

TRAINING REGULATIONS



AUTOMOTIVE MECHANICAL ASSEMBLY NC III

AUTOMOTIVE SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY

East Service Road, South Superhighway, Taguig City, Metro Manila

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**TRAINING REGULATIONS FOR
AUTOMOTIVE MECHANICAL ASSEMBLY NC III**

SECTION 1 AUTOMOTIVE MECHANICAL ASSEMBLY NC III QUALIFICATION

The AUTOMOTIVE MECHANICAL ASSEMBLY NC III Qualification consists of competencies that a person must achieve to rectify assembly faults on assembled mechanical assemblies; rectify faults on mounted/installed brake and fuel system; rectify faults on mounted/installed power drive system; and rectify faults on mounted/installed suspension drive train in accordance with manufacturer's specification. It also covers competencies of conducting engine hot test that determines the status of an engine for operating inconsistencies or faults.

This Qualification is packaged from the competency map of the Automotive Industry (Manufacturing sector) as shown in Annex A.

The Units of Competency comprising this Qualification include the following

CODE NO.	BASIC COMPETENCIES
500311109	Lead workplace communication
500311110	Lead small teams
500311111	Develop and practice negotiation skills
500311112	Solve problems related to work activities
500311113	Use mathematical concepts and techniques
500311114	Use relevant technologies

CODE NO.	COMMON COMPETENCIES
ALT311202	Perform Mensuration and Calculation
ALT742201	Read, Interpret and Apply Engineering Drawings
ALT723202	Move and Position Vehicle
ALT723201	Apply Appropriate Sealant/Adhesive
ALT 723205	Perform Shop Maintenance

CODE NO.	CORE COMPETENCIES
ALT827319	Conduct Engine Hot Test
ALT827320	Rectify Assembly Faults on Assembled Mechanical Assemblies
ALT827321	Rectify Faults on Mounted/Installed Brake and Fuel System
ALT827322	Rectify Faults on Mounted/Installed Power Drive System
ALT827323	Rectify Faults on Mounted/Installed Suspension Drive Train

A person who has achieved this Qualification is competent to be:

- Automotive Mechanical Assembly Rectifier

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in AUTOMOTIVE MECHANICAL ASSEMBLY NC III.

BASIC COMPETENCIES

UNIT OF COMPETENCY : LEAD WORKPLACE COMMUNICATION

UNIT CODE : 500311109

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to lead in the dissemination and discussion of ideas, information and issues in the workplace.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
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 discussions	2.1 Response to workplace issues are 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 personnel 3.4 Communication problems and issues are raised as they arise

RANGE OF VARIABLES

VARIABLE	RANGE
1. Methods of communication	1.1 Non-verbal gestures 1.2 Verbal 1.3 Face to face 1.4 Two-way radio 1.5 Speaking to groups 1.6 Using telephone 1.7 Written 1.8 Internet

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Dealt with a range of communication/information at one time 1.2 Made constructive contributions in workplace issues 1.3 Sought workplace issues effectively 1.4 Responded to workplace issues promptly 1.5 Presented information clearly and effectively written form 1.6 Used appropriate sources of information 1.7 Asked appropriate questions 1.8 Provided accurate information
<p>2. Underpinning knowledge</p>	<ul style="list-style-type: none"> 2.1 Organization requirements for written and electronic communication methods 2.2 Effective verbal communication methods
<p>3. Underpinning skills</p>	<ul style="list-style-type: none"> 3.1 Organize information 3.2 Understand and convey intended meaning 3.3 Participate in variety of workplace discussions 3.4 Comply with organization requirements for the use of written and electronic communication methods
<p>4. Resource implications</p>	<p>The following resources MUST be provided:</p> <ul style="list-style-type: none"> 4.1 Variety of Information 4.2 Communication tools 4.3 Simulated workplace
<p>5. Method of assessment</p>	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 5.1 Competency in this unit must be assessed through 5.2 Direct Observation 5.3 Interview
<p>6. Context of assessment</p>	<ul style="list-style-type: none"> 6.1 Competency may be assessed in the workplace or in simulated workplace environment

UNIT OF COMPETENCY : LEAD SMALL TEAMS

UNIT CODE : 500311110

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes to lead small teams including setting and maintaining team and individual performance standards.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1. Provide team leadership	1.1 Work requirements are identified and presented to team members 1.2 Reasons for instructions and requirements are communicated to team members 1.3 Team members' queries and concerns are recognized, discussed and dealt with
2. Assign responsibilities	2.1 Duties, and responsibilities are allocated having regard to the skills, knowledge and aptitude required to properly undertake the assigned task and according to company policy 2.2 Duties are allocated having regard to individual preference, domestic and personal considerations, whenever possible
3. Set performance expectations for team members	3.1 Performance expectations are established based on client needs and according to assignment requirements 3.2 Performance expectations are based on individual team members duties and area of responsibility 3.3 Performance expectations are discussed and disseminated to individual team members
4. Supervised team performance	4.1 Monitoring of performance takes place against defined performance criteria and/or assignment instructions and corrective action taken if required 4.2 Team members are provided with feedback , positive support and advice on strategies to overcome any deficiencies 4.3 Performance issues which cannot be rectified or addressed within the team are referenced to appropriate personnel according to employer policy 4.4 Team members are kept informed of any changes in the priority allocated to assignments or tasks which might impact on client/customer needs and satisfaction 4.5 Team operations are monitored to ensure that employer/client needs and requirements are met 4.6 Follow-up communication is provided on all issues affecting the team 4.7 All relevant documentation is completed in accordance with company procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work requirements	1.1 Client Profile 1.2 Assignment instructions
2. Team member's concerns	2.1 Roster/shift details
3. Monitor performance	3.1 Formal process 3.2 Informal process
4. Feedback	4.1 Formal process 4.2 Informal process
5. Performance issues	5.1 Work output 5.2 Work quality 5.3 Team participation 5.4 Compliance with workplace protocols 5.5 Safety 5.6 Customer service

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Maintained or improved individuals and/or team performance given a variety of possible scenario 1.2 Assessed and monitored team and individual performance against set criteria 1.3 Represented concerns of a team and individual to next level of management or appropriate specialist and to negotiate on their behalf 1.4 Allocated duties and responsibilities, having regard to individual's knowledge, skills and aptitude and the needs of the tasks to be performed 1.5 Set and communicated performance expectations for a range of tasks and duties within the team and provided feedback to team members
<p>2. Underpinning knowledge</p>	<ul style="list-style-type: none"> 2.1 Company policies and procedures 2.2 Relevant legal requirements 2.3 How performance expectations are set 2.4 Methods of Monitoring Performance 2.5 Client expectations 2.6 Team member's duties and responsibilities
<p>3. Underpinning skills</p>	<ul style="list-style-type: none"> 3.1 Communication skills required for leading teams 3.2 Informal performance counseling skills 3.3 Team building skills 3.4 Negotiating skills
<p>4. Resource implications</p>	<p>The following resources MUST be provided:</p> <ul style="list-style-type: none"> 4.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 4.2 Materials relevant to the proposed activity or task
<p>5. Methods of assessment</p>	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 5.1 Direct observations of work activities of the individual member in relation to the work activities of the group 5.2 Observation of simulation and/or role play involving the participation of individual member to the attainment of organizational goal 5.3 Case studies and scenarios as a basis for discussion of issues and strategies in teamwork
<p>6. Context of assessment</p>	<ul style="list-style-type: none"> 6.1 Competency assessment may occur in workplace or any appropriately simulated environment 6.2 Assessment shall be observed while task are being undertaken whether individually or in-group

UNIT OF COMPETENCY: DEVELOP AND PRACTICE NEGOTIATION SKILLS

UNIT CODE : 500311111

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes required to collect information in order to negotiate to a desired outcome and participate in the negotiation.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1. Plan negotiations	1.1 Information on <i>preparing for negotiation</i> is identified and included in the plan 1.2 Information on creating <i>non verbal environments</i> for positive negotiating is identified and included in the plan 1.3 Information on <i>active listening</i> is identified and included in the plan 1.4 Information on different <i>questioning techniques</i> is identified and included in the plan 1.5 Information is checked to ensure it is correct and up-to-date
2. Participate in negotiations	2.1 Criteria for successful outcome are agreed upon by all parties 2.2 Desired outcome of all parties are considered 2.3 Appropriate language is used throughout the negotiation 2.4 A variety of questioning techniques are used 2.5 The issues and processes are documented and agreed upon by all parties 2.6 Possible solutions are discussed and their viability assessed 2.7 Areas for agreement are confirmed and recorded 2.8 Follow-up action is agreed upon by all parties

