workplace Project (WP):** Application of acquired skills in real or simulated work environments.
6. **Reflective Journal (RJ)**
7. **Witness Statement (WS)**
8. **Assignment (ASS)**

Unit 02: Welding and Metal Joining Techniques

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO1: Understand the Principles of Welding and Metal Joining	1.1	Explain the techniques in welding and metal joining.									
	1.2	Discuss different types of welding and joining methods.									
	1.3	Describe the role of heat and pressure in joining and welding processes									
LO 2: Apply Different Welding and Joining Techniques Used in Blacksmithing	2.1	Explain common welding techniques (E.g., arc welding, gas welding, MIG, TIG).									
	2.2	Use appropriate welding techniques for different metals in a given task.									
	2.3	Apply metal joining processes such as riveting and brazing									
	2.4	Inspect welded joints for defects and structural soundness									
LO3: Select Appropriate Materials and Tools for Welding and Joining Metals	3.1	Identify appropriate materials and tools for welding and joining of metals.									
	3.2	Choose the correct materials such as electrodes, filler rods, shielding gases, etc. for welding metals in a given task.									
	3.3	Calibrate welding equipment for precision work.									
LO 5: Demonstrate Safety Measures in Welding and Metal Joining Operations	**5.1**	Identify potential hazards associated with welding and joining operations.									
	5.2	Use appropriate personal protective equipment (PPE) such as welding helmets, gloves, aprons, etc.									
	5.3	Follow workplace safety protocols, including proper ventilation and fire prevention.									

LO 6: Evaluate the Strength and Quality of Welded and Joined Metal Components	**6.1**	Conduct visual and mechanical tests on welded joints.									
	6.2	Assess weld quality based on penetration, bead uniformity, and defect presence.									
	6.3	Recommend improvements for welding and joining techniques to enhance quality.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled):	**Date:**

Unit 03: Toolmaking and Component Fabrication

Unit Reference Number: ENGG/BS/003/L3
NSQ Level: 3
Credit Value: 6
Guided Learning Hours (GLH): 60
Unit Type: Mandatory Unit

Purpose of the Unit:

This unit provides learners with the knowledge and skills for the fabrication of tools and components used in blacksmithing.

Objectives

By the end of this unit, learners should be able to:

1. Understand the properties of metals used in toolmaking.
2. Design and fabricate specialized tools and components.
3. Apply heat treatment processes for durability.
4. Operate advanced machining and forging equipment.
5. Ensure precision and functionality in tool fabrication.
6. Maintain tools and components for optimal performance.

Unit Assessment Requirements/Evidence Requirements

Learners will be assessed using some of the following methods:

1. **Direct Observation (DO):** Assessing the learner's practical welding skills.
2. **Work Product (WP):** Collection of completed welded and joined metal components.
3. **Question and Answer (QA):** Evaluating theoretical knowledge on welding and metal joining.
4. **Reflective Journal (RJ)**
5. **Witness Statement (WS)**
6. **Assignment (ASS)**

Unit 03: Advanced Toolmaking and Component Fabrication

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number				
LO 1: Understand the Properties of Metals Used in Tool making	1.1	Explain different types of metals and alloys used in tool making.										
	1.2	Explain the composition of metals explained above										
	1.3	Explain the mechanical, physical, and chemical properties influencing tool performance.										
LO 2: Design and Fabricate Specialized Tools and Components	2.1	Produce technical drawings for tool and component fabrication.										
	2.2	Select appropriate material for the job.										
	2.3	Apply appropriate cutting, shaping, and assembling techniques.										
LO3: Apply Heat Treatment Processes for Durability	3.1	Conduct heat treatment in blacksmithing										
	3.2	Conduct annealing, hardening, normalising and tempering on metals										
	3.3	Evaluate the effectiveness of heat treatment on different metals.										
LO *4*: Ensure Precision and Functionality in Tool Fabrication	4.1	Explain precision in tool making										
	4.2	Identify precision instrument used in tool making										
	4.3	Perform quality control checks on fabricated tools.										
	4.4	Adjust tool settings for optimal efficiency.										
LO *5*: Maintain Tools and Components for Optimal Performance	5.1	Identify common tool defects and wear patterns.										
	5.2	Identify process for tools and equipment repair of defects identified in 5.1 above.										
	5.3	Implement best practices for tools maintenance and storage.										

