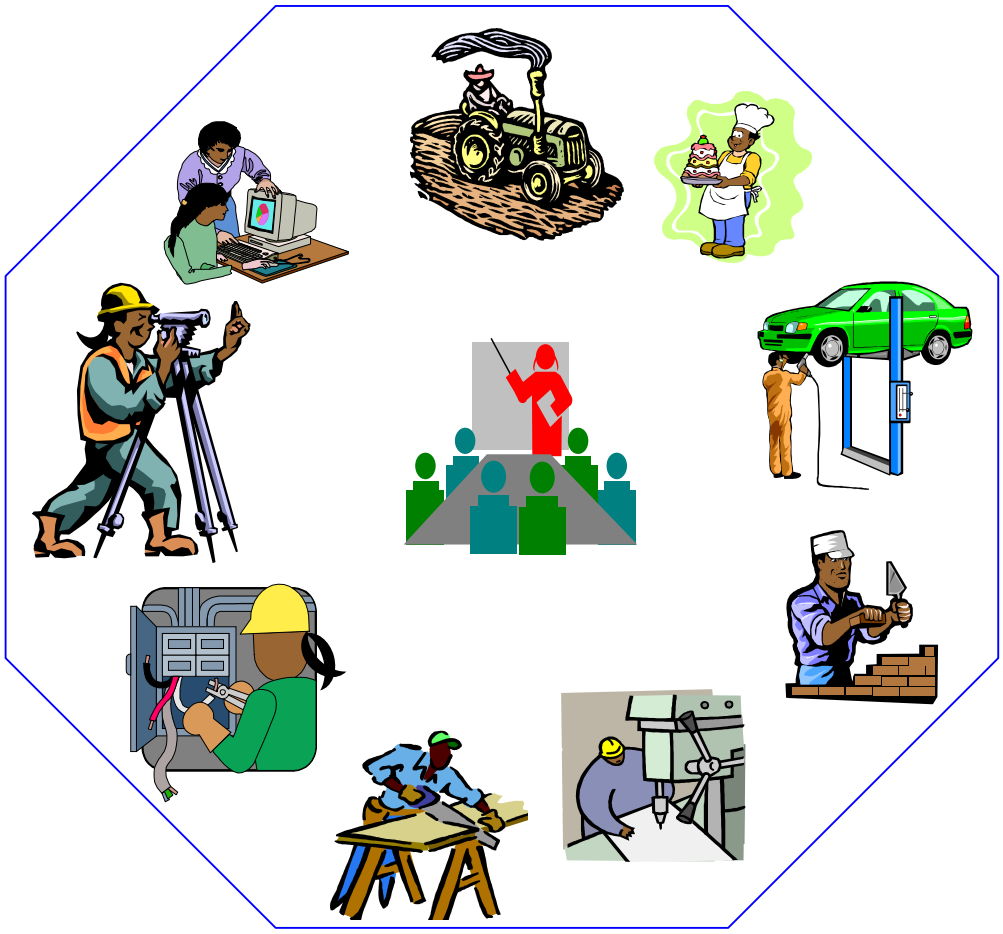
Federal Democratic Republic of Ethiopia

OCCUPATIONAL STANDARD

BOGIE AND BODY PRODUCTION AND ASSEMBLY

NTQF Level III



Ministry of Education

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Introduction

Ethiopia has embarked on a process of reforming its TVET-System. Within the policies and strategies of the Ethiopian Government, technology transformation – by using international standards and international best practices as the basis, and, adopting, adapting and verifying them in the Ethiopian context – is a pivotal element. TVET is given an important role with regard to technology transfer. The new paradigm in the outcome-based TVET system is the orientation at the current and anticipated future demand of the economy and the labor market.

The Ethiopian Occupational Standard (EOS) is the core element of the Ethiopian National TVET-Strategy and an important factor within the context of the National TVET-Qualification Framework (NTQF).They are national standards, which define the occupational requirements and expected outcome related to a specific occupation without taking TVET delivery into account.

This document details the mandatory format, sequencing, wording and layout for the Ethiopia Occupational Standard which comprised of Units of Competence.

A Unit of Competence describes a distinct work activity. It is documented in a standard format that comprises:

- Occupational title, NTQF level
- Unit title
- Unit code
- Unit descriptor
- Elements and Performance criteria
- Variables and Range statement
- Evidence guide

Together all the parts of a Unit of Competence guide the assessor in determining whether the candidate is competent.

The ensuing sections of this EOS document comprise a description of the occupation with all the key components of a Unit of Competence:

- chart with an overview of all Units of Competence for the level including the Unit Codes and the Unit of Competence Titles
- contents of each Unit of Competence listed in the chart
- occupational map providing the Technical and Vocational Education and Training (TVET) providers with information and important requirements to consider when designing training programs for this standards and for the individual, a career path

UNIT OF COMPETENCE CHART

Occupational Standard: Bogie and Body Production and Assembly

Occupational Code: IND BBA3

NTQF Level III

IND BBA3 01 0117 Produce Drawings from Design Concepts	**IND BBA3 02 0117** Manufacture Train Electrical Circuits and Wiring Systems	**IND BBA3 03 0117** Develop Documentation and Procedures of the Train Manufacturing
IND BBA3 04 0117 Assemble Bogie Frames and Axles	**IND BBA3 05 0117** Use Structured Problem Solving Tools on Assembly of Bogie Sub Assembly	**IND BBA3 06 0117** Select Metal Joining Process
IND BBA3 07 0117 Assemble, Install and Test Braking System Kits	**IND BBA3 08 0117** Inspect and Service Cooling Systems	**IND BBA3 09 0117** Inspect and Service Cooling Systems
IND BBA3 10 0117 Apply Basic Just in Time Systems to the Reduction of Waste	**IND BBA3 11 0117** Develop and Manage a Plan for a Simple Manufacturing Related Project	**IND BBA3 12 0117** Prepare a Simple Production Schedule
IND BBA3 13 0117 Set up Equipment for Continuous Operation	**IND BBA3 14 0117** Perform Sheet and Plate Assembly	**IND BBA3 15 0117** Assist in the Preparation of a Basic Workplace Layout
IND BBA3 16 0117 Detail Bolts and Welds for Structural Steelwork Connections	**IND BBA3 17 0117** Develop Conceptual Models and Prototypes	**IND BBA3 18 0117** Install Fixed and Moveable Glass Components on Vehicles
IND BBA3 19 0117 Monitor Implementation of Work Plan/Activities	**IND BBA3 20 0117** Apply Quality Control	**IND BBA3 21 0117** Lead Workplace Communication

IND BBA3 22 0117 Lead Small Teams	**IND BBA3 23 0117** Improve Business Practice	**IND BBA3 24 0117** Prevent and Eliminate MUDA

NTQF Level III

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Produce Drawings from Design Concepts**
Unit Code	**IND BBA3 01 0117**
Unit Descriptor	This unit covers the competence to produce drawings of objects from design concepts. Drawings are to include assembly type components which are hand drawn and may include computer-aided drawings. Work requires individuals to demonstrate judgement and problem-solving skills in managing own work activities and contributing to a productive team environment.

Elements	Performance Criteria
1. Identify object to be drawn	1.1. Purpose (and operational characteristics) of object to be drawn are identified 1.2. Production materials and method are identified
2. Establish design requirements and limitations	2.1. Type of drawing to be completed is identified 2.2. Design concept requirements are established and documented identifying dimensions, angles, shapes and finished size 2.3. Drawing conventions and specifications to be noted are identified and selected
3. Quantify and draft initial drawing	3.1. Dimensions are plotted from prototype sketch and documented specifications 3.2. Dimensional points are connected to match drawing view 3.3. Production notes or special requirements are noted 3.4. Drawing conventions and specifications are noted
4. Complete drawing	4.1. Angles, shapes and dimensions are checked against specifications and concept prototype drawing 4.2. Adjustments are made to the drawing within scope of authority 4.3. Drawing is checked for compliance with workplace documentation requirements

Variable	Range
WHS requirements	are to be in accordance with legislation/regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, workplace environment and safety and enterprise first aid
Personal protective equipment	include that prescribed under legislation/regulations/codes of practice and workplace policies and practices

Safe operating procedures	are to include, but are not limited to the conduct of operational risk assessment and treatments associated with site safety, working in proximity to others and site visitors
Emergency procedures	related to this unit are to include, but are not limited to enterprise first aid requirements and site evacuation
Environmental requirements	are to include but are not limited to waste management and clean-up management
Quality requirements	are to include, but are not limited to regulations, including internal company quality policy and standards and enterprise operations and procedures
Statutory/regulatory authorities	may include Federal, State/Territory and local authorities administering acts, regulations and codes of practice
Resources	are to include drawing equipment/aids which are manual and electronically based
Communications	are to include, but are not limited to verbal and visual instructions and may include site specific instructions, written instructions, plans or instructions related to job/task, telephones and pagers
Information/documents	may include: • schedules/plans/specifications, memos, material safety data sheets, diagrams or sketches • regulatory/legislative requirements pertaining to the automotive industry, including • organisation work specifications and requirements • instructions issued by authorised enterprise or external persons

Evidence Guide	
Critical Aspects of Competence	It is essential that competence in this unit signifies ability to transfer competence to changing circumstances and to respond to unusual circumstances in the critical aspects of: • observing safety procedures and requirements • communicating effectively with others involved in or affected by the work • selecting methods and techniques appropriate to the circumstances • completing preparatory activity in a systematic manner • interpreting specifications and measurements in two and three dimensional form • presenting information within production drawings • completing essential post-activity housekeeping
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • use mathematical ideas and techniques to correctly calculate time, assess tolerances, apply accurate measurements, calculate material requirements and establish quality checks • WHS regulations/requirements, equipment, material

	and personal safety requirements • common automotive terminology and vehicle safety requirements • design and techniques for translating concepts into form • Design standards. • technical drawing procedures • detailed site reporting procedures • work organisation and planning processes • enterprise quality processes
Underpinning Skills	Demonstrate skills to: • collect, organise and understand information • research and interpretive skills to locate, interpret and apply drawing production techniques and procedures • apply planning and organising skills to one's own work activities, including • making good use of time and resources, • sorting out priorities and monitoring one's own performance • interact effectively with other people both on a one-to-one basis and in groups, including understanding and responding to the needs of a client and working effectively as a member of a team to achieve a shared goal • establish safe and effective work processes which anticipate and/or resolve problems and downtime, to systematically develop solutions to avoid or minimise reworking and avoid wastage • use workplace technology related to the production of drawings, including the use of measuring equipment and communication devices and the reporting/documenting of results
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Manufacture Train Electrical Circuits and Wiring Systems**
Unit Code	**IND BBA3 02 0117**
Unit Descriptor	This unit describes the performance outcomes required to demonstrate knowledge of electrical principles that enable structured testing of basic circuits in electrical systems, components and technologies found in traction motor. The unit involves applying Ohm's, Watts and Kirchhoff's laws to enable basic structured problem solving to locate a range of common faults in bogie and traction motor electrical circuits and wiring systems Work applies to light rail tram and electrical multiple unit, locomotive outdoor power equipment and marine environments. It involves the application of knowledge of fundamental elements of electricity and vehicle electrical circuit theory and electrical wiring systems.