RANGE OF VARIABLES

VARIABLE	RANGE
1. Preparing for negotiation	1.1 Background information on other parties to the negotiation 1.2 Good understanding of topic to be negotiated 1.3 Clear understanding of desired outcome/s 1.4 Personal attributes 1.4.1 self awareness 1.4.2 self esteem 1.4.3 objectivity 1.4.4 empathy 1.4.5 respect for others Interpersonal skills 1.5.1 listening/reflecting 1.5.2 non verbal communication 1.5.3 assertiveness 1.5.4 behavior labeling 1.5.5 testing understanding 1.5.6 seeking information 1.5.7 self disclosing Analytic skills 1.6.1 observing differences between content and process 1.6.2 identifying bargaining information 1.6.3 applying strategies to manage process 1.6.4 applying steps in negotiating process 1.6.5 strategies to manage conflict 1.6.6 steps in negotiating process 1.6.7 options within organization and externally for resolving conflict
2. Non verbal environments	2.1 Friendly reception 2.2 Warm and welcoming room 2.3 Refreshments offered 2.4 Lead in conversation before negotiation begins
3. Active listening	3.1 Attentive 3.2 Don't interrupt 3.3 Good posture 3.4 Maintain eye contact 3.5 Reflective listening
4. Questioning techniques	4.1 Direct 4.2 Indirect 4.3 Open-ended

EVIDENCE GUIDE

1. Critical aspects of competency	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Demonstrated sufficient knowledge of the factors influencing negotiation to achieve agreed outcome 1.2 Participated in negotiation with at least one person to achieve an agreed outcome
2. Underpinning knowledge and Attitude	<ul style="list-style-type: none"> 2.1 Codes of practice and guidelines for the organization 2.2 Organizations policy and procedures for negotiations 2.3 Decision making and conflict resolution strategies procedures 2.4 Problem solving strategies on how to deal with unexpected questions and attitudes during negotiation 2.5 Flexibility 2.6 Empathy
3. Underpinning skills	<ul style="list-style-type: none"> 3.1 Interpersonal skills to develop rapport with other parties 3.2 Communication skills (verbal and listening) 3.3 Observation skills 3.1 Negotiation skills
4. Resource implications	<p>The following resources MUST be provided:</p> <ul style="list-style-type: none"> 4.1 Room with facilities necessary for the negotiation process 4.2 Human resources (negotiators)
5. Method of assessment	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 5.1 Observation/demonstration and questioning 5.2 Portfolio assessment 5.3 Oral and written questioning 5.4 Third party report
6. Context of assessment	<ul style="list-style-type: none"> 6.1 Competency to be assessed in real work environment or in a simulated workplace setting.

UNIT OF COMPETENCY : SOLVE PROBLEMS RELATED TO WORK ACTIVITIES

UNIT CODE : 500311112

UNIT DESCRIPTOR : This unit of competencies covers the knowledge, skills and attitudes required to solve problems in the workplace including the application of problem solving techniques and to determine and resolve the root cause of problems.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1. Identify the problem	1.1 Variances are identified from normal operating parameters; and product quality 1.2 Extent, cause and nature are of the problem are defined through observation, investigation and analytical techniques 1.3 Problems are clearly stated and specified
2. Determine fundamental causes of the 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 based on findings 2.3 Fundamental causes are identified per results of investigation conducted
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 actions are determined to resolve the problem and possible future causes 3.4 Action plans are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures
4. Provide recommendation/s to manager	4.1 Report on recommendations are prepared 4.2 Recommendations are presented to appropriate personnel. 4.3 Recommendations are followed-up, if required

RANGE OF VARIABLES

VARIABLE	RANGE
1. Analytical techniques	1.1 Brainstorming 1.2 Intuitions/Logic 1.3 Cause and effect diagrams 1.4 Pareto analysis 1.5 SWOT analysis 1.6 Gant chart, Pert CPM and graphs 1.7 Scatter diagrams
2. Problem	2.1 Non – routine process and quality problems 2.2 Equipment selection, availability and failure 2.3 Teamwork and work allocation problem 2.4 Safety and emergency situations and incidents
3. Action plans	3.1 Priority requirements 3.2 Measurable objectives 3.3 Resource requirements 3.4 Timelines 3.5 Co-ordination and feedback requirements 3.6 Safety requirements 3.7 Risk assessment 3.8 Environmental requirements

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Identified the problem 1.2 Determined the fundamental causes of the problem 1.3 Determined the correct / preventive action 1.4 Provided recommendation to manager <p>These aspects may be best assessed using a range of scenarios / case studies / what ifs as a stimulus with a walk through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.</p>
<p>2. Underpinning knowledge</p>	<ul style="list-style-type: none"> 2.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 2.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations <ul style="list-style-type: none"> 2.2.1 Relevant equipment and operational processes 2.2.2 Company goals, targets and measures 2.2.3 Company quality, OHS and environmental requirement 2.2.4 Principles of decision making strategies and techniques 2.2.5 Company information systems and data collation 2.2.6 Industry codes and standards
<p>3. Underpinning skills</p>	<ul style="list-style-type: none"> 3.1 Using range of formal problem solving techniques 3.2 Identifying and clarifying the nature of the problem 3.3 Devising the best solution 3.4 Evaluating the solution 3.5 Implementation of a developed plan to rectify the problem

4. Resource implications	4.1 Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios / case studies / what ifs will be required as well as bank of questions which will be used to probe the reason behind the observable action.
5. Method of assessment	<p>Competency may be assessed through:</p> <p>5.1 Case studies on solving problems in the workplace</p> <p>5.2 Observation</p> <p>The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.</p>
6. Context of assessment	6.1 In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY: USE MATHEMATICAL CONCEPTS AND TECHNIQUES

UNIT CODE : 500311113

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required in the application of mathematical concepts and techniques.

ELEMENT	Performance Criteria <i>Italicized terms</i> are elaborated in the Range of Variables
1. Identify mathematical tools and techniques to solve problem	1.1 Problem areas are identified based on given condition 1.2 Mathematical techniques are selected based on the given problem
2. Apply mathematical procedure/solution	2.1 Mathematical techniques are applied based on the problem identified 2.2 Mathematical computations are performed to the level of accuracy required for the problem 2.3 Results of mathematical computation is determined and verified based on job requirements
3. Analyze results	3.1 Result of application is reviewed based on expected and required specifications and outcome 3.2 Appropriate action is applied in case of error

RANGE OF VARIABLES

VARIABLE	RANGE
1. Mathematical techniques	May include but are not limited to: 1.1 Four fundamental operations 1.2 Measurements 1.3 Use/Conversion of units of measurements 1.4 Use of standard formulas
2. Appropriate action	2.1 Review in the use of mathematical techniques (e.g. recalculation, re-modeling) 2.2 Report error to immediate superior for proper action

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified, applied and reviewed the use of mathematical concepts and techniques to workplace problems
2. Underpinning knowledge	2.1 Fundamental operation (addition, subtraction, division, multiplication) 2.2 Measurement system 2.3 Precision and accuracy 2.4 Basic measuring tools/devices
3. Underpinning skills	3.1 Applying mathematical computations 3.2 Using calculator 3.3 Using different measuring tools
4. Resource implications	The following resources MUST be provided: 4.1 Calculator 4.2 Basic measuring tools 4.3 Case Problems
5. Method of assessment	Competency may be assessed through: 5.1 Authenticated portfolio 5.2 Written Test 5.3 Interview/Oral Questioning 5.4 Demonstration
6. Context of assessment	6.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY: USE RELEVANT TECHNOLOGIES

UNIT CODE : 500311114

UNIT DESCRIPTOR : This unit of competency covers the knowledge, skills, and attitude required in selecting, sourcing and applying appropriate and affordable technologies in the workplace.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1. Study/select appropriate technology	1.1 Usage of different technologies is determined based on job requirements 1.2 Appropriate technology is selected as per work specification
2. Apply relevant technology	2.1 Relevant technology is effectively used in carrying out function 2.2 Applicable software and hardware are used as per task requirement 2.3 Management concepts are observed and practiced as per established industry practices
3. Maintain/enhance of relevant technology	3.1 Maintenance of technology is applied in accordance with the industry standard operating procedure, manufacturer's operating guidelines and occupational health and safety procedure to ensure its operative ability 3.2 Updating of technology is maintained through continuing education or training in accordance with job requirement 3.3 Technology failure/ defect is immediately reported to the concern/responsible person or section for appropriate action

RANGE OF VARIABLES

VARIABLE	RANGE
1. Technology	May include but are not limited to: 1.1 Office technology 1.2 Industrial technology 1.3 System technology 1.4 Information technology 1.5 Training technology
2. Management concepts	May include but not limited to: 2.1 Real Time Management 2.2 KAIZEN or continuous improvement 2.3 5s 2.4 Total Quality Management 2.5 Other management/productivity tools
3. Industry standard operating procedure	3.1 Written guidelines relative to the usage of office technology/equipment 3.2 Verbal advise/instruction from the co-worker
4. Manufacturer's operating guidelines/ instructions	4.1 Written instruction/manuals of specific technology/ equipment 4.2 General instruction manual 4.3 Verbal advise from manufacturer relative to the operation of equipment
5. Occupational health and safety procedure	5.1 Relevant statutes on OHS 5.2 Company guidelines in using technology/equipment
6. Appropriate action	6.1 Implementing preventive maintenance schedule 6.2 Coordinating with manufacturer's technician