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled)	Date:
EQAM Signature (if sampled)	**Date:**

Unit 4: Quality Control in Blacksmithing
Unit Reference Number: ENGG/BS/004/L3
NSQ Level: 3
Credit Value: 5
Guided Learning Hours (GLH): 50

Unit Type: Mandatory Unit

Purpose of the Unit

This unit ensures that learners develop a deep understanding of quality control principles in blacksmithing, focusing on the inspection, testing, and refinement of forged products.

Objectives

By the end of this unit, learners should be able to:

1. Understand the importance of quality control in blacksmithing.
2. Identify defects in forged and fabricated metal components.
3. Use inspection and measurement tools accurately.
4. Implement corrective measures to improve product quality.
5. Maintain documentation and compliance with industry standards

Unit Assessment Requirements/Evidence Requirements
Learners will be assessed using some of the following methods:

1. **Direct Observation (DO):** Assessing the learner's practical welding skills.
2. **Work Product (WP):** Collection of completed welded and joined metal components.
3. **Question and Answer (QA):** Evaluating theoretical knowledge on welding and metal joining.
4. **Reflective Journal (RJ)**
5. **Witness Statement (WS)**
6. **Assignment (ASS)**

Unit 4: Quality Control in Blacksmithing

LO (Learning Outcome) Criteria: -			**Evidence Type**					**Evidence Ref Page Number**			
LO 1: Understand the Importance of Quality Control in Blacksmithing	**1.1**	Explain quality control in blacksmithing.									
	1.2	Follow quality control process in blacksmithing									
	1.3	Identify the effect of tool defects on performance and safety.									
LO 2: Identify Defects in Forged and Fabricated Metal Components	**2.1**	Explain common forging and welding defects.									
	2.2	Identify instrument used for detecting defects.									
	2.3	Perform visual and non-destructive testing.									
LO 3: Use Inspection and Measurement Tools Accurately	**3.1**	Explain the use of precision tools in blacksmithing.									
	3.2	Operate callipers, micrometres, and hardness testers.									
	3.3	Apply tolerance and precision measurement techniques.									
LO 4: Implement Corrective Measures to Improve Product Quality	**4.1**	Identify defect in forged or welded product									
	4.2	Adjust forging and welding processes based on quality control feedback.									
	4.3	Apply rework techniques to correct defects.									
LO 5: Maintain Documentation and Compliance with Industry Standards	**5.1**	Record quality control data.									
	5.2	Analyse quality control data.									
	5.3	Ensure adherence to safety and regulatory guidelines.									

Learner's Signature:	Date:
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Unit 05: Drawing and Specifications Interpretation
Unit Reference Number: ENGG/BS/005/L3
NSQ Level: 3
Credit Value: 5
Guided Learning Hours (GLH): 50

Unit Type: Mandatory Unit

Purpose of the Unit:
This unit enables learners to read, analyze, and interpret technical drawings and specifications related to blacksmithing, ensuring precision and accuracy in fabrication.

Objectives

By the end of this unit, learners should be able to:

1. Understand the principles of technical drawing interpretation.
2. Analyse blueprints and schematics.
3. Apply geometric dimensioning and tolerancing (GD&T).
4. Convert technical drawings into practical fabrication steps.
5. Identify errors and inconsistencies in drawings.

Unit Assessment Requirements/Evidence Requirements
Learners will be assessed using some of the following methods:
1. **Direct Observation (DO):** Assessing the learner's practical welding skills.
2. **Work Product (WP):** Collection of completed welded and joined metal components.
3. **Question and Answer (QA):** Evaluating theoretical knowledge on welding and metal joining.
4. **Reflective Journal (RJ)**
5. **Witness Statement (WS)**
6. **Assignment (ASS)**