Elements	Performance Criteria
1. Develop knowledge of vehicle electrical circuits and wiring systems	1.1. Relevant ***sources of information*** are located to assist with understanding of vehicle electrical circuits and wiring systems 1.2. Knowledge of the operating principles of ***electrical circuits*** and ***wiring systems*** is developed
2. Demonstrate knowledge of vehicle electrical circuits and wiring systems	2.1. Knowledge of the relationship of volts, amps and ohms in a vehicle electrical circuit is applied 2.2. Knowledge of circuit components, their function and operation in a vehicle electrical circuit is applied 2.3. Knowledge of basic principles for testing and processes for checking a vehicle's electrical circuits and wiring systems is applied
3. Demonstrate knowledge of electrical circuits as applied to bogie electrical system identification	3.1. Components of a vehicle's electrical circuit and wiring system are identified 3.2. Basic electrical principles are applied to practical inspection and service activities 3.3. Knowledge of a vehicle's electrical circuit and wiring system is practically applied when identifying potential faults

Variable	Range
Sources of information	may include: • workplace service information • automotive electrical texts • original equipment manufacturer information • train manufacturing workshop manuals

	• service bulletins • Magazine technical articles.
Electrical circuits	may include: • voltage • current • resistance • series circuits • parallel circuits • series and parallel circuits • open circuit to power, signal or ground • short circuit to power, signal or ground • High resistance to power, signal or ground.
Wiring systems	may include: • common multi-stand conductor • various wire gauges and insulation types • twisted pair (CAN-bus network wiring) • shielded wire (audio speaker wiring).

Evidence Guide	
Critical Aspects of Competence	A person who demonstrates competency in this unit must be able to apply and demonstrate knowledge of: • location of relevant sources of information on vehicle electrical circuits and wiring systems • operating principles of electrical circuits and wiring systems • relationship of volts, amps and ohms in a vehicle electrical circuit • relationship of current flow and necessary wire gauge • relationship of voltage dropping across a resistive load and the current flowing in the circuit • circuit components, their function and operation in a vehicle electrical circuit • Testing principles and processes for checking a vehicle's electrical circuits and wiring systems.
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • principles of vehicle electrical circuits and wiring systems • principles of electricity, including: ➢ Alternating Current (AC) ➢ Direct Current (DC) ➢ Ohm's law ➢ Watts law ➢ Kirchhoff's voltage law ➢ Kirchhoff's current law • range of sources of information available to assist with understanding basic principles and elements of electricity as they relate to train manufacturing applications

	• industry and workplace practice in relation to working safely in train manufacturing workplace
	• identification, location and function of major components of common automotive:
	• Traction motor electrical systems, including:
	  ➢ battery systems
	• starting systems:
	  ➢ vehicle access systems
	  ➢ wiper and washer systems
	  ➢ vehicle entertainment systems
	• wiring harness and loom assembly

Underpinning Skills	Demonstrate skills of:
	• communication skills to:
	  ➢ follow verbal and written instructions
	  ➢ communicate ideas and information relating to electrical terminology and procedures verbally and in writing
	  ➢ apply questioning and active listening skills, e.g. when obtaining factual information from sources
	• initiative and enterprise skills to recognise a workplace problem or potential problem and take action
	• learning skills to:
	  ➢ identify sources of information, assistance and expert knowledge to expand skills, knowledge and understanding
	  ➢ participate in self-improvement activities
	• literacy skills to:
	  ➢ understand workplace safety procedures
	  ➢ read and follow information in written instructions, specifications and other applicable reference documents
	• numeracy skills to:
	  ➢ understand measurement, units of measure, formulae, testing and proportions
	• planning and organising skills to:
	  ➢ identify risk factors and take action to minimise them
	  ➢ plan and organise activities that implement and follow standard procedures
	• problem-solving skills to:
	  ➢ refer problems outside area of responsibility to appropriate person
	  ➢ use and communicate basic mathematical ideas and techniques that relate to automotive systems and components
	• self-management skills to:
	  ➢ recognise limitations and seek timely advice
	  ➢ follow workplace documentation, such as workplace safe operating procedures
	• technical skills to:

	• collect, organise and understand technical information relating to: ➢ identifying, locating and determining function of vehicle electrical circuit components and wiring systems ➢ recognising and reporting unsafe situations ➢ collecting, organising and applying knowledge of vehicle electrical circuit and wiring information and concepts • technology skills to use information technology equipment to assist with research
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Develop Documentation and Procedures of the Train Manufacturing**
Unit Code	**IND BBA3 03 0117**
Unit Descriptor	This unit describes the performance outcomes required to develop and trial documentation and procedures in a range of contexts for production activities. It applies to those working in a train and related component manufacturing environment and involves the application of skills and knowledge at a production worker level.

Elements	Performance Criteria
1. Identify documentation and procedure requirements	1.1. Need for documentation is identified and evaluated in consultation with management and production departments 1.2. Specifications are prepared ensuring that documentation and procedures will facilitate effective communication between relevant internal and external personnel 1.3. Scope of documentation and procedure requirements is discussed and finalised with management and production departments
2. Develop draft documentation and procedures	2.1. Draft documentation and associated procedures are drafted according to approved arrangements 2.2. Draft documentation and procedures are prepared and trialled with intended users according to ***workplace procedures*** 2.3. Draft documentation and procedures are modified according to trial feedback
3. Finalise documentation and procedures	3.1. Documentation and procedures as approved are produced according to specifications and workplace procedures 3.2. Intended users are instructed in the use of documentation and procedures according to workplace procedures and requirements 3.3. Documentation and procedures are distributed and stored according to workplace procedures

Variable	Range
Workplace procedures	must include: • quality and continuous improvement processes • recording and reporting • site guidelines • Work Health and Safety (WHS) requirements.

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills competence to: • problem identification and resolution techniques • requirements relating to the documentation and procedures to be developed trialling and modifying processes to follow when producing documentation and procedures for storing and distributing documentation.
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • workplace procedures to be followed when developing documents and procedures, including • Work Health and Safety (WHS) procedures • technical work documentation covering procedures, specifications, schedules and work plans or equivalent • quality system documentation covering instructions, procedures, performance indicators and review processes or equivalent • cost and waste avoidance practices
Underpinning Skills	Demonstrate skills of: • Writing skills to ➢ complete draft documentation and workplace instructions • Oral communication skills to: ➢ speak clearly and directly in order to communicate changes in documentation development to relevant personnel ➢ gather feedback • Teamwork skills to: ➢ apply teamwork to a range of situations, including the trialling of new documentation • Planning and organising skills to: ➢ manage time when planning, preparing and organising work priorities ➢ organize own work priorities • interpret workplace procedures • interpret workplace instructions • identify quality assurance system and technical documentation
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Assemble Bogie Frames and Axles**
Unit Code	**IND BBA3 04 0117**
Unit Descriptor	This unit describes the performance outcomes required to assemble bogie frames, axles, suspension and associated components. It applies to those in atrain manufacturing environment and involves the application of skills and knowledge at a production worker level. Performance outcomes required to install and fit out body, trimming and mechanical components.

Elements	Performance Criteria
1. Plan and prepare assembly	1.1. Materials, parts, drawings and work orders are interpreted to establish work requirements 1.2. Lifting equipment is identified, selected and operated according to ***workplace procedures*** 1.3. Tools and equipment are selected and inspected, and faults are reported
2. Cut, drill and weld chassis frame	2.1 Bogie frame is cut as specified in work order and working drawings 2.2 Holes are drilled that comply in size and position with drawing specifications 2.3 Bogie frame rails are welded according to workplace procedures, drawing specifications and, if applicable, standards
3. Fit axles, suspension, brackets, fixtures and service lines	3.1 Fasteners are selected and used according to drawing specifications 3.2 Axles, suspension, bolster and side frames are assembled to bogie frame. 3.3 Bolts and fasteners are fitted and tensioned to specifications
4. Complete work processes	4.1 Work area, tools and equipment are cleaned, inspected and stored according to workplace procedures 4.2 Faulty equipment is identified, tagged and reported 4.3 Waste material is collected, recycled or disposed of according to workplace procedures 4.4 Workflow and production schedule are recorded and workplace documents completed.
5. Plan and prepare	5.1 Work orders and job specifications are identified and confirmed

	5.2 Tools, equipment and materials are selected and checked for quality and safe operation according to job requirements 5.3 Assembly and installation information is accessed from manufacturer specifications
6. Select and use fasteners, adhesives, sealants and solvents	6.1 Workplace procedures are identified and followed 6.2 Fasteners are identified, selected and fitted to meet job requirements 6.3 Adhesives and sealants are selected and applied to meet job requirements 6.4 Solvents are selected and used to remove excess adhesives and sealants
7. Install components	7.1 Parts and components are identified, selected and matched to work order and job specifications 7.2 Parts and components are positioned, secured and tensioned according to job specifications 7.3 Installed components and sub-assemblies are inspected and checked for quality and fit according to job specifications and workplace procedures
8. Route assembly lines	8.1 Service lines are identified and located according to job requirements 8.2 ***Service lines*** are routed, tied and clipped according to job specifications 8.3 Installed service lines are inspected and tested according to workplace procedures and job specifications
9. Complete work processes	9.1 Unused materials are collected and stored or disposed of in line with workplace procedures 9.2 Work area, tools and equipment are cleaned, maintained, checked and stored according to workplace procedures 9.3 Faulty equipment is identified, tagged and reported 9.4 Work sheets and production records are completed

Variable	**Range**
Workplace procedures	must include: • Bogie frame and axle assembly equipment operation • recording and reporting procedures for assembling bogie frames and axles • WHS requirements for assembling bogie frames and axles. • recording and reporting procedures for installing and replacing mechanical units and assemblies

	• procedures for the use of mechanical unit and assembly installation and replacement equipment • workplace quality guidelines for installing and fitting out components • Work Health and Safety (WHS) requirements for installing and fitting out components.
Service lines	must include: • electrical wiring • Pneumatic or hydraulic.

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills competence to procedures for assembling bogie frames and axles, including: • component parts and materials. • identify and prepare bogie frame and axle components, equipment and work area
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • WHS requirements relating to assembling bogie frames and axles • types and applications of bogie frames, axles and suspension systems • procedures for assembling bogie frames and axles, including: • component parts and materials, including: ➢ fasteners: clips, pins and clamps; nuts and bolts; and screws ➢ service lines • types, application and operation of common bogie component assembly equipment, including fastener tensioning procedures • manual-handling techniques for bogie frames and axles • Communication protocols to report equipment faults.
Underpinning Skills	Demonstrate skills to: • Reading skills to: ➢ interpret job specifications, work orders, work instructions and workplace procedures ➢ analyse tool and equipment operating instructions ➢ identify components and materials list ➢ identify appropriate welding standards • Writing skills to: ➢ complete faulty equipment tags ➢ complete production schedules • Oral communication skills to: ➢ report faulty equipment to appropriate personnel • Numeracy skills to: ➢ record parts and materials used for stock control ➢ use imperial and metric systems for bolt tensioning to required specifications

	• Planning and organising skills to: ➢ follow assembly specifications • Reading skills to: ➢ interpret work orders and job specifications ➢ interpret workplace procedures and manufacturer installation specifications ➢ identify application precautions when applying adhesives, sealants and solvents • Writing skills to: ➢ complete faulty tool and equipment tags ➢ complete work sheets and production records • Oral communication skills to:
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Use Structured Problem Solving Tools on Assembly of Bogie Sub Assembly**
Unit Code	**IND BBA3 05 0117**
Unit Descriptor	This competency covers the solving of process and other problems, beyond those associated directly with the process unit/equipment, using structured process improvement tools to identify improvements and/or solve problems. The competency is typically performed by an experienced operator, team leader or supervisor. Generally the person would be part of a team during the solving of complex or systemic problems and would be expected to perform all parts of this unit and at all times would be liaising and cooperating with other members of the team. This includes: • using a range of formal problem solving techniques • identifying and clarifying the nature of the problem • devising the best solution • evaluating the solution • Developing an implementation plan to rectify the problem. This unit does not cover the solving of problems undertaken as part of the operator's normal role which is covered in the relevant operation competency unit.

Elements	Performance Criteria
1. Identify the problem.	1.1 Variances are identified from normal operating parameters and product quality. 1.2 The extent, cause and nature of the problem are defined by observation and investigation. 1.3 The problem is stated and specified clearly in the ***context*** of this company, In large plants or manufacturing organisations with multiple processes.
2. Determine fundamental cause of problem.	2.1 Possible causes are identified based on experience and the use of problem solving tools/analytical techniques. 2.2 Possible cause statements are developed. 2.3 Fundamental cause is identified.
3. Determine corrective action.	3.1 All possible options are considered for resolution of the problem. 3.2 Strengths and weaknesses of possible options are considered. 3.3 Corrective action is determined to remove the ***problems*** and possible future causes.