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Studied and selected appropriate technology consistent with work requirements 1.2 Applied relevant technology 1.3 Maintained and enhanced operative ability of relevant technology
2. Underpinning knowledge	2.1 Awareness on technology and its function 2.2 Repair and maintenance procedure 2.3 Operating instructions 2.4 Applicable software 2.5 Communication techniques 2.6 Health and safety procedure 2.7 Company policy in relation to relevant technology 2.8 Different management concepts 2.9 Technology adaptability
3. Underpinning skills	3.1 Relevant technology application/implementation 3.2 Basic communication skills 3.3 Software applications skills 3.4 Basic troubleshooting skills
4. Resource implications	The following resources MUST be provided: 4.1 Relevant technology 4.2 Interview and demonstration questionnaires 4.3 Assessment packages
5. Method of assessment	Competency must be assessed through: 5.1 Interview 5.2 Actual demonstration 5.3 Authenticated portfolio (related certificates of training/seminar)
6. Context of assessment	6.1 Competency may be assessed in actual workplace or simulated environment

COMMON COMPETENCIES

UNIT OF COMPETENCY : PERFORM MENSURATION AND CALCULATION

UNIT CODE : ALT311202

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in measuring and calculating using tools and measuring instrument. It also covers caring for and handling of measuring instrument.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1. Select measuring instruments	1.1 Object or component to be measured is identified 1.2 Correct specifications are obtained from relevant source 1.3 Appropriate <i>measuring instrument</i> is selected according to job requirements
2. Carry out measurements and calculation	2.1 Measuring tools are selected in line with job requirements 2.2 Accurate measurements are obtained to job 2.3 <i>Calculation</i> needed to complete work tasks are performed using the four fundamental operation of addition (+), subtraction (-), multiplication (x) and division (/). 2.4 Calculations involving fractions, percentages and mixed numbers are used to complete workplace tasks. 2.5 Numerical computation is self-checked and corrected for accuracy 2.6 Instruments are read to the limit of accuracy of the tool.
3. Maintain measuring instruments	3.4 Measuring instruments are kept free from corrosion 3.4 Measuring instruments are not dropped to avoid damage 3.4 Measuring instruments are cleaned before and after using.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Measuring instruments	Measuring instruments includes: 1.1 Multitester 1.2 Micrometer (In-out, depth) 1.3 Vernier caliper (Out, inside) 1.4 Dial gauge with Mag. Std. 1.5 Plastigauge 1.6 Straight edge 1.7 Thickness gauge 1.8 Torque gauge 1.9 Small hole gauge 1.10 Telescopic gauge 1.11 Try square 1.12 Protractor 1.13 Combination gauge 1.14 Steel rule
2. Calculation	Includes calculation of the following: 2.1 Volume 2.2 Area 2.3 Displacement 2.4 Inside diameter 2.5 Circumference 2.6 Length 2.7 Thickness 2.8 Outside diameter 2.9 Taper 2.10 Out of roundness 2.11 Oil clearance 2.12 End play/thrust clearance

EVIDENCE GUIDE

1. Critical aspects of competency	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Selected measuring instruments 1.2 Carried-out measurements and calculations. 1.3 Maintained measuring instruments
2. Underpinning knowledge	<ul style="list-style-type: none"> 2.1 Types of measuring instruments and its uses 2.2 Safe handling procedures in using measuring instruments 2.3 Four fundamental operation of mathematics 2.2 Formula for volume, area, perimeter and other geometric figures
3. Underpinning skills	<ul style="list-style-type: none"> 3.1 Caring and handling measuring instruments 3.2 Calibrating and using measuring instruments 3.3 Performing calculation by Addition, Subtraction, Multiplication and Division 3.4 Visualizing objects and shapes 3.4 Interpreting formula for volume, area, perimeter and other geometric figures
4. Resource implications	<p>The following resources MUST be provided:</p> <ul style="list-style-type: none"> 4.1 Workplace location 4.2 Measuring instrument appropriate to servicing processes 4.3 Instructional materials relevant to the propose activity
5. Method of assessment	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 5.1 Observation with questioning 5.2 Written or oral examination 5.3 Interview 5.4 Demonstration with questioning
6. Context of assessment	<ul style="list-style-type: none"> 6.1 Competency elements must be assessed in a safe working environment 6.2 Assessment may be conducted in a workplace or simulated environment

UNIT OF COMPETENCY : **READ, INTERPRET AND APPLY ENGINEERING DRAWINGS**

UNIT CODE **:** **ALT742201**

UNIT DESCRIPTOR **:** This unit deals with identifying, interpreting and applying automotive mechanical assembly engineering manuals / specifications in accordance with requirements of the job.

ELEMENT	PERFORMANCE CRITERIA
	<i>Italicized</i> terms are elaborated in the Range of Variables
1. Identify and access engineering manuals / specifications	1.1 Appropriate <i>manuals</i> are identified and accessed as per job requirements. 1.2 Version and date of manual is checked to ensure correct specification and procedure are identified.
2. Interpret manuals	4.1 Relevant sections, chapters of manuals/specifications are located in relations to the work to be conducted 4.2 Information and procedure in the manual are interpreted in accordance to industry practices
3. Apply information in manual	3.1 Manual is interpreted according to job requirements 3.2 Work steps are correctly identified in accordance with manufacturer specification 3.3 Manual data is applied according to the given task 3.4 All correct sequencing and adjustments are interpreted in accordance with information contained on the manual or specifications
4. Store manuals	4.1 Manual or specification are stored appropriately to ensure prevention of damage, ready access and updating of information when required in accordance with company requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Manuals	Kinds of manuals: 1.1 Manufacturer's specification manual 1.2 Vehicle assembly manual 1.3 Vehicle quality standard manual 1.4 Vehicle specification manual

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified and accessed manual/specification 1.2 Interpreted manuals 1.3 Applied information in manuals 1.4 Stored manuals
2. Underpinning knowledge	4.1 Types of manuals used in automotive industry 4.2 Identification of symbols used in the manuals 4.3 Identification of units of measurements 4.4 Unit conversion
3. Underpinning skills	3.1 Reading and comprehension skills required to identify and interpret automotive manuals and specifications 3.2 Accessing information and data
4. Resource Implications	The following resources MUST be provided: 4.1 All manuals/catalogues relative to Automotive 4.2 Work order 4.3 Actual vehicle or simulator
5. Method of assessment	Competency MUST be assessed through: 5.1 Observation with questioning 5.2 Interview
6. Context of assessment	6.1 Assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 6.2 Assessment may be conducted in the workplace or a simulated environment.

UNIT OF COMPETENCY : MOVE AND POSITION VEHICLE

UNIT CODE : ALT723202

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude needed to move and position vehicle in a workshop before and after servicing.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1. Prepare vehicle for driving	1.1 Check-up procedures is performed based on vehicle manufacturer standard
2. Move and position vehicle	2.1 Select vehicle to be moved or re-position. 2.2 Drive the vehicle to appropriate location 2.3 Park vehicle following parking safety techniques and procedure
3. Check the vehicle	3.1 Vehicle position is checked as per required 3.2 Vehicle is checked for external damages

RANGE OF VARIABLE

VARIABLE	RANGE
1. Check-up procedure	Check-up procedures include the following: 1.1 Oil level 1.2 Brake fluid 1.3 Clutch fluid 1.4 Coolant level 1.5 Battery (electrolyte) 1.6 Tire pressure 1.7 Position of driving gear 1.8 Lighting and warning devices
2. Vehicles	2.1 Vehicles with automatic transmission 2.2 Vehicles with manual transmission
3. Parking safety techniques	3.1 Engaging of park brake 3.2 Vehicle parking position 3.3 Front wheel position

EVIDENCE GUIDE

1. Critical aspects of competency	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Prepared vehicle for driving. 1.2 Moved and positioned vehicle 1.3 Checked the vehicle.
2. Underpinning knowledge and attitudes	<ul style="list-style-type: none"> 2.1 Driver's code of conduct 2.2 Workshop signs and symbols 2.3 Driving skills 2.4 Vehicle accessories for safe driving and parking
3. Underpinning skills	<ul style="list-style-type: none"> 3.1 Ability to handle vehicle/maneuver vehicle the easiest way 3.2 Immediate response to accident 3.3 Preparing vehicle for driving 3.4 Parking downhill, uphill, parallel 3.5 Shifting gears 3.6 Maneuvering
4. Resource implications	<p>The following resources MUST be provided:</p> <ul style="list-style-type: none"> 4.1 Driving range/area 4.2 Appropriate vehicle for driving 4.3 Vehicle accessories
5. Method of assessment	<p>Competency MUST be assessed through:</p> <ul style="list-style-type: none"> 5.1 Observation with questioning 5.2 Written or oral examination
6. Context of assessment	<ul style="list-style-type: none"> 6.1 Assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 6.2 Assessment of practical skills must be done in a workplace or simulated environment.