Unit 05: Drawing and Specifications Interpretation

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1: Understand the Principles of Technical Drawing Interpretation	1.1	Explain different types of drawings.									
	1.2	Identify different types of instruments used in technical drawing									
	1.3	Identify key elements such as symbols, views, and dimensions									
LO 2: Analyze Blueprints and Schematics	2.1	Produce blueprint of a given job									
	2.2	Interpret complex blueprints and welding diagrams.									
	2.3	Extract relevant data for forging and machining from blueprint.									
LO 3: Apply Geometric Dimensioning and Tolerancing (GD&T)	3.1	Use GD&T symbols and notations correctly.									
	3.2	Ensure compliance with tolerances and fit									
	3.3	Produce working drawing of a given project									
LO 4: Convert Technical Drawings into Practical Fabrication Steps	4.1	Produce set of detailed drawing of a given component									
	4.2	Execute manufacturing processes based on drawings.									
	4.3	Communicate effectively with teams using drawing references									
LO 5: Identify Errors and Inconsistencies in Drawings	5.1	Identify what to look out for in working drawings e.g., dimensions, border line, title block etc.									
	5.2	Detect missing dimensions or incorrect specifications.									
	5.3	Suggest modifications to improve manufacturability									

Learner's Signature:	Date:
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Unit 06: Metal Treatment and Finishing
Unit Reference Number: ENGG/BS/006/L3
NSQ Level: 3
Credit Value: 6
Guided Learning Hours (GLH): 60

Unit Type: Mandatory Unit

Purpose of the Unit:

This unit provides learners with knowledge and skills in metal treatment and finishing techniques used in blacksmithing.

Objectives

By the end of this unit, learners should be able to:

1. Understand the principles and importance of metal treatments and finishing.
2. Apply heat treatment techniques for enhanced metal properties.
3. Perform surface treatment processes to improve durability and corrosion resistance.
4. Utilize finishing techniques for improved aesthetics.
5. Ensure quality control in metal treatments and finishing.
6. Follow safety procedures and environmental guidelines in metal finishing.

Unit Assessment Requirements/Evidence Requirements
Learners will be assessed using some of the following methods:

1. **Direct Observation (DO):** Assessing the learner's practical welding skills.
2. **Work Product (WP):** Collection of completed welded and joined metal components.
3. **Question and Answer (QA):** Evaluating theoretical knowledge on welding and metal joining.
4. **Reflective Journal (RJ)**
5. **Witness Statement (WS)**
6. **Assignment (ASS)**

Unit 06: Metal Treatments and Finishing

LO (Learning Outcome) Criteria: -			Evidence Type					Evidence Ref Page Number			
LO 1: Understand the Principles and Importance of Metal Treatments and Finishing	**1.1**	Explain the purpose of metal treatment and finishing in blacksmithing.									
	1.2	Identify different finishing methods and their applications.									
	1.3	Discuss the impact of finishing on metal durability, strength, and aesthetics.									
LO 2: Apply Heat Treatment Techniques for Enhanced Metal Properties	**2.1**	Demonstrate heat treatment processes such as annealing, normalising, tempering, and case hardening.									
	2.2	Analyse the effects of different heat treatments on metal strength and hardness.									
	2.3	Select appropriate heat treatment methods based on material type and application.									
LO 3: Perform Surface Treatment Processes to Improve Durability and Corrosion Resistance	**3.1**	Carry out different surface treatment methods, including galvanizing, anodizing, and powder coating.									
	3.2	Apply rust prevention and protective coating									
	3.3	Evaluate the effectiveness of surface treatments through practical application.									
LO 4: Utilize Finishing Techniques for Improved Aesthetics	**4.1**	Perform polishing, grinding, and buffing to achieve desired surface finishes.									
	4.2	Apply patination and colouring for decorative purposes.									
	4.3	Use engraving and etching to enhance design details.									
LO 5: Ensure Quality Control in Metal	**5.1**	Inspect metal products for surface defects and inconsistencies.									
	5.2	Measure coating thickness									

Treatments and Finishing		and adherence to finishing standards.									
	5.3	Implement corrective actions to improve finishing quality									
LO 6: **Follow Safety Procedures and Environmental Guidelines in Metal Finishing**	**6.1**	Identify potential hazards in metal treatment and finishing operations.									
	6.2	Use personal protective equipment (PPE) and adhere to workplace safety protocols.									
	6.3	Follow environmental guidelines for waste disposal and chemical handling.									

Learner's Signature:	Date:
Assessor's Signature:	Date:
IQAM Signature (if sampled):	Date:
EQAM Signature (if sampled):	**Date:**

National Skills Qualifications FOR

BLACKSMITHING

LEVEL 1, 2 & 3

Plot B, Bida Road, PMB 2239,Kaduna
ideasworldbankproject@nbte.gov.ng
Tel: +234 (0) 802 4728 042