	3.4 Implementation plans identifying measurable objectives, resource needs and timelines are developed in accordance with safety and operating ***procedures***. 3.5 Recommendations are developed for ongoing monitoring and testing.
4. Communicate recommendations.	4.1 Report is prepared on recommendations. 4.2 Recommendations are presented to appropriate personnel. 4.3 Recommendations are followed up if required.

Variable	**Range**
Context	The competency unit applies to a wide range of processes and equipment. The process manufacturing technical units of competency include a problem solving element where problems specific to that competency unit are to be resolved. This competency unit is where structured problem solving techniques are to be applied more broadly, or with greater depth/rigour than is implied by the problem solving element of the technical units. In large plants or manufacturing organisations with multiple processes, it may apply to more than one process if those processes interact with each other. It applies to all operators across all functions.
Problems	'Anticipate and solve problems' means resolve a wide range of routine and non-routine problems, using product and process knowledge to develop solutions to problems which do not have a known solution/a solution recorded in the procedures. Typical process and product problems may include: • non- routine process and quality problems • equipment selection, availability and failure • teamwork and work allocation problems • safety and emergency situations and incidents
Procedures	• All operations are performed in accordance with procedures. • Procedures include all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards
Hazards	Typical hazards include leaks, spillages and equipment hazards that can occur during the walk-through of a plant.

Evidence Guide	
Critical Aspects of Competence	The ability to apply and explain: • relevant equipment and operational processes • enterprise policies and procedures • enterprise goals, targets and measures

	• enterprise quality, OHS and environmental requirements • principles of decision-making strategies and techniques • enterprise information systems and data collation • Industry codes and standards. Consistent performance should be demonstrated. For example, look to see that: • problems are recognised and clarified • possible causes are identified, based on experience and use of analytical techniques in solving the problem, including: ➢ identifying variations ➢ identifying cause and effect ➢ separating single problems from multiple problems • Recognising recurring problems. • fundamental cause of process or equipment faults is determined • corrective/preventative implementation plans are developed to avoid recurrence of the problem • Implementation plan is presented to relevant personnel.
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • brainstorming • fishbone diagrams/cause and effect diagrams • process logic/process requirements • logic tree • similarity/difference analysis • Pareto analysis • force field/SWOT analysis • flow charts • control charts, run charts and graphs • Scatter grams.
Underpinning Skills	Demonstrate skills of: • Action plans to solve problems are prepared including: ➢ priority requirements ➢ measurable objectives ➢ resource requirements ➢ methods for reaching objectives ➢ timelines • Coordination and feedback requirements safety requirements risk assessment environmental requirements. • Language, literacy and numeracy requirements • This unit requires the ability to read and interpret typical product specifications, job sheets and material labels as provided to operators. • Writing is required to the level of report writing and completing workplace forms.

	• Basic numeracy is also required, e.g. to interpret quality data and graphs
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Select Metal Joining Process**
Unit Code	**IND BBA3 06 0117**
Unit Descriptor	This competency covers the selection of the appropriate metal joining processes for an application. It requires using metallurgical principles and techniques to select a process which is appropriate for the required product end use and the metal(s) to be used This competency applies to technicians who are required to recommend a metal joining process for making a metal product. It includes: • knowing the principles of common joining processes and their typical applications • identifying the key factors in the product to be made which will guide the joining process selection Applying basic metallurgy to the situation so as to make an appropriate recommendation. The unit covers assembling prefabricated/formed components using a range of joining techniques. This unit applies to production assembly of pre-fabricated/formed components. Applications of this unit may include • Manufacture of bogie assemblies. • Where measurement skills are required,

Elements	Performance Criteria
1. Confirm requirements.	1.1. Technical and aesthetic specification is communicated with stakeholders 1.2. Process constraints such as timelines and cost are identified 1.3. Any special requirements of product or process are identified 1.4. Product and process requirements are confirmed with stakeholders.
2. Shortlist possible joining processes.	1.5. Joining processes which may be appropriate are identified 2.1. Suitability of different processes are discussed with stakeholders. 2.2. Stakeholders are guided to determine relative benefits of individual processes 2.3. Conflicts of information and benefits that arise are clarified.
3. Select metal joining process.	3.1. The most appropriate process is selected for the application.

	3.2. Reasons are explained for selecting process to stakeholders. 3.3. Any unresolved areas are clarified.
4. Read and understand job sheets	4.1. Job sheets/instruction are correctly interpreted and followed.
5. Select and use sheet and plate assembly equipment	5.1. ***Assembly equipment*** is selected in accordance with instructions on job sheet. 5.2. Equipment is used in a safe manner according to standard operating procedures.
6. Assemble fabrications	6.1. Products to be assembled are verified against specifications. 6.2. Assembly is produced following correct sequence of operations. 6.3. Assemblies/fabrications are joined to specification using specified ***joining techniques***. 6.4. Assembly is tested/checked for compliance with job requirements using standard operating procedures.
7. Protect assembly from damage	7.1. Assemblies/fabrications are handled and stored according to standard operating procedures and in a safe manner least likely to cause damage.

Variable	**Range**
Assembly equipment	Jigs, fixtures and other appropriate tools
Joining techniques	Seaming, bonding, riveting, welding etc.
Codes or practice/standards	Where reference is made to industry codes of practice, and/or Ethiopian/international standards, it is expected the latest version will be used.

Evidence Guide	
Critical Aspects of Competence	It is essential that competence is demonstrated in the ability to: • select appropriate joining process • justify the selection of that process • Ask appropriate questions to determine the required information. • Consistent performance should be demonstrated. In particular look to see that: • several scenarios requiring the selection of different processes have been completed successfully • This unit may be assessed concurrently with other relevant units
Underpinning Knowledge and Attitudes	Competence in this unit requires knowledge of the principles, strengths and weaknesses and typical applications of: • Metal Joining without parent metal fusion including

	soldering, brazing &adhesives. • Solid phase welding &diffusion bonding including time, temperature, pressure, deformation, friction welding, explosive welding, ultrasonic welding, butter welding. • Metal Joining - Fusion welding including heat sources, atmosphere, arc, gas, laser, electro slag, MIG and TIG welding, use of heat blankets • Heat effects of metal joining processes including heat flow, heat affected zone, weld pool solidification etc. • Weld ability, testing, weld defects including solidification cracking, heat affected zone hot tearing, hydrogen cracking, lamellar tearing, porosity, heat treatment cracking, weld decay, stress corrosion cracking, brittle fracture, fatigue, • Time-Temperature-Transformation TTT Curves applied to preheat, post heat and post weld heat treatment • Welding &Weld ability of: ➢ carbon steels, low alloy steels &cast irons ➢ aluminium &alloys, copper &alloys ➢ stainless steels &nickel alloys • Residual stresses in welding including causes and elimination • Economic and timeliness factors • Quality • Aesthetics of finish • Technical differences such as: ➢ strength ➢ rigidity ➢ corrosion resistance and grain structure • chemical composition • the importance of following the sequence of operations • application and function of assembly equipment • safety precautions and operating characteristics of assembly equipment and tools • application and limitations of different joining techniques • surface preparation and joining techniques • assembly tests/checks • safe handling and storage procedures applicable to components, fabrications and/or assemblies • effects of inappropriate handling and storage procedures • hazards and control measures associated with sheet and plate assembly • use and application of personal protective equipment • safe work practices and procedures for sheet and plate assembly

Underpinning Skills	Demonstrate skills to: • identify and ask questions which will lead stakeholders to describe the key factors and properties required • communicate technical information both with technical and non-technical stakeholders who may be customers or managers • Write to the level of reading technical information and writing technical reports and production specifications Understand and interpret numeric data. • reading, interpreting and following written job sheets, instructions, standard operating procedures and other applicable reference documents • checking and clarifying routine familiar information • selecting and using specified assembly equipment and tools • following sequence of operations • joining the components/fabrications correctly and safely using appropriate techniques • testing and checking assembled products for compliance with specifications • handling and storing components, fabrications and/or assemblies • checking for conformance to specifications • following oral instructions
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Assemble, Install and Test Braking System Kits**
Unit Code	**IND BBA3 07 0117**
Unit Descriptor	This unit describes the performance outcomes required to assemble, install and test a vehicle braking system kit and its associated components. It applies to individuals in train manufacturing environment and involves the application of skills and knowledge at a specialist level.

Elements	Performance Criteria
1. Plan the job	1.1. Work order and job specifications are used to determine installation process 1.2. Braking system and components are identified, selected and inspected 1.3. ***Tools and equipment*** required for the job are selected and checked for safe operation 1.4. Assembly and installation information is accessed from manufacturer specifications
2. Assemble and install braking system kit	2.1. Assembly and installation activities are carried out according to ***workplace procedures*** 2.2. Braking system kit is assembled using appropriate ***sources of information*** 2.3. Braking system kit is installed using installation procedures that comply with manufacturer specifications, tolerances and adjustment requirements
3. Test braking system	3.1. Test information is accessed and interpreted from manufacturer specifications 3.2. System tests are carried out according to manufacturer specifications and workplace procedures 3.3. Braking system assembly and test results are recorded
4. Complete work processes	4.1. Tools and equipment are cleaned, inspected for defects and stored according to workplace procedures 4.2. Faulty tools and equipment are identified, tagged and reported according to workplace procedures 4.3. Workplace documentation is completed according to workplace procedures

Variable	Range
Tools and equipment	must include: • cutting, measuring, lifting, brake bleeding and test equipment • Hand tools and power tools.

Workplace procedures	must include: • quality guidelines • recording and reporting • use of equipment • environmental requirements • WHS requirements to assemble and install braking system kits.
Sources of information	must include: • customer requirements • manufacturer specifications • Workplace procedures to assemble and install electro mechanical braking system kits.

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills competence to: • procedures for assembling, fitting, bleeding and adjusting braking system kits • identify workplace procedures and Work Health and Safety (WHS) requirements
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • WHS requirements and workplace procedures relating to assembling, installing and testing braking system kits • braking system operating principles • fabrication and routing procedures for brake lines • brake fluid types and applications
Underpinning Skills	Demonstrate skills to: • Reading skills to: ➢ interpret job instructions and braking system manufacturer specifications ➢ follow assembly specifications • Writing skills to: ➢ legibly record braking system test results ➢ complete faulty equipment tags • Numeracy skills to: ➢ measure components and equipment to determine compliance with specifications • Oral communication skills to: ➢ refer tool, equipment and machinery faults to supervisor • Planning and organising skills to: ➢ identify and prepare braking system kits ➢ identify and prepare assembly equipment and work area ➢ conduct braking system tests • Problem-solving skills to: ➢ solve problems when braking system tests do not comply with specifications

Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Inspect and Service Cooling Systems**
Unit Code	**IND BBA3 08 0117**
Unit Descriptor	This unit of competency describes the skills and knowledge required to carry out the inspection and service of air and liquid cooling systems in locomotive engine retail, service and/or repair context.