UNIT OF COMPETENCY : **APPLY APPROPRIATE SEALANT/ADHESIVE**

UNIT CODE : **ALT723201**

UNIT DESCRIPTOR : This competency unit covers the selection and application of sealant/adhesives.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> terms are elaborated in the Range of Variables
1. Identify appropriate sealant / adhesive	1.1 Sealant/adhesive is selected in line with job requirements and manufacturer's specification 1.2 Sealant/adhesive checking is performed to ensure that product is fit for use.
2. Prepare surface for sealant / adhesive application	2.1 Surface materials are identified as per construction 2.2 Surface is cleaned and free of moisture, dust and other foreign matters to ensure maximum adhesion or seal.
3. Apply Sealant / adhesive evenly	3.1 Sealant/adhesive is applied evenly on the surface in line with manufacturer's specification 3.2 Excess sealant/adhesive is removed by sanding or scrapping 3.3 Tools and equipment used to apply sealant/adhesive are appropriate to job requirements 3.4 Safety are observed and PPE are worn in accordance with industry SOP 3.4 Hazards associated with the use of sealant and adhesives are identified.
4. Store / Dispose of sealant / adhesive	4.1 Sealant/adhesive are stored as per prescribed procedure 4.2 Waste are disposed as per workshop SOP

RANGE OF VARIABLES

VARIABLE	RANGE
1. Sealant/Adhesive	Sealant/adhesive includes: 1.1 Form in Place Gasket (FIPG) 1.2 Ribbon Sealer 1.3 Hametite 1.4 Silicon Body sealer 1.5 Prestite for Auto and Auto Aircon
2. Adhesive/Sealant checking	Adhesive/Sealant checking includes: 2.1 Expiry date 2.2 Free of contamination 2.3 Cap/Covers 2.4 Tightly closed 2.5 Concentration
3. Tools and equipment	Tools and equipment include: 3.1 Putty knife 3.2 Scraper 3.3 Compressor 3.4 Steel brush 3.5 Paint brush 3.6 Rubber hammer 3.7 Hand tools Personal protective equipment include: 3.8 Gloves 3.9 Apron 3.10 Safety shoes 3.11 Goggles 3.12 Gas mask
4. Safety	Safety includes: 4.1 Ventilation 4.2 Handling of Flammable/Irritating substances 4.3 Use of Personal Protective Equipment
5. Hazards	Hazard includes: 5.1 Fumes 5.2 Skin irritation 5.3 Burns

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified appropriate sealant/adhesives 1.2 Prepared surface for sealant/adhesive 1.3 Applied sealant/adhesive 1.4 Stored unused or dispose of used sealant/adhesive
2. Underpinning knowledge and attitude	2.1 OH & S regulation 2.2 Safe handling of sealant/adhesive 2.3 Industry code of practice 2.4 Procedures in sealant/adhesive application 2.5 Procedures in interpreting manuals
3. Underpinning skills	3.1 Handling sealant/adhesive 3.2 Applying sealant/adhesive 3.3 Sanding the surface 3.4 Use of tools, equipment 3.5 Mixing of body filler and epoxy base and hardener
4. Resource implications	The following resources MUST be provided: 4.1 Materials relevant to the activity 4.2 Appropriate tools and equipment 4.3 Real or simulated workplace
5. Method of assessment	Competency MUST be assessed through 5.1 Observation with questioning 5.2 Interview related to: <ul style="list-style-type: none"> • Safe and correct use of tools and equipment • Application of adhesive/sealant
6. Context of assessment	6.1 Competency elements must be assessed in a safe working environment 6.2 Assessment may be done in a workplace or simulated environment

UNIT OF COMPETENCY : **PERFORM SHOP MAINTENANCE**

UNIT CODE **:** **ALT723205**

UNIT DESCRIPTOR **:** This unit deals with inspecting and cleaning of work area including tools, equipment and facilities. Storage and checking of tools/equipment and disposal of used materials are also incorporated in this competency

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> terms are elaborated in the Range of Variables
1. Inspect/clean tools and work area	1.1 Cleaning solvent used as per workshop/tools <i>cleaning requirement</i> 1.2 <i>Work area</i> is checked and cleaned 1.3 Wet surface/spot in work area is wiped and dried
2. Store/arrange tools and shop equipment	2.1 Tools/equipment are checked and stored in their respective shelves/location 2.2 Corresponding labels are posted and visible 2.3 Tools are safely secured and logged in the records
3. Dispose wastes/used lubricants	3.1 Containers for used lubricants are visibly labeled 3.2 Wastes/used lubricants are disposed as per workshop SOP
4. Report damaged tools/equipment	4.1 Complete inventory of tools/equipment is maintained 4.2 Damaged tools/equipment/facilities are identified and repair recommendation is given 4.3 Reports prepared has no error/discrepancy

RANGE OF VARIABLES

VARIABLE	RANGE
1. Cleaning requirement	1.1 Cleaning solvent 1.2 Inventory of supplies, tools, equipment, facilities 1.3 List of mechanics/technicians 1.4 Rags 1.5 Broom 1.6 Map 1.7 Pail 1.8 Used oil container 1.9 Oiler 1.10 Dust/waste bin
2. Work Area	Work areas include: 2.1 Workshop areas for assembly of automotive vehicle and/or outdoor power equipment 2.2 Open workshop and enclosed, ventilated office area 2.3 Other variables may include workshop with: <ul style="list-style-type: none"> • Mess hall • Wash room • Comfort room

EVIDENCE GUIDE

1. Critical aspects of competency	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Cleaned workshop tools/facilities 1.2 Maintained equipment, tools and facilities 1.3 Disposed wastes and used lubricants/fluid as per required procedure
2. Underpinning knowledge and attitudes	<ul style="list-style-type: none"> 2.1 5S or TQM 2.2 Service procedures 2.3 Relevant technical information 2.4 Safe handling of Equipment and tools 2.5 Vehicle safety requirements 2.6 Workshop policies 2.7 Personal safety procedures 2.8 Fire Extinguishers and prevention 2.9 Storage/Disposal of Hazardous/flammable materials 2.10 Positive Work Values (Perseverance, Honesty, Patience, Attention to Details)
3. Underpinning skills	<ul style="list-style-type: none"> 3.1 Handling/Storing of tools/equipment/supplies and material 3.2 Cleaning grease/lubricants 3.3 Disposing of wastes and fluid 3.4 Preparing inventory of s/m and tools and equipment 3.5 Monitoring of s/m and tools/equipment
4. Resource implications	<p>The following resources MUST be provided:</p> <ul style="list-style-type: none"> 4.1 Workplace: Real or simulated work area 4.2 Appropriate Tools & equipment 4.3 Materials relevant to the activity
5. Method of assessment	<p>Competency MUST be assessed through:</p> <ul style="list-style-type: none"> 5.1 Written/Oral Questioning 5.2 Demonstration 5.3 Assessment of underpinning knowledge and practical skills may be combined.
6. Context of assessment	<ul style="list-style-type: none"> 6.1 Competency must be assessed on the job or simulated environment. 6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.

CORE COMPETENCIES

UNIT OF COMPETENCY : CONDUCT ENGINE HOT TEST

UNIT CODE : ALT827319

UNIT DESCRIPTOR : This unit specifies the competency required to assess the status of an engine for operating inconsistencies or faults by connecting it to all service requirements and running it for a designated duration. The unit includes the transfer of the engine to and from the inspection cradle, the connection and disconnection of services, the completion of computer / keypad aided and manual / sensory testing to specification and the reporting of non-conforming engines.

The competency must require testing beyond that involving only computer/keypad aided monitoring systems

ELEMENT	PERFORMANCE CRITERIA
	<i>Italicized terms</i> are elaborated in the Range of Variables
1. Plan and prepare for work	<p>1.1 Planning and preparation of work instruction including plans, specifications, quality requirements and operational details are obtained, confirmed and applied.</p> <p>1.2 Occupational health and safety (OH & S) requirements are followed in accordance with company safety policies and procedures.</p> <p>1.3 Tools and equipment selected to carry out tasks are consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported prior to commencement.</p> <p>1.4 Materials appropriate to the work application are identified, obtained, prepared, safely handled and located ready for use.</p> <p>1.5 Working environment considerations are identified and measures to reduce noise, dust and obstacles are applied.</p>
2. Shift engine	<p>2.1 Engine is transferred from the assembly line to the engine testing area.</p> <p>2.2 Engine is located in position ready for hot test procedures.</p> <p>2.3 Engine which pass inspection are transferred back to the assembly line.</p> <p>2.4 Non-conforming engines are transferred to the rectification area.</p>

<p>3. Perform engine hot test</p>	<p>3.1 Engine is mounted in the engine testing cradle.</p> <p>3.2 Services are connected to the engine simulating normal operating conditions.</p> <p>3.3 Engine is brought to hot operating conditions.</p> <p>3.4 Computerized / keypad aided and manual/sensory tests are conducted on all operating facets of the engine against designated performance specifications.</p> <p>3.5 Minor modifications are carried out in accordance with company procedures and engineering manuals.</p> <p>3.6 Engine hot test results including engine faults are recorded and documented</p> <p>3.7 Engine designated as conforming or requiring rectification are labeled and prepared for transfer.</p>
<p>4. Clean up</p>	<p>4.1 Work area is cleared and materials disposed of, reused or recycled in accordance with company requirements.</p> <p>4.2 Tools and equipment are cleaned, checked, maintained and stored in accordance with company requirements.</p>

RANGE OF VARIABLES

VARIABLE	RANGE
1. Planning and preparation	<p>Planning and preparation may include but not be limited to:</p> <ul style="list-style-type: none"> 1.1 Engine inspection 1.2 Defect identification 1.3 Assessment of conditions and hazards 1.4 Determination of work requirements
2. Occupational health and safety (OH & S) requirements	<p>OH&S requirements are in accordance with Legislation / regulations / codes of practice and company safety policies and procedures. This may include but not limited to:</p> <ul style="list-style-type: none"> 2.1 Use of Protective clothing and equipment 2.2 Proper use of tools and equipment 2.3 Workplace and environment safety 2.4 Handling of materials 2.5 Use of fire fighting equipment 2.6 Access to company first aid 2.7 Hazard control and hazardous materials and substances 2.8 Use of Personal protective equipment prescribed under legislation/regulation/codes of practice and workplace policies and practices 2.9 Following safe operating procedures which include but not be limited to the conduct of operational risk assessment and treatments associated with heavy objects, vehicular movement, toxic substances, electrical shock, machinery movement and operation, production line operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors. 2.10 Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, company first aid requirements and plant evacuation
3. Tools and equipment	<p>Tools and equipment may include:</p> <ul style="list-style-type: none"> 3.1 Testing device 3.2 Hoist 3.3 Slings 3.4 Gantry crane 3.5 Relevant hand and power tools
4. Materials	<p>Materials may include:</p> <ul style="list-style-type: none"> 4.1 Fuel 4.2 Oil 4.3 Water 4.4 Gas

5. Working environment	Working environment consideration may include management of : 5.1 Waste 5.2 Noise 5.3 Dust 5.4 Vibration 5.5 Workplace housekeeping (Clean-up)
6. Engineering manuals	Engineering manuals are to include but not be limited to: 6.1 Vehicle assembly manuals per model-variant 6.2 Vehicle quality standard manuals per model/variant 6.3 Process control Chart/sheets 6.4 Vehicle Specification sheets 6.5 Materials/Parts list
7. Engine fault	Testing may include but not limited to discovery of faults such as: 7.1 Misfire, 7.2 Bore discrepancies 7.3 Fuel, exhaust and electrical 7.4 Cooling 7.5 Faulty gaskets 7.6 Leaks and abnormal noises 7.7 Ignition 7.8 All other engine operations and parts

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <p>1.1 Located interpreted and applied the relevant information, standards and specifications.</p> <p>1.2 Complied with company safety policies and procedures and OH&S legislation / regulations / codes of practice applicable to operations including quality requirements</p> <p>1.3 Shifted engine</p> <p>1.4 Applied hot test procedures to correctly identify a minimum of three (3) different and significant non-conforming engines, which must include faults identified using both computer/ keypad aided systems and manual / sensory capabilities</p> <p>1.5 Communicated and worked effectively and safely with others</p>
<p>2. Underpinning knowledge and attitudes</p>	<p>2.1 Workplace and equipment safety requirements</p> <p>2.2 Relevant company production quality standards</p> <p>2.3 Company manufacturing and production techniques for mechanical components and systems</p> <p>2.4 Automotive Industry terminology</p> <p>2.5 Tools and equipment types, characteristics, uses and limitations</p> <p>2.6 Engine faults and symptoms</p> <p>2.7 Engine parts and construction</p> <p>2.8 Engine testing techniques and equipment</p> <p>2.9 Processes for the calculation of material requirements</p> <p>2.10 Material Safety Data Sheets</p> <p>2.11 Plans, drawings and specifications</p> <p>2.12 Materials handling, storage and environment-friendly waste management</p> <p>2.13 Company safety policies and procedures</p> <p>2.14 Relevant Philippine Standards</p>
<p>3. Underpinning skills</p>	<p>3.1 Collect, organize, interpret and understand the information required for mechanical rectification, including work instructions, plans / sketches / diagrams, safety instructions, signage, labels, quality procedures, material safety data sheets and equipment instructions</p> <p>3.2 Communicate ideas and information orally and in writing, in simple English to enable confirmation of work requirements, passage of information and requests to other workers during operations and the reporting and recording of work outcomes</p> <p>3.3 Conduct activities associated with mechanical rectification, including the coordination and use of equipment, materials and tools to avoid backtracking and rework</p> <p>3.4 Work with others and in a team by recognizing dependencies and using co-operative approaches to optimize satisfaction and productivity</p> <p>3.5 Establish safe and effective work processes which anticipate and/or resolve problems and downtime, to systematically develop solutions to avoid or minimize reworking and avoid wastage</p>

	<p>3.6 Use mathematical ideas and techniques to correctly calculate time, assess tolerances and timing, apply accurate measurements, and establish quality checks</p> <p>3.7 Use workplace technology related to mechanical rectification, including the use of computers, measuring equipment, computerized equipment, mechanical diagnostic equipment, the use of communication devices and the reporting/recording of results</p>
4. Resource implications	<p>The following resources MUST be provided:</p> <p>4.1 Workplace</p> <p>4.2 Appropriate tools and equipment</p> <p>4.3 Materials relevant to the proposed activity and tasks</p>
5. Method of assessment	<p>Competency MUST be assessed through</p> <p>5.1 Observation with questioning</p> <p>5.2 Portfolio</p>
6. Context of assessment	<p>Competency may be assessed individually in the actual workplace or a simulated workplace environment.</p>

UNIT OF COMPETENCY : **RECTIFY ASSEMBLY FAULTS ON ASSEMBLED MECHANICAL ASSEMBLIES**

UNIT CODE : **ALT827320**

UNIT DESCRIPTOR : This unit specifies the competency required to rectify assembly faults on assembled mechanical assemblies, including sealing systems, based on recommendations from the inspection records and report of the fully assembled vehicle. The unit includes location, diagnosis, rectification of the assembly and sealing faults and full re-assembly in an offline environment.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1. Plan and prepare for work	1.1 Planning and preparation of work instructions, including relevant inspection reports and forms and quality requirements are obtained, confirmed and applied 1.2 Occupational health and safety (OH & S) requirements are followed in accordance with company safety policies and procedures 1.3 Tools and equipment selected to carry out tasks are consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported prior to commencement 1.4 Materials appropriate to the work application are identified, obtained, prepared, safely handled and located ready for use 1.5 Working environment considerations are identified and measures to reduce noise, dust and obstacles are applied
2. Locate and rectify assembly faults	2.1 Final report is interpreted and fault located on assembled vehicle 2.2 Assembly fault is diagnosed and suitable method of correction planned 2.3 Rectification is applied, depending on the fault and in accordance with engineering manuals 2.4 Fault is re-diagnosed to assess outcome of rectification and to ensure rework has eliminated the fault and final adjustments made 2.5 Documentation is completed outlining nature of problem, work conducted and outcome and appropriate communication is conveyed, in accordance with company requirements 2.6 Vehicle is returned to production line

<p>3. Locate and rectify sealing system faults</p>	<p>3.1 Final report is interpreted and faults located on assembled vehicles.</p> <p>3.2 Sealing faults are assessed and suitable method of correction planned</p> <p>3.3 Rectification is applied, dependent on the fault and in accordance with engineering manuals</p> <p>3.4 Faults are water tested to check outcome of rectification and to ensure rework has eliminated the fault and final adjustments made</p> <p>3.5 Documentation is completed outlining nature of problem, work conducted and outcome and appropriate communication is conveyed, in accordance with company requirements</p> <p>3.6 Vehicle is returned to production sequence</p>
<p>4. Clean up work area</p>	<p>4.1 Work area is cleared and materials disposed of, reused or recycled in accordance with company requirements</p> <p>4.2 Tools and equipment are cleaned, checked, maintained and stored in accordance with company requirements</p>

RANGE OF VARIABLES

VARIABLE	RANGE
1. Planning and preparation	Planning and preparation may include but not limited to: 1.1 Vehicle inspection 1.2 Defect identification 1.3 Assessment of conditions and hazards 1.4 Determination of work requirements
2. Quality requirements	Quality requirements are to include but not be limited to: 2.1 Relevant regulations including Philippine Standards 2.2 Internal company quality policy and standard 2.3 Company operations and procedures
3. Occupational health and safety (OH & S) requirements	OH&S requirements are to be in accordance with Legislation / regulations / codes of practice and company safety policies and procedures and may include but not limited to: 3.1 Protective clothing and equipment 3.2 Proper use of tools and equipment 3.3 Workplace environment and safety 3.4 Handling of materials 3.5 Use of fire fighting equipment 3.6 Company first aid 3.7 Hazard control and hazardous materials and substances 3.8 Use of Personal protective equipment is to include prescribed under legislation/regulation/codes of practice and workplace policies and practices 3.9 Following safe operating procedures such as conduct of operational risk assessment and treatments associated with heavy objects, vehicular movement, toxic substances, electrical shock, machinery movement and operation, production line operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors 3.10 Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, company first aid requirements and plant evacuation
4. Tools and equipment	4.1 Hand and power tools 4.2 Mechanical diagnostic equipment 4.3 Water testing equipment
5. Materials	Materials may include but not be limited to 5.1 Assembly line consumables and parts 5.2 Seal material 5.3 Bonding agents
6. Working environment	Working environment requirements include management of : 6.1 Waste 6.2 Noise 6.3 Dust 6.4 Vibration 6.5 Workplace Housekeeping (Clean-up)