Elements	Performance Criteria
1. Prepare for work	1.1. Job requirements, including method, processes and equipment are determined 1.2. Job specifications are read and interpreted 1.3. Information is accessed and interpreted from manufacturer/component supplier specifications and workshop manuals 1.4. Equipment and tooling are identified and checked for safe and effective operation 1.5. Procedures are determined to minimise task time
2. Inspect cooling systems and analyse results	2.1. ***Workplace Health and Safety (WHS) requirements***, including individual state/territory regulatory requirements and personal protection needs are observed throughout the work 2.2. Warnings in relation to working with pressurised cooling systems are observed 2.3. Cooling system inspection is performed in accordance with workplace procedures and manufacturer/component supplier specifications 2.4. Inspection results are compared with manufacturer/component supplier specifications to indicate compliance or non-compliance 2.5. Results are documented with evidence and supporting information and recommendations made 2.6. Report is processed in accordance with workplace procedures
3. Carry out servicing	3.1. ***Servicing*** and adjustments are carried out in accordance with workplace procedures and manufacturer/component supplier specifications 3.2. Appropriate tooling, techniques and ***materials*** are selected and used 3.3. Final ***inspection*** is made to ensure work is to workplace expectations
4. Prepare equipment	4.1. Servicing schedule documentation is completed

for use or storage	4.2. Waste and scrap are removed following workplace procedures 4.3. Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures 4.4. ***Tooling and equipment*** are maintained and stored in accordance with workplace procedures 4.5. Job card is processed in accordance with workplace procedures

Variable	Range
WHS requirements	are to be in accordance with applicable commonwealth, state or territory legislation and regulations, and organisational safety policies and procedures, and may include: • personal protective equipment and clothing • safety equipment • first aid equipment • hazard and risk control • electrical safety • elimination of hazardous materials and substances • manual handling, including shifting, lifting and carrying • emergency procedures
Servicing	is to include: • fluids • filters • adjustments • operational testing, visual inspections and documents
Materials	may include: • coolant • spare parts • cleaning materials
Inspection	are to include: • visual, • aural and functional assessments, including, damage, corrosion, fluid levels/leaks and wear
Tooling and equipment	may include: • hand tooling • meters, gauges and pressure testing devices
Specific requirements	include: • fluid cooled systems • air cooled systems • combination systems
System variables	may include: • thermostats, water pumps, hoses, ducting, fans, drive belts, heat exchanger, electric and viscous fans, sealed and non-sealed systems, interior heater and coolant

	heater manifold • cooling fins size, material, colour and finish • ferrous and non-ferrous metals • keel cooling, heat exchanger, raw water cooling and sacrificial anodes • cooling system additives
Information/documents	may include: • verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, Material Safety Data Sheets (MSDS), diagrams or sketches • safe work procedures related to servicing cooling systems • regulatory/legislative requirements pertaining to servicing cooling systems • engineer's design specifications and instructions • organisation work specifications and requirements • instructions issued by authorised enterprise or external persons • Ethiopian standards
Legislative requirements	are to be in accordance with applicable commonwealth, state or territory legislation, regulations, certification requirements and codes of practice, and may include: • award and enterprise agreements • industrial relations • Ethiopian standards • Ethiopian Design Rules • confidentiality and privacy • WHS • the environment • equal opportunity • anti-discrimination • relevant industry codes of practice • duty of care
Environmental requirements	may include: • waste management • pollution • noise • dust • clean-up management
Quality requirements	may include: • regulations, including Ethiopian standards • internal organisational quality policies and procedures • enterprise operations and procedures
Organisational policies and procedures	may include: • quality policies and procedures, including Ethiopian standards • WHS, sustainability, environment, equal opportunity

	and anti-discrimination • manufacturer specifications and industry codes of practice • safe work procedures • reporting and recording procedures

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills competence to: • Assessors must be satisfied that the candidate can competently and consistently: • observe safety procedures and requirements • communicate effectively with others involved in or affected by the work • select methods and techniques appropriate to the circumstances • complete preparatory activity in a systematic manner • accurately interpret analysis results • identify application, purpose and operating principles • conduct inspection, servicing and operational testing in accordance with workplace and manufacturer/component supplier specifications • complete service of cooling systems and associated components within workplace timeframes present equipment to customer in compliance with workplace requirements.
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • WHS and environmental regulations/requirements, equipment, material and personal safety requirements • dangers of working with coolants • identification of application, purpose and operating principles • inspection procedures • types and layout of service/repair manuals (hard copy and electronic) • cooling system service procedures • selection, checking and use of tooling and equipment • manufacturer and/or component supplier specifications • applicable commonwealth, state or territory legislation, regulations, standards and codes of practice, including WHS and environment, relevant to inspection and servicing of cooling systems • organisational policies and procedures, including quality requirements, reporting and recording procedures, and work organisation and planning processes, related to inspection and servicing of cooling systems
Underpinning Skills	Demonstrate skills of: • technical skills to the level required to use workplace

	technology and tools related to the inspection and servicing of cooling systems, including the use of specialist tooling and equipment, measuring equipment, computerised technology and communication devices • communication skills to the level required to confirm work requirements and specifications, to communicate effectively regarding work requirements with supervisor, other workers and customers, to apply common industry terminology, to report work outcomes and problems, and to relate to people from a range of social, cultural and ethnic backgrounds and of varying physical and mental abilities • literacy skills to the level required to understand information related to work orders and to locate, interpret and apply manufacturer/component supplier technical information and specifications, workplace policies and safety procedures • numeracy skills to the level required to correctly calculate time, complete tests and measurements to determine repair/replacement requirements, calculate material requirements and establish quality checks • problem-solving skills to the level required to plan and organise activities and establish safe and effective work processes which anticipate and/or resolve problems and downtime, and to systematically develop solutions to avoid or minimise reworking and avoid wastage • team skills to the level required to work effectively and cooperatively with others to optimise workflow and productivity • organisational skills to the level required to plan and organise activities, including preparation and layout of worksite, and obtaining equipment and materials to avoid backtracking or workflow interruptions
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Conduct Engine Hot Tests**
Unit Code	**IND BBA3 09 0117**
Unit Descriptor	This unit describes the performance outcomes required to assess the status of an engine for operating inconsistencies or faults. It applies to those in a train manufacturing environment and involves the application of skills and knowledge at a specialist level.

Elements	Performance Criteria
1. Plan and prepare	1.1. Work instructions and specifications are identified and confirmed 1.2. Tools and equipment for the job are inspected and faults are rectified or reported 1.3. Materials list is interpreted and materials are selected and prepared
2. Shift and mount engine	2.1. ***Workplace procedures*** are identified and followed 2.2. Engine is transferred from assembly line to the engine testing area 2.3. Engine is mounted in engine testing cradle for hot test procedures
3. Hot test engine	3.1. Services are connected to the engine, simulating normal operating conditions, and engine is brought to hot operating conditions 3.2. Mechanical, sensory and electronic scan tool tests are conducted and results are compared against performance specifications 3.3. Minor modifications are carried out according to workplace procedures 3.4. Test results are recorded and documented 3.5. Engine is designated as conforming or requiring rectification, and is labelled and prepared for transfer to assembly line or engine rectification area
4. Complete work processes	4.1. Workplace documentation is completed 4.2. Work area is cleaned and materials disposed of, reused or recycled according to workplace procedures 4.3. Tools and equipment are cleaned, checked, maintained and stored according to workplace procedures

Variable	Range
Workplace procedures	must include:

	• engine test equipment operations • recording and reporting • WHS requirements • Workplace quality guidelines.

Evidence Guide	
Critical Aspects of Competence	Must demonstrate knowledge and skills competence to: • interpret and apply job specifications and work instructions when conducting engine hot test • apply quality requirements when conducting engine hot test • use tools and equipment safely when conducting engine hot test • use engine hot test procedures to identify non-conforming engine faults, using electronic scan tools, mechanical and sensory tests, following WHS requirements and workplace procedures • complete workplace test records and documents
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • WHS requirements and workplace procedures for conducting hot engine tests • workplace production quality standards • manufacturing and production techniques for engines • engine testing terminology • types and uses of engine test tools and equipment • engine faults and symptoms • engine parts and construction • engine testing techniques and equipment • processes for calculating material requirements
Underpinning Skills	Demonstrate skills of: • Reading skills to: ➢ interpret work instructions and inspection reports ➢ Interpret manuals and specification sheets. • Writing skills to: ➢ complete faulty engine and equipment tags ➢ Complete test and fault rectification reports. • Numeracy skills to: ➢ identify engineering specifications ➢ measure parts and components to determine compliance with specifications ➢ Interpret results from test equipment. • Digital literacy skills to: ➢ Use engine electronic test equipment. • Planning and organizing skills to: ➢ prepare work area, engines and equipment ➢ Manage engine test time. • Problem-solving skills to: ➢ Identify engine running defects.

Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Apply Basic Just in Time Systems to the Reduction of Waste**
Unit Code	**IND BBA3 10 0117**
Unit Descriptor	This unit covers reviewing and making continuous improvements to an existing Just in Time (JIT) production system in manufacturing.

Elements	Performance Criteria
1. Identify potential to eliminate waste in the current system	1.1. Value ***importance chain*** members are identified. 1.2. Principles of ***waste*** elimination are applied to each step in the value chain. 1.3. Current storage/inventory in value chain is analysed for excesses. 1.4. Production lead time is analysed for all components, sub-assemblies and assemblies subject to ***JIT*** including potential for set up time reductions. 1.5. Workplace layout is analysed for flow and application of housekeeping principles. 1.6. Production process is analysed for excess rework and scrap.
2. Draft workable procedures to implement improvements to JIT system	2.1. Key measures for improvements are determined. 2.2. The plan is referred to a higher authority for approval in accordance with policy and procedures.
3. Implement the JIT system/improve	3.1. The JIT system/improvements are implemented according to workplace procedures. 3.2. Key measures of JIT are monitored.

Variable	Range
Importance chain	the entire production system, beginning with the customer, and includes the sales outlet, product design, processing and supply
Waste	Includes activities and results to be eliminated within manufacturing Categories of waste include excess production and early production, waiting, materials queuing, not moving, people not working, transporting, double handling, poor process design, inventory, stores, buffers, lot sizes, inefficient performance of a process, reaching, bending, exertion, making defective items, rework, rejects, unnecessary inspection
JIT	Includes a production scheduling concept that calls for any item needed at a production operation - whether raw

	material, finished item, or anything in between, to be produced and available precisely when needed JIT systems may also be known as part of other manufacturing systems such as lean manufacturing, active manufacturing or similar

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills to: • JIT manufacturing philosophy • hazards and control measures associated with applying basic JIT systems to the reduction of waste • set up time reduction techniques
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • push and pull systems • work cells • group technology • ABC analysis of inventory • safe work practices and procedures
Underpinning Skills	Demonstrate skills of: • analysing • communicating
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Develop and Manage a Plan for a Simple Manufacturing Related Project**
Unit Code	**IND BBA3 11 0117**
Unit Descriptor	This unit covers developing and managing low risk manufacturing related projects that may be small scale and managed by one person and are carried out under guidance.

Elements	Performance Criteria
1. Select appropriate project management tools and develop project plan	1.1. A working knowledge of ***project management tools*** and ***plan*** is used to develop a plan for a ***simple manufacturing related project*** and schedule of activities to meet project outcomes. 1.2. The plan is referred to a supervisor for approval in accordance with policy and procedures.
2. Implement planned activities	2.1. Plan is implemented according to schedule. 2.2. All affected personnel are communicated with regarding project implementation. 2.3. Supply and/or allocation of required resources including materials and equipment is organised. 2.4. Project progress is regularly reported in relation to agreed milestones to provide a measure of performance throughout the life of the plan. 2.5. Progress is discussed in consultation with other staff and contractors to ensure effective outcomes.
3. Review project plan and schedule	3.1. Project outcomes, performance standards and project objectives are monitored and analysed against specifications and the results are reported in accordance with procedures. 3.2. Variations in keeping to plan are discussed with supervisors and are resolved in accordance with enterprise policy and procedures.