7. Assembled Vehicle	7.1 Passenger Car 7.2 Utility Vehicle
8. Assembly Fault	8.1 Non-electrical aspects of the instrument panel and associated parts 8.2 Door lock and mechanism 8.3 Windows 8.4 Upholstery 8.5 Trimming 8.6 Suspension Assembly 8.7 Fuel Tank Assembly 8.8 Brake, clutch and accelerator pedal assembly 8.9 Radiator cooling system assembly 8.10 Air conditioning system 8.11 Front and rear bumpers assembly 8.12 Wheel assembly 8.13 Windshield and door glasses assembly
9. Engineering Manuals	Engineering manuals are to include but not be limited to: 9.1 Vehicle assembly manuals per model-variant 9.2 Vehicle quality standard manuals per model-variant 9.3 Process control Chart/sheets 9.4 Vehicle Specification sheets 9.5 Materials/Parts list
10. Sealing system fault	Sealing system fault may include but not limited to; 10.1 Holes 10.2 Pinches 10.3 Separation 10.4 De-bonding 10.5 Twisting 10.6 Perishing and raised segments
11. Communications	Communications are to include but not limited to 11.1 Verbal 11.2 Visual instructions 11.3 Fault reporting 11.4 Site specific instructions 11.5 Written instructions 11.6 Plans or instructions related to job/task, 11.7 Telephones and pagers

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <p>1.1 Located, interpreted and applied the relevant information, standards and specifications.</p> <p>1.2 Complied with company safety policies and procedures and OH&S legislation/regulations/codes of practice applicable to operations including quality requirements</p> <p>1.3 Completed diagnosis, rectification and re-assembly of mechanical faults rectified to engineering specifications and company inspection requirements on a minimum of three (3) separate vehicles each with different faults including those requiring:</p> <ul style="list-style-type: none"> • The removal and re-assembly of the instrument panel • The disassembly and re-assembly of all mechanical assemblies and door components • The replacement of trimming parts and components <p>1.4 Completed diagnosis and rectification to specification of sealing system faults on a minimum of three (3) separate vehicles including a minimum of:</p> <ul style="list-style-type: none"> • One involving a door • One involving a windscreen seal • One involving a boot seal fault • One involving the forward passenger compartment floor <p>1.5 Communicated and worked effectively and safely with others</p>
<p>2. Underpinning knowledge and attitudes</p>	<p>2.1 Workplace and equipment safety requirements</p> <p>2.2 Relevant company production quality standards</p> <p>2.3 Company manufacturing and production techniques for mechanical components and systems</p> <p>2.4 Automotive Industry terminology</p> <p>2.5 Tools and equipment types, characteristics, uses and limitations</p> <p>2.6 Mechanical faults symptoms and diagnosis techniques</p> <p>2.7 Sealing system testing techniques including water leak testing</p> <p>2.8 Processes for the calculation of material requirements</p> <p>2.9 Material Safety Data Sheets</p> <p>2.10 Plans, drawings and specifications</p> <p>2.11 Materials handling, storage and environmentally friendly waste management</p> <p>2.12 Company safety policies and procedures</p> <p>2.13 Relevant Philippine Standards OH&S</p> <p>2.14 Positive Work Values (Patience, Perseverance, Honesty, etc.)</p>

<p>3. Underpinning skills</p>	<p>3.1 Collect, organize, interpret and understand the information required for mechanical rectification, including work instructions, plans / sketches / diagrams, safety instructions, signage, labels, quality procedures, material safety data sheets and equipment instructions</p> <p>3.2 Communicate ideas and information orally and in writing, in simple English to enable confirmation of work requirements, passage of information and requests to other workers during operations and the reporting and recording of work outcomes</p> <p>3.3 Conduct activities associated with assembly and sealing system rectification, including the coordination and use of equipment, materials and tools to avoid backtracking and rework</p> <p>3.4 Work with others and in a team by recognizing dependencies and using co-operative approaches to optimize satisfaction and productivity</p> <p>3.5 Establish safe and effective work processes which anticipate and/or resolve problems and downtime, to systematically develop solutions to avoid or minimize reworking and avoid wastage</p> <p>3.6 Use mathematical ideas and techniques to correctly calculate time, assess tolerances and timing, apply accurate measurements, and establish quality checks</p> <p>3.7 Use workplace technology related to assembly and sealing system rectification, including the use of computers, measuring equipment, computerized equipment, mechanical diagnostic equipment, water leak testing equipment, the use of communication devices and the reporting/recording of results</p>
<p>4. Resource implications</p>	<p>The following resources MUST be provided:</p> <p>4.1 Workplace: Real or simulated work area</p> <p>4.2 Appropriate Tools & equipment</p> <p>4.3 Materials relevant to the activity</p>
<p>5. Method of assessment</p>	<p>Competency MUST be assessed through</p> <p>5.1 Observation with Questioning</p> <p>5.2 Portfolio</p>
<p>6. Context of assessment</p>	<p>6.1 Competency may be assessed individually in the actual workplace or a simulated workplace environment.</p>

UNIT OF COMPETENCY : RECTIFY FAULTS ON MOUNTED / INSTALLED BRAKE AND FUEL SYSTEM

UNIT CODE : ALT827321

UNIT DESCRIPTOR : This unit specifies the competency required to rectify brake and fuel system faults based on recommendations from the inspection records and report of the fully assembled vehicle. The unit includes location, diagnosis and rectification of the faults in an off-line environment.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1 Plan and prepare for work	1.1 Planning and preparation of work instructions, including relevant inspection reports and forms and quality requirements are obtained, confirmed and applied 1.2 Occupational health and safety (OH & S) requirements are followed in accordance with company safety policies and procedures 1.3 Tools and equipment selected to carry out tasks are consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported prior to commencement 1.4 Materials appropriate to the work application are identified, obtained, prepared, safely handled and located ready for use 1.5 Working environment considerations are identified and measures to reduce noise, dust and obstacles are applied
2 Diagnose and rectify mechanical fault	2.1 Inspection report is interpreted and fault is located on assembled vehicle . 2.2 Mechanical fault is diagnosed and suitable method of correction is planned. 2.3 Rectification is applied, dependent on the fault and in accordance with engineering manuals 2.4 Fault is re-diagnosed to assess outcome of rectification and to ensure rework has eliminated the fault and final adjustments made 2.5 Documentation is completed and communication is conveyed outlining nature of problem, work conducted and outcome, in accordance with company requirements 2.6 Vehicle is returned to production sequence
3 Clean up work area	3.1 Work area is cleared and materials disposed of, reused or recycled in accordance with company requirements 3.2 Tools and equipment are cleaned, checked, maintained and stored in accordance with company requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Planning and preparation	Planning and preparation may include the following: 1.1 Vehicle inspection 1.2 Defect identification 1.3 Assessment of conditions and hazards 1.4 Determination of work requirements
2. Quality requirements	Quality requirements are to include but not be limited to: 2.1 Relevant regulations including Philippine Standards 2.2 Internal company quality policy and standards 2.3 Company operations and
3. Occupational health and safety (OH & S) requirements	OH&S requirements may include Legislation / regulations / codes of practice and company safety policies and procedures such as: 3.1 Protective clothing and equipment 3.2 Proper use of tools and equipment 3.3 Workplace environment and safety 3.4 Handling of materials 3.5 Use of fire fighting equipment 3.6 Company first aid 3.7 Hazard control and hazardous materials and substances 3.8 Personal protective equipment is to include that prescribed under legislation/regulation/codes of practice and workplace policies and practices 3.9 Safe operating procedures are to include but not be limited to the conduct of operational risk assessment and treatments associated with heavy objects, vehicular movement, toxic substances, electrical shock, machinery movement and operation, production line operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors 3.10 Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, company first aid requirements and plant evacuation
4. Tools and equipment	Tools and equipment are to include but not be limited to: 4.1 Mechanical diagnostic equipment 4.2 Relevant hand and power tools

5. Materials	Materials include: 5.1 Replacement parts 5.2 Fuel 5.3 Oil 5.4 Water 5.5 Seals 5.6 Gaskets, 5.7 Brake fluids 5.8 Lubricants 5.9 Gas
6. Working Environment	Working Environment requirements includes management of : 6.1 Waste 6.2 Noise 6.3 Dust 6.4 Vibration 6.5 Workplace Housekeeping (Clean-up)
7. Assembled Vehicle	7.1 Passenger Car 7.2 Utility Vehicle
8. Mechanical Fault	Rectification of mechanical faults may include but not be limited to detection of faults such as: 8.1 Leak on Fuel system line and abnormal noises 8.2 Clearance on Fuel and brake lines 8.3 Brake master cylinder malfunction 8.4 Leak on brake system line and abnormal noises 8.5 All other mechanical operations and parts related to brake and fuel systems like fuel pump, brake cylinders, etc...
9. Engineering Manuals	Engineering manuals are to include but not be limited to: 9.1 Vehicle assembly manuals per model-variant 9.2 Vehicle quality standard manuals per model/variant 9.3 Process control Chart/sheets 9.4 Vehicle Specification sheets 9.5 Materials/Parts list
10. Communications	Communications are to include but not limited to 10.1 Verbal 10.2 Visual instructions 10.3 Fault reporting 10.4 Site specific instructions 10.5 Written instructions 10.6 Plans or instructions related to job/task, 10.7 Telephones and pagers