Variable	Range
Project management tools	May include Critical Path Method (CPM), bar and Gantt charts, work breakdown structures, Program Evaluation and Review Technique (PERT), project management software packages, recording systems - electronic and manual
Plan	May include project implementation plans, quality assurance targets, milestones, any planning that relates to time, cost or quality and requires that progress is communicated to others

Simple manufacturing related project	Projects that are small scale, low risk, managed by one person, carried out under guidance, related to manufacturing processes and products

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills in: • Planning and control procedures, resource management and risk management. • reading, interpreting and following information on written job instructions
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • applicable regulations and standards • appropriate software • Critical Path Method (CPM) • bar charts • work breakdown structures • Program Evaluation and Review Technique (PERT) • basic quality assurance techniques • knowledge of availability of resources • safe work practices and procedures a basic knowledge of: ➢ the project life cycle and the relationship between project phases ➢ planning and control procedures, resource management and risk management
Underpinning Skills	Demonstrate skills of: • using computing skills • using interpersonal communication skills • negotiating • report writing • reading, interpreting and following information on written job instructions,
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Prepare a Simple Production Schedule**
Unit Code	**IND BBA3 12 0117**
Unit Descriptor	This unit covers preparing a simple production schedule in manufacturing. For skills associated with determining steps in manufacturing process. This unit applies to all manufacturing and engineering workplace environments. It covers the scheduling of production that involves several interconnected manufacturing processes. All work is carried out under supervision.

Elements	Performance Criteria
1. Identify production requirements	1.1. The production processes to be used are identified from instructions and specifications provided. 1.2. Customer requirements in terms of volume, delivery time and arrangements and quality are obtained from supervisor or other appropriate sources. 1.3. Customer and process requirements are analysed to determine production requirements.
2. Develop an activity plan production requirements	2.1. Production requirements are divided into activity elements. 2.2. A network diagram is constructed. 2.3. The critical path is determined. 2.4. The latest start/earliest finish and slack time are determined for activity elements to meet requirements. 2.5. Assistance and approval from supervisor is obtained.
3. Prepare the production schedule	3.1. A ***simple production schedule*** is prepared . 3.2. A simple bill of materials required is prepared to assist in control of materials. 3.3. Schedule is depicted using a Gantt chart or similar graphical display. 3.4. Schedule allows for future changes to improve performance. 3.5. Assistance and approval from supervisor is obtained.
4. File and issue the schedule	4.1. The schedule is reviewed and tested with appropriate personnel. 4.2. The schedule is referred to appropriate personnel for implementation. 4.3. All supporting documents are provided for implementation. 4.4. The schedule is filed/issued according to workplace procedures.

Variable	Range
Simple production schedule	Applies to the preparation of a schedule for the manufacture of a single component or single assembly function; or to operations for a single small production work unit or production cell The schedule will involve only a small number of constraints or variables

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills to: • Just in Time procedures • communicating • reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • types of production • jobbing production • batch production • process production • cellular manufacture • scheduling • interpreting customer requirements • machine capability and selection • Gant charts
Underpinning Skills	Demonstrate skills of: • prioritising • managing time • organising • documenting • using project management tools • analysing • calculating • planning and sequencing operations • checking and clarifying task-related information
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be accessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Set up Equipment for Continuous Operation**
Unit Code	**IND BBA3 13 0117**
Unit Descriptor	This competency covers setting up equipment for a continuous production run. It applies to processes which are essentially continuous in nature, and standard production processes. This competency applies to advanced operators who set up equipment for continuous operation. The key factors are production requirements and setting up equipment to match requirements. This competency is typically performed by experienced operators working either independently or as part of a work team.

Elements	Performance Criteria
1. Identify production requirements.	1.1 Specifications and standard operating ***procedures*** are read for production run and equipment. 1.2 Materials required are identified. 1.3 Production control requirements are noted for production and warm up time, pressure(s), speed(s), and temperature and product specifications. 1.4 Key stages are noted in the process for quality checks. 1.5 Equipment and components required are identified. 1.6 Assembly requirements for items of production and downstream equipment or specialised component are checked to ensure efficient work flow will occur.
2. Set up equipment	2.1 Work area is checked to ensure adequate space for the process. 2.2 Equipment and components are placed in required configuration. 2.3 Guards, warning devices and cut-offs are installed as required. 2.4 All connecting components and services are checked for integrity and effectiveness. 2.5 Dies/ moulds/jigs are checked as required for suitability for production requirements. 2.6 Standard operating procedures and quality procedures are placed in appropriate work stations. 2.7 Work area is checked for operator ergonomic efficiency, access and egress requirements. 2.8 The***context*** of this competency is applied to experienced operators working either independently or as part of a work team.

3. Explain process to operators when required	3.1 Particular requirements are explained for machine adjustments, materials characteristics, quality specifications and key production stages to the operator. 3.2 Explain standard operating procedures and any particular OHS issues are identified. 3.3 Appropriate contingency strategies are identified and explained for process faults, quality, OHS issues, and materials supply or quality machine malfunctions. 3.4 Operators are encouraged to ask questions and clarify procedures.
4. Produce first-off production sample(s).	4.1 Process is started following standard operating procedures. 4.2 Product quality is observed through process and compare to standards. 4.3 Machine setting ranges are compared to documented requirements. 4.4 Observations of the process outcomes are used to fine tune the settings and other production variables. 4.5 Final product is checked for the required standards. 4.6 Standard operating procedures are compared with actual production run and note variances.
5. Fine tune the process.	5.1 Information collected is used during trial to modify workplace documentation, including standard operating procedures, machine settings and process instructions. 5.2 Appropriate advice and permission are obtained where variations are outside of quality or specification range. 5.3 Operators are advised of variations to process and document as required. 5.4 Required ***tools and equipment*** must be used.

Variable	Range
Procedures	May include but not limited to: • All operations are performed in accordance with procedures. • A procedure means all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards.
Context	May include but not limited to: • This competency applies to experienced operators working either independently or as part of a work team.
Tools and equipment	May include but not limited to:

	• hand carts and trolleys • hoists/lifting equipment not requiring any special permits or licences • basic hand tools required for opening of material packaging • material loading equipment used for loading of raw materials • Relevant personal protective equipment.
Hazards	May include but not limited to: • inadequate use of guards and warning signs • manual handling hazards • hazardous materials • Equipment operations.
Problems	May include but not limited to: • variations in materials • faulty components • machine malfunction • variation in product • contamination of materials and processing problems.
Variables	May include but not limited to: • variations in the timing of machine cycles • variations in the sequence of product availability • variations in the quality of the raw materials • Product integrity and general conformance to specification/sample.

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills to: • identify equipment and components by name and operating principles and function, and to locate, interpret and apply relevant information • maintain workplace records, identify and safely handle products and materials applying safety precautions appropriate to the task • identify critical materials properties and process characteristics in relation to the process requirements and the end product • plan own work process within workplace procedures and explain the reasons for the steps in the process • Take appropriate action to observe equipment, materials and products for out of specification results, make adjustments and identify problems to be reported.
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • the hierarchy of control, including engineering controls • impact of variations in raw materials and equipment operation in relation to final product • waste management and importance of non-conforming materials

	• quality requirements at each production stage • function and operating principles of equipment, machine components and ancillary equipment • products, materials and material characteristics
Underpinning Skills	Demonstrate skills of: • recognise focus of operation of work systems and equipment • identify and correctly use equipment, processes and procedures • plan own work, including predicting consequences and identifying improvements • maintain output and product quality using appropriate instruments, controls, test information and readings • make adjustments to equipment operation to rectify variations in equipment operation or product quality • safely shut down equipment in normal or abnormal circumstances • identify factors which may affect product quality or production identify hazards of the materials and process • output and appropriate remedies • identify impact of mechanical, hydraulic, pneumatic and electrical/electronic principles of the production process • distinguish particular requirements of products, materials, equipment and production process • interpret from production requests the correct selection and use of equipment, materials, processes and procedures • take samples when required and identify product out of specification • Safely handle products and materials, read relevant safety information and apply safety precautions appropriate to the task.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Perform Sheet and Plate Assembly**
Unit Code	**IND BBA3 14 0117**
Unit Descriptor	The unit covers assembling prefabricated/formed components using a range of joining techniques. This unit applies to production assembly of pre-fabricated/formed components. Applications of this unit may include manufacture of white goods, appliances, electrical cabinets, metal furniture, cladding and shelving, box trailer bodies, ductwork and other sheet and plate assemblies.

Elements	Performance Criteria
1. Read and understand job sheets	1.1. Job sheets/instruction are correctly interpreted and followed. 1.2. Work is done according to the instruction.
2. Select and use sheet and plate assembly equipment	2.1. ***Assembly equipment*** is selected in accordance with instructions on job sheet. 2.2. Equipment is used in a safe manner according to standard operating procedures.
3. Assemble fabrications	3.1. Products to be assembled are verified against specifications. 3.2. Assembly is produced following correct sequence of operations. 3.3. Assemblies/fabrications are joined to specification using specified ***joining techniques***. 3.4. Assembly is tested/checked for compliance with job requirements using standard operating procedures.
4. Protect assembly from damage	4.1. Assemblies/fabrications are handled and stored according to standard operating procedures and in a safe manner least likely to cause damage.

Variable	Range
Assembly equipment	May include but not limited to: • Jigs, fixtures and other appropriate tools
Joining techniques	May include but not limited to: • Seaming, bonding, riveting, welding etc.

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills to: • application and limitations of different joining techniques • hazards and control measures associated with sheet and plate assembly • selecting and using specified assembly equipment and tools

	• testing and checking assembled products for compliance with specifications
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • the importance of following the sequence of operations • application and function of assembly equipment • safety precautions and operating characteristics of assembly equipment and tools • application and limitations of different joining techniques • surface preparation and joining techniques • assembly tests/checks • safe handling and storage procedures applicable to components, fabrications and/or assemblies • effects of inappropriate handling and storage procedures • hazards and control measures associated with sheet and plate assembly • use and application of personal protective equipment • safe work practices and procedures for sheet and plate assembly
Underpinning Skills	Demonstrate skills of: • reading, interpreting and following written job sheets, instructions, standard operating procedures and other applicable reference documents • checking and clarifying routine familiar information • selecting and using specified assembly equipment and tools • following sequence of operations • joining the components/fabrications correctly and safely using appropriate techniques • testing and checking assembled products for compliance with specifications • handling and storing components, fabrications and/or assemblies • checking for conformance to specifications • following oral instructions
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Assist in the Preparation of a Basic Workplace Layout**
Unit Code	**IND BBA3 15 0117**
Unit Descriptor	This unit covers assisting in the charting and analysis of basic manufacturing operations including assisting in the preparation of workplace layouts. The unit covers basic principles of ergonomics, productivity improvements and quality procedures and work flow analysis.

Elements	Performance Criteria
1. Identify opportunities for workplace layout improvement	1.1. Basic analysis of workplace data is undertaken to determine sources of ***waste***. 1.2. Future capacity requirement is obtained in accordance with policy and procedures. 1.3. Productivity improvement areas are established in accordance with organisational policy and procedures. 1.4. Appropriate productivity measures are established in conjunction with supervisors and other appropriate personnel.
2. Develop basic layout options for workplace improvement	2.1. Operation process charts, flow charts, flow process charts, and string diagrams etc. are used to develop basic layout options. 2.2. ***Information on ergonomics, health and safety hazards*** is considered in accordance with policy and procedures. 2.3. Improvements are developed in consultation with users and supervisors and in accordance with policy and procedures. 2.4. Simple economic appraisals for proposed improvements are developed in accordance with policy and procedures. 2.5. Layout options are referred to a higher authority for approval in accordance with policy and procedures.