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Located, interpreted and applied the relevant information, standards and specifications. 1.2 Complied with company safety policies and procedures and OH&S legislation/regulations/codes of practice applicable to operations including quality requirements 1.3 Completed diagnosis and rectification of mechanical faults on a minimum of five (3) separate vehicles each with different faults, rectified to engineers specifications and company inspection requirements 1.4 Communicated and worked effectively and safely with others
<p>2. Underpinning knowledge and attitudes</p>	<ul style="list-style-type: none"> 2.1 Workplace and equipment safety requirements 2.2 Relevant company production quality standards 2.3 Company manufacturing and production techniques for mechanical components and systems 2.4 Automotive Industry terminology 2.5 Tools and equipment types, characteristics, uses and limitations 2.6 Mechanical faults and symptoms 2.7 Engine parts and construction 2.8 Mechanical diagnosis techniques 2.9 Processes for the calculation of material requirements 2.10 Material Safety Data Sheets 2.11 Plans, drawings and specifications 2.12 Materials handling, storage and environmentally friendly waste management 2.13 Company safety policies and procedures 2.14 Relevant Philippine standards OH&S legislation
<p>3. Underpinning skills</p>	<ul style="list-style-type: none"> 3.1 Collect, organize, interpret and understand the information required for mechanical rectification, including work instructions, plans / sketches / diagrams, safety instructions, signage, labels, quality procedures, material safety data sheets and equipment instructions 3.2 Communicate ideas and information orally and in writing, in simple English to enable confirmation of work requirements, passage of information and requests to other workers during operations and the reporting and recording of work outcomes 3.3 Conduct activities associated with mechanical rectification, including the coordination and use of equipment, materials and tools to avoid backtracking and rework 3.4 Work with others and in a team by recognizing dependencies and using co-operative approaches to optimize satisfaction and productivity

	<p>3.5 Establish safe and effective work processes which anticipate and/or resolve problems and downtime, to systematically develop solutions to avoid or minimize reworking and avoid wastage</p> <p>3.6 Use mathematical ideas and techniques to correctly calculate time, assess tolerances and timing, apply accurate measurements, and establish quality check</p> <p>3.7 Use workplace technology related to mechanical rectification, including the use of computers, measuring equipment, computerized equipment, mechanical diagnostic equipment, the use of communication devices and the reporting/recording of results</p>
4. Resource implications	<p>The following resources MUST be provided:</p> <p>4.1 Workplace</p> <p>4.2 Appropriate tools and equipment</p> <p>4.3 Materials relevant to the proposed activity and tasks</p>
5. Method of assessment	<p>Competency MUST be assessed through</p> <p>5.1 Observation with Questioning</p> <p>5.2 Portfolio</p>
6. Context of assessment	<p>Competency may be assessed individually in the actual workplace or a simulated workplace environment.</p>

UNIT OF COMPETENCY : RECTIFY FAULT ON MOUNTED / INSTALLED POWER DRIVE SYSTEM

UNIT CODE : ALT827322

UNIT DESCRIPTOR : This unit specifies the competency required to rectify power drive system faults based on recommendations from the inspection records and report of the fully assembled vehicle. The unit includes location, diagnosis and rectification of the faults in an off-line environment.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1. Plan and prepare for work	1.1 Planning and preparation of work instructions, including relevant inspection reports and forms and quality requirements are obtained, confirmed and applied 1.2 Occupational health and safety (OH & S) requirements are followed in accordance with company safety policies and procedures 1.3 Tools and equipment selected to carry out tasks are consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported prior to commencement 1.4 Materials appropriate to the work application are identified, obtained, prepared, safely handled and located ready for use 1.5 Working environment considerations are identified and measures to reduce noise, dust and obstacles are applied
2. Diagnose and rectify mechanical fault	2.1 Inspection report is interpreted and fault is located on assembled vehicle 2.2 Mechanical fault is diagnosed and suitable method of correction is planned. 2.3 Rectification is applied, dependent on the fault and in accordance with engineering manuals 2.4 Fault is re-diagnosed to assess outcome of rectification and to ensure rework has eliminated the fault and final adjustments made 2.5 Documentation is completed and communication is conveyed outlining nature of problem, work conducted and outcome, in accordance with company requirements 2.6 Vehicle is returned to production sequence
3. Clean up	3.1 Work area is cleared and materials disposed of, reused or recycled in accordance with company requirements 3.2 Tools and equipment are cleaned, checked, maintained and stored in accordance with company requirements

RANGE OF VARIABLES

<p>1. Planning and preparation</p>	<p>Planning and preparation may include the following:</p> <ul style="list-style-type: none"> 1.1 Vehicle inspection 1.2 Defect identification 1.3 Assessment of conditions and hazards 1.4 Determination of work requirements
<p>2. Quality requirements</p>	<p>Quality requirements are to include but not be limited to:</p> <ul style="list-style-type: none"> 2.1 Relevant regulations including Philippine Standards 2.2 Internal company quality policy and standards 2.3 Company operations
<p>3. Occupational health and safety (OH & S) requirements</p>	<p>OH&S requirements may include Legislation / regulations / codes of practice and company safety policies and procedures such as:</p> <ul style="list-style-type: none"> 3.1 Protective clothing and equipment 3.2 Proper use of tools and equipment 3.3 Workplace environment and safety 3.4 Handling of materials 3.5 Use of fire fighting equipment 3.6 Company first aid 3.7 Hazard control and hazardous materials and substances 3.8 Personal protective equipment is to include that prescribed under legislation/regulation/codes of practice and workplace policies and practices 3.9 Safe operating procedures are to include but not be limited to the conduct of operational risk assessment and treatments associated with heavy objects, vehicular movement, toxic substances, electrical shock, machinery movement and operation, production line operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors 3.10 Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, company first aid requirements and plant evacuation
<p>4. Tools and equipment</p>	<p>Tools and equipment are to include but not be limited to:</p> <ul style="list-style-type: none"> 4.1 Mechanical diagnostic equipment 4.2 Relevant hand and power tools

5. Materials	Materials include: 5.10 Replacement parts 5.11 Fuel 5.12 Oil 5.13 Water 5.14 Seals 5.15 Gaskets, 5.16 Brake fluids 5.17 Lubricants 5.18 Gas
6. Working Environment	Working Environment requirements includes management of : 6.6Waste 6.7Noise 6.8Dust 6.9Vibration 6.10 Workplace Housekeeping (Clean-up)
7. Assembled Vehicle	7.1 Passenger Car 7.2Utility Vehicle
8. Mechanical Fault	Rectification of mechanical faults may include but not be limited to detection of faults such as: 7.1 Fuel exhaust 7.2Cooling 7.3Faulty gaskets 7.4Leaks and abnormal noises 7.5Mounting systems 7.6Steering 7.7All other mechanical operations and parts
9. Engineering Manuals	Engineering manuals are to include but not be limited to: 9.1Vehicle assembly manuals per model-variant 9.2Vehicle quality standard manuals per model-variant 9.3Process control Chart/sheets 9.4Vehicle Specification sheets 9.5Materials/Parts list
10. Communications	Communications are to include but not limited to 10.1 Verbal 10.2 Visual instructions 10.3 Fault reporting 10.4 Site specific instructions 10.5 Written instructions 10.6 Plans or instructions related to job/task, 10.7 Telephones and pagers

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Located, interpreted and applied the relevant information, standards and specifications. 1.2 Complied with company safety policies and procedures and OH&S legislation/regulations/codes of practice applicable to operations including quality requirements 1.3 Completed diagnosis and rectification of mechanical faults on a minimum of five (3) separate vehicles each with different faults, rectified to engineers specifications and company inspection requirements 1.4 Communicated and worked effectively and safely with others
<p>2. Underpinning knowledge and attitudes</p>	<ul style="list-style-type: none"> 2.1 Workplace and equipment safety requirements 2.2 Relevant company production quality standards 2.3 Company manufacturing and production techniques for mechanical components and systems 2.4 Automotive Industry terminology 2.5 Tools and equipment types, characteristics, uses and limitations 2.6 Mechanical faults and symptoms 2.7 Engine parts and construction 2.8 Mechanical diagnosis techniques 2.9 Processes for the calculation of material requirements 2.10 Material Safety Data Sheets 2.11 Plans, drawings and specifications 2.12 Materials handling, storage and environment-friendly waste management 2.13 Company safety policies and procedures 2.14 Relevant Philippine Standards OH&S legislation