Variable	Range
Waste	• Excess production and early production, waiting, materials queuing, not moving, people not working, transporting, double handling, poor process design, inventory, stores, buffers, lot sizes, inefficient performance of a process, reaching, bending, exertion • Making defective items, rework, rejects, unnecessary inspection

Information on ergonomics, health and safety hazards	• Standard references including NOHSC guidelines, any relevant Acts and Regulations, information contained in manufacturers' manuals, standard operating procedures • Workplace reports including:, incident reports, commissioned studies, advice from relevant leaders/supervisors/workplace committees

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills to: • engineering processes and systems • definition and measures of productivity
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • basic knowledge of workplace layout principles including at a basic level the degree to which workplace layout is affected by: ➢ engineering processes and systems ➢ materials flow patterns ➢ types of production plant and machinery ➢ materials handling methods ➢ unit loads ➢ types of production methods • productivity: ➢ definition and measures of productivity ➢ factors affecting productivity ➢ productivity and quality ➢ value adding • recording techniques: ➢ flow charts ➢ activity relationship charts ➢ outline process charts ➢ flow process charts ➢ multipurpose charts ➢ string diagrams ➢ basic principle of ergonomics • the concept of waste and its application to productivity improvements
Underpinning Skills	Demonstrate skills of: • communicating • analysing • documenting • reviewing
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning

Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Detail Bolts and Welds for Structural Steelwork Connections**
Unit Code	**IND BBA3 16 0117**
Unit Descriptor	This unit covers the skills and knowledge required to detail bolts and welds for structural steelwork connections consistent with design specifications. This unit applies to a structural steel detailer who has to detail various types of bolts and welds for structural steelwork connections. The detailing may be done manually or by using CAD and/or proprietary steel detailing software. The unit may apply to structural steel detailing carried out for residential, commercial, industrial or mining fabrication and construction projects. The unit assumes that knowledge of basic technical drawing conventions and procedures such as view, dimensioning, drawing layout, etc. is already held. Work is conducted according to defined procedures. Work may be conducted in small to large scale enterprises and may involve individual and team activities. This unit requires the application of skills associated with planning and organising to complete structural steel detail drawings. Communication and numeracy skills are used to refer to patterns and specifications and complete and label sketches. Self-management skills are used to ensure conformance of own work to quality standards.

Elements	Performance Criteria
1. Determine shop and field connections from design drawings	1.1. Fabrication shop capabilities and preferences are discussed with fabricator 1.2. Connections are allocated as shop or field welded in conjunction with fabricator 1.3. Connections to be field bolted are allocated and extent of shop preparation of connections decided 1.4. Connection fittings are allocated to either columns or beams to suit fabrication efficiency or design requirements 1.5. A request for further information (RFI) is made to design engineer where clarification of requirements is needed 1.6 All work must comply with relevant Federal and State or Territory ***legislative or regulatory requirements***
2. Detail bolts for connections	2.1. Knowledge of standard bolting category identification system is demonstrated

	2.2. Bolt types and sizes for each connection are specified using design information and consideration of commercial availability 2.3. Bolt and thread lengths are selected according to design specifications, and connection requirements 2.4. ***Bolt and trade lengthen*** are detailed taking into account AS 4100 requirements, tightening and tensioning specifications and clearances 2.5. Field bolt list is prepared and checked and sent to fabricator 2.6 Detailing may be undertaken in a variety of ***work environments*** including commercial, home office or fabrication or construction enterprise
3. Detail welds for connections	3.1. Knowledge of joint and weld types is demonstrated 3.2. Shop and field welds are identified 3.3. Standard welding symbols are used 3.4. Clearances for welding are applied 3.5. Field weld details are placed on erection plans and shop drawings and submitted to design engineer for approval 3.6 ***Standard welding symbols*** are applied.

Variable	**Range**
Legislative/regulatory requirements	May include but not limited to: • All work must comply with relevant Federal and State or Territory legislative or regulatory requirements
Bolt and thread lengths	May include but not limited to: • Bolt and thread lengths may be specified by the engineer or by the detailer
Work environment	May include but not limited to: • Detailing may be undertaken in a variety of work environments including commercial, home office or fabrication or construction enterprise. • Work may be performed individually on a contracting/project basis or as part of a project team and in response to combinations of paper based and electronic instructions.
Standard welding symbols	May include but not limited to: • Standard welding symbols

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills to: • identify and interpret engineering design specifications for structural steel bolted and welded connections

	• relate design information to structural steel detailing processes • correctly use the Ethiopian standard bolting category identification system
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • architectural and engineering design drawings including standard symbols, terms, abbreviations and sketches • structural steel members and connections used in structural steelwork • the difference between design and detail drawing processes • drawing office procedures • fabrication processes and procedures • Ethiopian standard bolting category identification system
Underpinning Skills	Demonstrate skills of: • assessing design information for adequacy of information needed for structural steel detailing • liaising with design engineers • assessing scope of structural steel detailing tasks and priorities • interpreting design drawings, sketches and schedules • communicate at all levels about technical issues related to patterns and specifications • reading and numeracy is required to the level of interpreting workplace documents and technical information
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Develop Conceptual Models and Prototypes**
Unit Code	**IND BBA3 17 0117**
Unit Descriptor	This unit describes the performance outcomes required to develop and trial conceptual models and prototypes in the design, development and production of train. It applies to those in an automotive manufacturing environment. No licensing, legislative or certification requirements apply to this unit at the time of publication.

Elements	Performance Criteria
1. Determine model and prototype requirements	1.1. ***Workplace requirements*** for the development of conceptual ***models and prototypes*** are confirmed 1.2. ***Instructions*** and plans are interpreted to identify processes and materials needed to undertake the work 1.3. Client requirements for model and prototype are confirmed with relevant personnel 1.4. Approval is sought for the proposed development or modifications to conceptual model and prototype
2. Plan model and prototype-making activities	2.1. Steps involved in the development or modification of the model and prototype are identified 2.2. Fabrication and machining processes and instructions are determined 2.3. Timetable, resource requirements, personnel, and purchase and supply schedule are confirmed 2.4. Approved plan is communicated to relevant personnel
3. Prepare tools and equipment	3.1. Required tools and equipment to construct or modify the model or prototype are selected and prepared for use 3.2. Necessary materials and components are obtained according to design requirements
4. Produce conceptual model and prototype	4.1. Model and prototypes are designed according to design plans and specifications 4.2. Model and prototypes are fabricated and constructed according to plans and specifications 4.3. Completed model and prototypes are compared to specification and modified as required
5. Test and modify model and prototype	5.1. ***Model and prototypes*** are tested and checked against project objectives, design specifications and workplace standards 5.2. Test results are analysed and action is taken where required to modify the model and prototypes

	5.3. Outcomes of development process and associated testing are documented and referred to relevant personnel

Variable	Range
Workplace requirements	must include: • equipment use • quality and continuous improvement processes • recording and reporting guidelines • WHS requirements relating to the development of models and prototypes.
Models and prototypes	must include: • formed using metal, plastics, clay, fibre glass, wood, foam, and other suitable material • Shaped through the development and use of moulds, templates, carving and computerised shaping equipment on material.
Instructions	must include: • job sheets, plans, specifications, drawings and designs • manufacturer instructions • Workplace procedures relating to the development of prototypes.

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills to: • methods for determining model and prototype requirements and producing models • WHS requirements when developing models and prototypes • operation of vehicle design software systems and components • developing conceptual models and prototypes that satisfy customer requirements
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • WHS requirements when developing models and prototypes • common types and applications of conceptual model and prototype plans and specifications • workplace procedures for developing conceptual models and prototypes • methods for determining model and prototype requirements and producing models • operation of vehicle design software systems and components • techniques to test and evaluate models and prototypes against project objectives, specifications and workplace standards • workplace quality standards relating to developing

	conceptual models and prototypes • Procedures for recording and reporting workplace records and information.
Underpinning Skills	Demonstrate skills of: • developing conceptual models and prototypes • communicate effectively with design engineers during development process • apply, within scope of own authority, the requirements of the job in relation to. • developing conceptual models and prototypes that satisfy customer requirements • achieving work quality goals • completing documentation of the model and prototype development process • Completing work area housekeeping requirements, including documentation of project activity, process and outcomes.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Install Fixed and Moveable Glass Components on Vehicles**
Unit Code	**IND BBA3 18 0117**
Unit Descriptor	This unit describes the performance outcomes required to cut, prepare and install fixed and moveable glass components on vehicles. It applies to those on train service and repair environment and involves the application of skills and knowledge at a production worker level.

Elements	Performance Criteria
1. Fabricate templates for glass components	1.1. Job specifications are identified from work orders and work instructions 1.2. ***Workplace procedures*** are identified 1.3. Templates are fabricated from selected materials to meet job specifications
2. Mark and cut glass openings	2.1. Templates are used to mark and cut glass opening using workplace methods and equipment 2.2. Train panels and trims are prepared for installing glass components
3. Install glass components	3.1. Adhesives or glass retaining system are identified and selected according to work order and job specification 3.2. Glass components are installed according to train manufacturer specifications 3.3. Installed glass components are checked against specifications and leak tested, and corrective action is taken as required
4. Complete work processes	4.1. Work area is cleaned, and materials disposed of or recycled according to workplace procedures 4.2. Tools and equipment are cleaned, checked, maintained and stored according to workplace procedures 4.3. Workplace documentation is completed according to workplace procedures

Variable	Range
Workplace procedures	must include: • Recording and reporting guidelines for installing glass components in train. • use of equipment for installing glass components in train • WHS requirements related to installing glass components in train, including: ➢ train protection measures

	➢ personal protective equipment, including safety glasses, gloves and coveralls • Workplace quality guidelines for installing glass components in train.

Evidence Guide	
Critical Aspects of Competence	Demonstrate knowledge and skills to: • cutting procedures for train panels and trim • select appropriate glass sealants, adhesives, tools and equipment • installation procedures for fixed, bonded and moveable glass components • prepare, install and adjust fixed and moveable glass components according to workplace procedures and WHS requirements
Underpinning Knowledge and Attitudes	Demonstrate knowledge of: • workplace procedures and WHS requirements relating to installing fixed and moveable glass components on train • work documentation covering procedures, specifications, schedules and work plans • template measuring and marking out procedures • cutting procedures for train panels and trim • installation procedures for fixed, bonded and moveable glass components • urethane, rubber and butyl installation methods • bonded glass installation methods
Underpinning Skills	Demonstrate skills of: • interpret job information • mark out and fabricate templates for glass components • select appropriate glass sealants, adhesives, tools and equipment • prepare, install and adjust fixed and moveable glass components according to workplace procedures and WHS requirements • leak test installed glass components • Complete job sheets relating to installation.
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Monitor Implementation of Work Plan/Activities**
Unit Code	**IND BBA3 19 0117**
Unit Descriptor	This unit covers competence required to oversee and monitor the quality of work operations within an enterprise. This unit may be carried out by team leaders or supervisors.

Elements	Performance Criteria
1. Monitor and improve workplace operations	1.1 Efficiency and service levels are monitored on an ongoing basis. 1.2 Operations in the workplace have been supported overall enterprise goals and quality assurance initiatives. 1.3 Quality ***problems*** and issues are promptly identified and adjustments made accordingly. 1.4 Procedures and systems are changed in consultation with colleagues to improve efficiency and effectiveness. 1.5 Colleagues are consulted about ways to improve efficiency and service levels.
2. Plan and organise workflow	2.1 Current workload of colleagues is accurately assessed. 2.2 Work is scheduled in a manner which enhances efficiency and customer service quality. 2.3 Work is delegated to appropriate people in accordance with principles of delegation. 2.4 Workflow is assessed against agreed objectives and timelines and colleagues are assisted in prioritisation of workload. 2.5 Input regarding staffing needs is provided to appropriate management.
3. Maintain workplace records	3.1 ***Workplace records*** are accurately completed and submitted within required timeframes. 3.2 Where appropriate, completion of records is delegated and monitored prior to submission.
4. Solve problems and make decisions	4.1 Workplace problems are promptly identified and considered from an operational and customer service perspective. 4.2 Short term action is initiated to resolve the immediate problem where appropriate. 4.3 Problems are analysed for any long term impact and potential solutions assessed and actioned in consultation with relevant colleagues. 4.4 Where problem is raised by a team member, they are encouraged to participate in solving the problem. 4.5 Follow up action is taken to monitor the effectiveness of solutions in the workplace.

Variables	Range
Problems	May include but not limited to: • difficult customer service situations • equipment breakdown/technical failure • delays and time difficulties • competence
Workplace records	May include but is not limited to: • staff records and regular performance reports

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge in: • ability to effectively monitor and respond to a range of common operational and service issues in the workplace • the role of staff involved in workplace monitoring • quality assurance, principles of workflow planning, delegation and problem solving
Underpinning Knowledge and Attitude	Demonstrate knowledge of: • roles and responsibilities in monitoring work operations • overview of leadership and management responsibilities • principles of work planning and principles of delegation • typical work organization methods appropriate to the sector • quality assurance principles and time management • problem solving and decision making processes • industrial and/or legislative issues which affect short term work organization as appropriate to industry sector
Underpinning Skills	Demonstrate skills to: • monitor and improve workplace operations • plan and organize workflow • maintain workplace records
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Apply Quality Control**
Unit Code	**IND BBA3 20 0117**
Unit Descriptor	This unit covers the knowledge, attitudes and skills required in applying quality control in the workplace.

Elements	Performance Criteria
1. Implement quality standards	1.1 Agreed quality standard and procedures are acquired and confirmed. 1.2 Standard procedures are introduced to organizational staff/personnel. 1.3 Quality standard and procedures documents are provided to employees in accordance with the organization policy. 1.4 Standard procedures are revised / updated when necessary.
2. Assess quality of service delivered	2.1 Services delivered are ***quality checked*** against organization ***quality standards*** and specifications. 2.2 Service delivered are evaluated using the appropriate evaluation ***quality parameters*** and in accordance with organization standards. 2.3 Causes of any identified faults are identified and corrective actions taken in accordance with organization policies and procedures.
3. Record information	3.1 Basic information on the quality performance is recorded in accordance with organization procedures. 3.2 Records of work quality are maintained according to the requirements of the organization.
4. Study causes of quality deviations	4.1 Causes of deviations from final outputs or services are investigated and reported in accordance with organization procedures. 4.2 Suitable preventive action is recommended based on organization quality standards and identified causes of deviation from specified quality standards of final service or output.
5. Complete documentation	5.1 Information on quality and other indicators of service performance is recorded. 5.2 All service processes and outcomes are recorded.

Variable	Range
Quality check	May include but not limited to: • Check against design / specifications • Visual and Physical inspection

Quality standards	May include but not limited to: • Materials • Components • Process • Procedures
Quality parameters	May include but not limited to: • Standard Design / Specifications • Material Specification

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: • Check completed work continuously against organization standard • Identify and isolate faulty or poor service • Check service delivered against organization standards • Identify and apply corrective actions on the causes of identified faults or error • Record basic information regarding quality performance • Investigate causes of deviations of services against standard • Recommend suitable preventive actions
Underpinning Knowledge and Attitude	Demonstrates knowledge of: • Relevant quality standards, policies and procedures • Characteristics of services • Safety environment aspects of service processes • Evaluation techniques and quality checking procedures • Workplace procedures and reporting procedures
Underpinning Skills	Demonstrates skills to: • interpret work instructions, specifications and standards appropriate to the required work or service • carry out relevant performance evaluation • maintain accurate work records • meet work specifications and requirements • communicate effectively within defined workplace procedures
Resource Implications	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Lead Workplace Communication**
Unit Code	**IND BBA3 21 0117**
Unit Descriptor	This unit covers the knowledge, attitudes and skills needed to lead in the dissemination and discussion of information and issues in the workplace.

Elements	Performance Criteria
1. Communicate information about workplace processes	1.1 Appropriate ***communication method*** is selected. 1.2 Multiple operations involving several topics areas are communicated accordingly. 1.3 Questions are used to gain extra information. 1.4 Correct sources of information are identified. 1.5 Information is selected and organized correctly. 1.6 Verbal and written reporting is undertaken when required. 1.7 Communication skills are maintained in all situations.
2. Lead workplace discussion	2.1 Response to workplace issues is sought. 2.2 Response to workplace issues are provided immediately. 2.3 Constructive contributions are made to workplace discussions on such issues as production, quality and safety. 2.4 Goals/objectives and action plan undertaken in the workplace are communicated.
3. Identify and communicate issues arising in the workplace	3.1 Issues and problems are identified as they arise. 3.2 Information regarding problems and issues are organized coherently to ensure clear and effective communication. 3.3 Dialogue is initiated with appropriate staff/personnel. 3.4 Communication problems and issues are raised as they arise.

Variable	Range
Methods of communication	May include but not limited to: • Non-verbal gestures • Verbal • Face to face • Two-way radio • Speaking to groups • Using telephone • Written

	• Using Internet • Cell phone

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: • Deal with a range of communication/information at one time • Make constructive contributions in workplace issues • Seek workplace issues effectively • Respond to workplace issues promptly • Present information clearly and effectively written form • Use appropriate sources of information • Ask appropriate questions • Provide accurate information
Underpinning Knowledge and Attitude	Demonstrates knowledge of: • Organization requirements for written and electronic communication methods • Effective verbal communication methods
Underpinning Skills	Demonstrates skills to: • Organize information • Understand and convey intended meaning • Participate in variety of workplace discussions • Comply with organization requirements for the use of written and electronic communication methods
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Lead Small Teams**
Unit Code	**IND BBA3 22 0117**
Unit Descriptor	This unit covers the skills, knowledge and attitudes required to determine individual and team development needs and facilitate the development of the work group.

Elements	Performance Criteria
1. Provide team leadership	1.1 ***Learning and development needs*** are systematically identified and implemented in line with ***organizational requirements***. 1.2 Learning plan is collaboratively developed and implemented to meet individual and group training and developmental needs. 1.3 Individuals are encouraged to self-evaluate performance and areas identified for improvement. 1.4 ***Feedback on performance*** of team members is collected from relevant sources and compared with established team learning process.
2. Foster individual and organizational growth	2.1 Learning and development program goals and objectives are identified to match the specific knowledge and skills requirements of competence standards. 2.2 ***Learning delivery methods*** are made appropriate to the learning goals, the learning style of participants and availability of equipment and resources. 2.3 Workplace learning opportunities and coaching/ mentoring assistance are provided to facilitate individual and team achievement of competencies. 2.4 Resources and timelines required for learning activities are identified and approved in accordance with organizational requirements.
3. Monitor and evaluate workplace learning	3.1 Feedback from individuals or teams is used to identify and implement improvements in future learning arrangements. 3.2 Outcomes and performance of individuals/teams are assessed and recorded to determine the effectiveness of development programs and the extent of additional support. 3.3 Modifications to learning plans are negotiated to improve the efficiency and effectiveness of learning. 3.4 Records and reports of competence are maintained within organizational requirement.
4. Develop team commitment and	4.1 Open communication processes are used by team to obtain and share information.

cooperation	4.2 Decisions are reached by the team in accordance with its agreed roles and responsibilities. 4.3 Mutual concern and camaraderie are developed in the team.
5. Facilitate accomplishment of organizational goals	5.1 Team members are made actively participatory in team activities and communication processes. 5.2 Individual and joint responsibility has been developed teams members for their actions. 5.3 Collaborative efforts are sustained to attain organizational goals.

Variable	**Range**
Learning and development needs	May include but not limited to: • Coaching, mentoring and/or supervision • Formal/informal learning program • Internal/external training provision • Work experience/exchange/opportunities • Personal study • Career planning/development • Performance appraisals • Workplace skills assessment & Recognition of prior learning
Organizational requirements	May include but not limited to: • Quality assurance and/or procedures manuals • Goals, objectives, plans, systems and processes • Legal and organizational policy/guidelines and requirements • Safety policies, procedures and programs • Confidentiality and security requirements • Business and performance plans • Ethical standards • Quality and continuous improvement processes and standards
Feedback on performance	May include but not limited to: • Formal/informal performance appraisals • Obtaining feedback from supervisors and colleagues • Obtaining feedback from clients • Personal and reflective behavior strategies • Routine and organizational methods for monitoring service delivery
Learning delivery methods may include but not limited to:	• On the job coaching or mentoring • Problem solving • Presentation/demonstration • Formal course participation • Work experience and Involvement in professional networks • Conference/seminar attendance and induction

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to: • identify and implement learning opportunities for others • give and receive feedback constructively • facilitate participation of individuals in the work of the team • negotiate learning plans to improve the effectiveness of learning • prepare learning plans to match skill needs • access and designate learning opportunities
Underpinning Knowledge and Attitude and Attitude	Demonstrates knowledge of: • coaching and mentoring principles • how to work effectively with team members who have diverse work styles, aspirations, cultures and perspective • how to facilitate team development and improvement • methods and techniques for eliciting and interpreting feedback • methods for identifying and prioritizing personal development opportunities and options • career paths and competence standards in the industry
Underpinning Skills	Demonstrates skills to: • read and understand a variety of texts, prepare general information and documents according to target audience; spell with accuracy; use grammar and punctuation effective relationships and conflict management • receive feedback and report, maintain effective relationships and conflict management • organize required resources and equipment to meet learning needs • provide support to colleagues • organize information; assess information for relevance and accuracy; identify and elaborate on learning outcomes • facilitation skills to conduct small group training sessions • relate to people from a range of social, cultural, physical and mental backgrounds
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written exam • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the workplace or in a simulated workplace setting

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Improve Business Practice**
Unit Code	**IND BBA3 23 0117**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required in promoting, improving and growing business operations.

Elements	Performance Criteria
1. Diagnose the business	1.1 ***Sources data*** is identified; ***data required*** for diagnosis is determined and acquired based on the business diagnosis toolkit. 1.2 Value chain analysis is conducted. 1.3 ***SWOT analysis*** of the data is undertaken. 1.4 ***Competitive advantage*** of the business is determined from the data.
2. Benchmark the business	2.1 Product or service to be benchmarked is identified and selected. 2.2 Sources of relevant benchmarking data are identified. 2.3 ***Key indicators*** are selected for benchmarking in consultation with key stakeholders. 2.4 Key indicators of own practice are compared with benchmark indicators. 2.5 Areas of improvements are identified.
3. Develop plans to improve business performance	3.1 A consolidated list of required improvements is developed. 3.2 Cost-benefit analysis is determined for required improvements. 3.3 Work flow changes resulting from proposed improvements are determined. 3.4 Proposed improvements are ranked according to agreed criteria. 3.5 An action plan is developed and agreed to implement the top ranked improvements. 3.6 ***Organizational structures*** are checked to ensure they are suitable.
4. Develop marketing plans	4.1 The practice vision statement is reviewed. 4.2 Practice ***objectives*** are developed/ reviewed. 4.3 Market research is conducted and result is obtained. 4.4 Target markets are identified/ refined. 4.5 ***Market position*** is developed/ reviewed.

	4.6 ***Practice brand*** is developed. 4.7 ***Benefits*** of products or services are identified. 4.8 ***Promotion tools*** are selected and developed.
5. Develop business growth plans	5.1 Plans are developed to increase profitability 5.2 Proposed plans are ***ranked*** according to agreed criteria. 5.3 An action plan is developed and agreed to implement the top ranked plans. 5.4 Business work practices are reviewed to ensure they support growth plans.
6. Implement and monitor plans	6.1 Implementation plan is developed in consultation with all ***relevant stakeholders***. 6.2 Success indicators of the plan are agreed. 6.3 Implementation is monitored against agreed indicators. 6.4 Implementation is adjusted as required.

Variable	**Range**
Data sources	May include primary data and secondary sources
Data required	May include but not limited to: • Organization capability • Appropriate business structure • Level of client service which can be provided • Internal policies, procedures and practices • Staff levels, capabilities and structure • Market and market definition • Market changes/market segmentation • Market consolidation/fragmentation • Revenue • Level of commercial activity • Expected revenue levels, short and long term • Revenue growth rate • Break even data • Pricing policy • Revenue assumptions • Business environment • Economic conditions • Social factors • Demographic factors • Technological impacts • Political/legislative/regulative impacts • Competitors, competitor pricing and response to pricing • Competitor marketing/branding • Competitor products

SWOT analysis	May include but not limited to: • Internal strengths such as staff capability, recognized quality • Internal weaknesses such as poor morale, under-capitalization, poor technology • External opportunities such as changing market and economic conditions • External threats such as industry fee structures, strategic alliances, competitor marketing
Competitive advantage	May include but not limited to: • Quality • Pricing • Cost • Location • Technology • Delivery • Timeframe • Promotion • Niche marketing • Support from government
Key indicators	May include but not limited to: • Staffing • Cost and expenses • Personnel productivity (particularly of principals) • Goodwill • Profitability • Price structure • Customers base • Productivity • Quality • System
Organizational structures	May include but not limited to: • Lines of authority and reporting relationship
Objectives	May include but not limited to: • Market share growth • Revenue growth • Profitability • Productivity • Innovation
Market position	May include but not limited to: • The goods or service provided • Product mix • The core product - what is bought • The tangible product - what is perceived • The augmented product - total package of consumer • Features/benefits • Product differentiation from competitive products • New/changed products

	• Price and pricing strategies (cost plus, supply/demand, ability to pay, etc.) • Pricing objectives (profit, market penetration, etc.) • Cost components • Market position • Distribution strategies • Marketing channels • Promotion • Target audience • Communication
Practice brand	May include but not limited to: • Practice image • Practice logo/letterhead/signage • Phone answering protocol • Facility decor • Slogans • Templates for communication/invoicing • Style guide • Writing style • AIDA (Attention, Interest, Desire and Action)
Benefits	May include but not limited to: • Features as perceived by the client • Benefits as perceived by the client
Promotion tools	May include but not limited to: • Networking and referrals • Seminars • Sales promotion • Advertising • Personal selling • Press releases • Publicity and sponsorship • Brochures • Newsletters (print and/or electronic) • Websites • Direct mail • Telemarketing/cold calling
Ranking	May include but not limited to: • Importance • Urgency • Technology • Resource availability
Relevant stockholders	May include but not limited to: • Micro and Small Enterprises development • Non-Government Organizations (NGOs) • Finance institutions • Capital goods leasing enterprise

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge of: • Identifying the key indicators of business performance • Identifying the key market data for the business • A wide range of available information sources • Acquiring information not readily available within a business • Analyzing data and determine areas of improvement • Negotiating required improvements to ensure implementation • Evaluating systems against practice requirements • Forming recommendations and/or make recommendations • Assessing the accuracy and relevance of information
Underpinning Knowledge and Attitude	Demonstrates knowledge of: • Data gathering and analysis • Value chain analysis • SWOT analysis • Competitive advantage • Cost benefit analysis • Target market • Marketing principles • Organizational structure • Marketing mix • Promotion mix • Market position • Branding Profitability demonstrates knowledge of: • Data gathering and analysis • Value chain analysis • SWOT analysis • Competitive advantage • Cost benefit analysis • Target market • Marketing principles • Organizational structure • Marketing mix • Promotion mix • Market position • Branding • Profitability
Underpinning Skills	Demonstrates skill in: • Benchmarking skills • Communication skills • Computers kills to manipulate data and present information • Negotiation skills • Preparing action plan

	• Conducting market research • Identifying target market • Identifying suitable marketing mix • Preparing promotional tools • Problem solving • Planning skills • Monitoring and evaluation • Ability to acquire and interpret relevant data • Use of market intelligence • Development and implementation strategies of promotion and growth plans • Ability to acquire and interpret required data, current practice systems and structures and sources of relevant benchmarking data • Applying methods of selecting relevant key benchmarking indicators • Communication skills • Working and consulting with others when developing plans for the business • Negotiation skills • Using computers to manipulate, present and distribute information
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

Occupational Standard: Bogie and Body Production and Assembly Level III	
Unit Title	**Prevent and Eliminate MUDA**
Unit Code	**IND BBA3 24 0117**
Unit Descriptor	This unit of competence covers the knowledge, skills and attitude required by a worker to prevent and eliminate MUDA/wastes in his/her their workplace. It covers responsibility for the day-to-day operation of the work and ensures Kaizen elements are continuously improved and institutionalized.

Elements	Performance Criteria
1. Prepare for work.	1.1 Work instructions are used to determine job requirements, including method, material and equipment. 1.2 Job specifications are read and interpreted following working manual. 1.3 ***OHS requirements***, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work. 1.4 Appropriate material is selected for work. 1.5 ***Safety equipment and tools*** are identified and checked for safe and effective operation.
2. Identify MUDA.	2.1 Plan of MUDA identification is prepared and implemented. 2.2 Causes and effects of MUDA are discussed. 2.3 ***Tools and techniques*** are used to draw and analyze current situation of the work place. 2.4 Wastes/MUDA are identified and measured based on ***relevant procedures***. 2.5 Identified and measured wastes are reported to relevant personnel.
3. Eliminate wastes/MUDA.	3. 1. Plan of MUDA elimination is prepared and implemented. 3. 2. Necessary attitude and ***the ten basic principles for improvement*** are adopted to eliminate waste/MUDA. 3. 3. Tools and techniques are used to eliminate wastes/MUDA based on the procedures and OHS. 3. 4. Wastes/MUDA are reduced and eliminated in accordance with OHS and organizational requirements. 3. 5. Improvements gained by elimination of waste/MUDA are reported to relevant bodies.
4. Prevent occurrence of	4.1 Plan of MUDA prevention is prepared and implemented.

wastes/MUDA.	4.2 Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement are discussed and prepared. 4.3 Occurrences of wastes/MUDA are prevented by using ***visual and auditory control methods***. 4.4 Waste-free workplace is created using ***5W and 1H***sheet. 4.5 The completion of required operation is done in accordance with standard procedures and practices. 4.6 The updating of standard procedures and practices is facilitated. 4.7 The capability of the work team that aligns with the requirements of the procedure is ensured.

Variable	**Range**
OHS requirements	May include but not limited to: • Are to be in accordance with legislation/ regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of firefighting equipment, enterprise first aid, hazard control and hazardous materials and substances. • Personal protective equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices. • Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with workplace organization. • Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation.
Safety equipment and tools	May include but not limited to: • dust masks / goggles • glove • working cloth • first aid and safety shoes
Tools and techniques	May include but not limited to: • Plant Layout • Process flow • Other Analysis tools • Do time study by work element • Measure Travel distance • Take a photo of workplace • Measure Total steps • Make list of items/products, who produces them and who

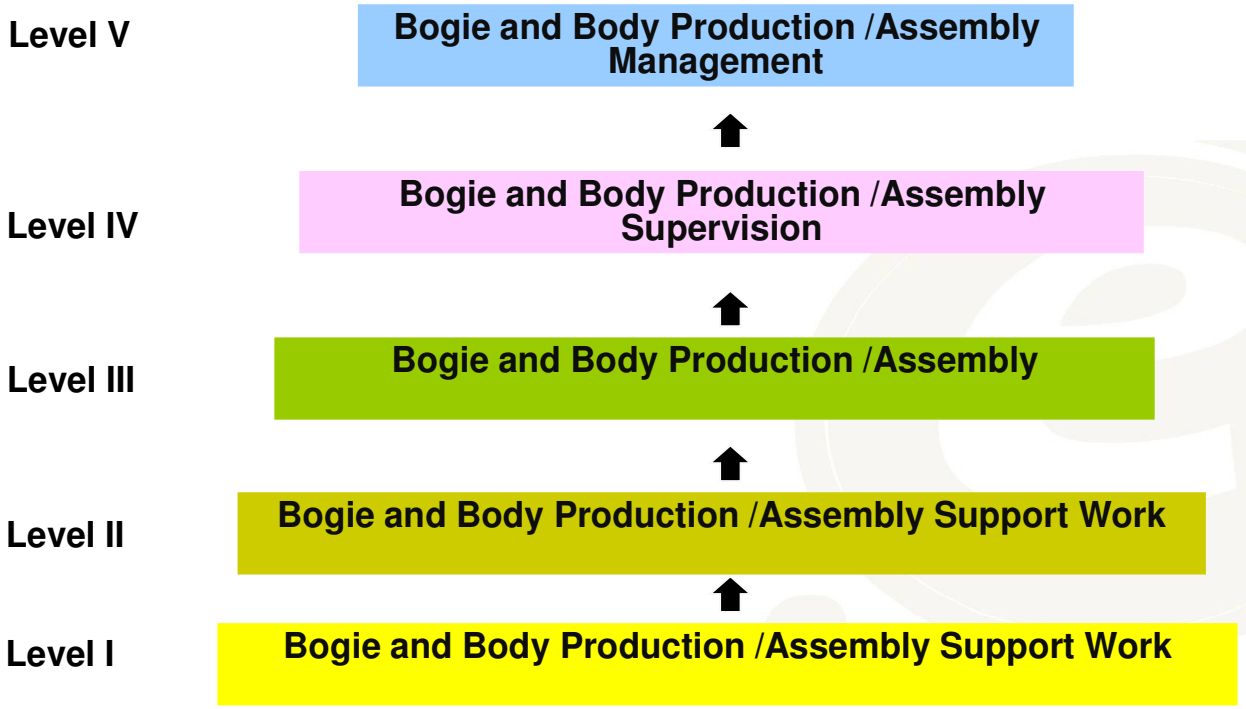
	uses them & those in warehouses, storages etc. • Focal points to Check and find out existing problems • 5S • Layout improvement • Brainstorming • Andon • U-line • In-lining • Unification • Multi-process handling & Multi-skilled operators • A.B. control (Two point control) • Cell production line • TPM (Total Productive Maintenance)
Relevant procedures	May include but not limited to: • Make waste visible • Be conscious of the waste • Be accountable for the waste. • Measure the waste.
The ten basic principles for improvement	May include but not limited to: • Throw out all of your fixed ideas about how to do things. • Think of how the new method will work- not how it won. • Don't accept excuses. Totally deny the status quo. • Don't seek perfection. A 5o percent implementation rate is fine as long as it's done on the spot. • Correct mistakes the moment they are found. • Don't spend a lot of money on improvements. • Problems give you a chance to use your brain. • Ask "why?" At least five times until you find the ultimate cause. • Ten people's ideas are better than one person's. • Improvement knows no limits.
Visual and auditory control methods	May include but not limited to: • Red Tagging • Sign boards • Outlining • Andons • Kanban, etc.
5W and 1H	May include but not limited to: • Who • What • Where • When • Why • How

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge to:

	• discuss why wastes occur in the workplace • discuss causes and effects of wastes/MUDA in the workplace • analyze the current situation of the workplace by using appropriate tools and techniques • identify, measure, eliminate and prevent occurrence of wastes by using appropriate tools and techniques • use 5W and 1H sheet to prevent
Underpinning Knowledge and Attitude	Demonstrates knowledge of: • Targets of customers and manufacturer/service provider • Traditional and kaizen thinking of price setting • Kaizen thinking in relation to targets of manufacturer/service provider and customer • value • The three categories of operations • the 3“MU” • waste/MUDA • wastes occur in the workplace • The 7 types of MUDA • The Benefits of identifying and eliminating waste • Causes and effects of 7 MUDA • Procedures to identify MUDA • Necessary attitude and the ten basic principles for improvement • Procedures to eliminate MUDA • Prevention of wastes • Methods of waste prevention • Definition and purpose of standardization • Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement • Methods of visual and auditory control • TPM concept and its pillars. • Relevant OHS and environment requirements • Plan and report • Method of communication
Underpinning Skills	Demonstrates skills to: • draw & analyze current situation of the work place • use measurement apparatus (stop watch, tape, etc.) • calculate volume and area • use and follow checklists to identify, measure and eliminate wastes/MUDA • identify and measure wastes/MUDA in accordance with OHS and procedures • use tools and techniques to eliminate wastes/MUDA in accordance with OHS procedure • apply 5W and 1H sheet • update and use standard procedures for completion of

	required operation • work with others • read and interpret documents • observe situations • solve problems • communicate • gather evidence by using different means • report activities and results using report formats
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Methods of Assessment	Competence may be assessed through: • Interview / Written Test • Observation / Demonstration with Oral Questioning
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting.

BOGIE AND BODY PRODUCTION AND ASSEMBLY



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