<p>3. Underpinning skills</p>	<p>3.1 Collect, organize, interpret and understand the information required for mechanical rectification, including work instructions, plans / sketches / diagrams, safety instructions, signage, labels, quality procedures, material safety data sheets and equipment instructions</p> <p>3.2 Communicate ideas and information orally and in writing, in simple English to enable confirmation of work requirements, passage of information and requests to other workers during operations and the reporting and recording of work outcomes</p> <p>3.3 Conduct activities associated with mechanical rectification, including the coordination and use of equipment, materials and tools to avoid backtracking and rework</p> <p>3.4 Work with others and in a team by recognizing dependencies and using co-operative approaches to optimize satisfaction and productivity</p> <p>3.5 Establish safe and effective work processes which anticipate and/or resolve problems and downtime, to systematically develop solutions to avoid or minimize reworking and avoid wastage</p> <p>3.6 Use mathematical ideas and techniques to correctly calculate time, assess tolerances and timing, apply accurate measurements, and establish quality checks</p> <p>3.7 Use workplace technology related to mechanical rectification, including the use of computers, measuring equipment, computerized equipment, mechanical diagnostic equipment, the use of communication devices and the reporting/recording of results</p>
<p>4. Resource implications</p>	<p>The following resources MUST be provided:</p> <p>4.1 Workplace</p> <p>4.2 Appropriate tools and equipment</p> <p>4.3 Materials relevant to the proposed activity and tasks</p>
<p>5. Method of assessment</p>	<p>Competency MUST be assessed through</p> <p>5.1 Observation with Questioning</p> <p>5.2 Portfolio</p>
<p>6. Context of assessment</p>	<p>Competency may be assessed individually in the actual workplace or a simulated workplace environment.</p>

- UNIT OF COMPETENCY** : **RECTIFY FAULT ON MOUNTED / INSTALLED SUSPENSION DRIVE TRAIN SYSTEM**
- UNIT CODE** : **ALT827323**
- UNIT DESCRIPTOR** : This unit specifies the competency required to rectify suspension drive train system faults based on recommendations from the inspection records and report of the fully assembled vehicle. The unit includes location, diagnosis and rectification of the faults in an off-line environment.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1. Plan and prepare for work	1.1 Planning and preparation of work instructions, including relevant inspection reports and forms and quality requirements are obtained, confirmed and applied 1.2 Occupational health and safety (OH & S) requirements are followed in accordance with company safety policies and procedures 1.3 Tools and equipment selected to carry out tasks are consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported prior to commencement 1.4 Materials appropriate to the work application are identified, obtained, prepared, safely handled and located ready for use 1.5 Working environment considerations are identified and measures to reduce noise, dust and obstacles are applied
2. Diagnose and rectify mechanical fault	2.1 Inspection report is interpreted and fault is located on assembled vehicle 2.2 Mechanical fault is diagnosed and suitable method of correction is planned. Rectification is applied, dependent on the fault and in accordance with Planning and preparation of work instructions, including relevant inspection reports and forms and quality requirements are obtained, confirmed and applied 2.3 Fault is re-diagnosed to assess outcome of rectification and to ensure rework has eliminated the fault and final adjustments made 2.4 Documentation is completed and communication is conveyed outlining nature of problem, work conducted and outcome, in accordance with company requirements 2.5 Vehicle is returned to production sequence
3. Clean up	3.1 Work area is cleared and materials disposed of, reused or recycled in accordance with company requirements 3.2 Tools and equipment are cleaned, checked, maintained and stored in accordance with company requirements

RANGE OF VARIABLES

<p>1. Planning and preparation</p>	<p>Planning and preparation may include the following:</p> <ul style="list-style-type: none"> 1.1 Vehicle inspection 1.2 Defect identification 1.3 Assessment of conditions and hazards 1.4 Determination of work requirements
<p>2. Quality requirements</p>	<p>Quality requirements are to include but not be limited to:</p> <ul style="list-style-type: none"> 2.1 Relevant regulations including Philippine Standards 2.2 Internal company quality policy and standards 2.3 Company operations
<p>3. Occupational health and safety (OH & S) requirements</p>	<p>OH&S requirements may include Legislation / regulations / codes of practice and company safety policies and procedures such as:</p> <ul style="list-style-type: none"> 3.1 Protective clothing and equipment 3.2 Proper use of tools and equipment 3.3 Workplace environment and safety 3.4 Handling of materials 3.5 Use of fire fighting equipment 3.6 Company first aid 3.7 Hazard control and hazardous materials and substances 3.8 Personal protective equipment is to include that prescribed under legislation/regulation/codes of practice and workplace policies and practices 3.9 Safe operating procedures are to include but not be limited to the conduct of operational risk assessment and treatments associated with heavy objects, vehicular movement, toxic substances, electrical shock, machinery movement and operation, production line operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors 3.10 Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, company first aid requirements and plant evacuation
<p>4. Tools and equipment</p>	<p>Tools and equipment are to include but not be limited to:</p> <ul style="list-style-type: none"> 4.1 Mechanical diagnostic equipment 4.2 Relevant hand and power tools

5. Materials	Materials include: 5.1 Replacement parts 5.2 Fuel 5.3 Oil 5.4 Water 5.5 Seals 5.6 Gaskets, 5.7 Brake fluids 5.8 Lubricants 5.9 Gas
6. Working Environment	Working Environment requirements includes management of : 6.1 Waste 6.2 Noise 6.3 Dust 6.4 Vibration 6.5 Workplace Housekeeping (Clean-up)
7. Assembled Vehicle	7.1 Passenger Car 7.2 Utility Vehicle
8. Mechanical Fault	Rectification of mechanical faults may include but not be limited to detection of faults such as: 7.1 Leaks and abnormal noises 7.2 Mounting systems 7.3 Suspension coil and strut wrong installation 7.4 All other mechanical operations and parts
9. Engineering Manuals	Engineering manuals are to include but not be limited to: 9.1 Vehicle assembly manuals per model-variant 9.2 Vehicle quality standard manuals per model/variant 9.3 Process control Chart/sheets 9.4 Vehicle Specification sheets 9.5 Materials/Parts list
10. Communications	Communications are to include but not limited to 10.1 Verbal 10.2 Visual instructions 10.3 Fault reporting 10.4 Site specific instructions 10.5 Written instructions 10.6 Plans or instructions related to job/task, 10.7 Telephones and pagers

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Located, interpreted and applied the relevant information, standards and specifications. 1.2 Complied with company safety policies and procedures and OH&S legislation/regulations/codes of practice applicable to operations including quality requirements 1.3 Completed diagnosis and rectification of mechanical faults on a minimum of five (3) separate vehicles each with different faults, rectified to engineers specifications and company inspection requirements 1.4 Communicated and worked effectively and safely with others
<p>2. Underpinning knowledge and attitudes</p>	<ul style="list-style-type: none"> 2.1 Workplace and equipment safety requirements 2.2 Relevant company production quality standards 2.3 Company manufacturing and production techniques for mechanical components and systems 2.4 Automotive Industry terminology 2.5 Tools and equipment types, characteristics, uses and limitations 2.6 Mechanical faults and symptoms 2.7 Engine parts and construction 2.8 Mechanical diagnosis techniques 2.9 Processes for the calculation of material requirements 2.10 Material Safety Data Sheets 2.11 Plans, drawings and specifications 2.12 Materials handling, storage and environmentally friendly waste management 2.13 Company safety policies and procedures 2.14 Relevant Philippine Standards OH&S legislation

<p>3. Underpinning skills</p>	<p>3.1 Collect, organize, interpret and understand the information required for mechanical rectification, including work instructions, plans / sketches / diagrams, safety instructions, signage, labels, quality procedures, material safety data sheets and equipment instructions</p> <p>3.2 Communicate ideas and information orally and in writing, in simple English to enable confirmation of work requirements, passage of information and requests to other workers during operations and the reporting and recording of work outcomes</p> <p>3.3 Conduct activities associated with mechanical rectification, including the coordination and use of equipment, materials and tools to avoid backtracking and rework</p> <p>3.4 Work with others and in a team by recognizing dependencies and using co-operative approaches to optimize satisfaction and productivity</p> <p>3.5 Establish safe and effective work processes which anticipate and/or resolve problems and downtime, to systematically develop solutions to avoid or minimize reworking and avoid wastage</p> <p>3.6 Use mathematical ideas and techniques to correctly calculate time, assess tolerances and timing, apply accurate measurements, and establish quality checks</p> <p>3.7 Use workplace technology related to mechanical rectification, including the use of computers, measuring equipment, computerized equipment, mechanical diagnostic equipment, the use of communication devices and the reporting/recording of results</p>
<p>4. Resource implications</p>	<p>The following resources MUST be provided:</p> <p>4.1 Workplace</p> <p>4.2 Appropriate tools and equipment</p> <p>4.3 Materials relevant to the proposed activity and tasks</p>
<p>5. Method of assessment</p>	<p>Competency MUST be assessed through</p> <p>5.1 Observation with Questioning</p> <p>5.2 Portfolio</p>
<p>6. Context of assessment</p>	<p>6.1 Competency may be assessed individually in the actual workplace or a simulated workplace environment.</p>

SECTION 3. TRAINING STANDARDS

These standards are set to provide technical and vocational education and training (TVET) providers with information and other important requirements to consider when designing training programs for Automotive Mechanical Assembly NC III.

3.1 CURRICULUM DESIGN

Course Title: **AUTOMOTIVE MECHANICAL ASSEMBLY**

NC Level **NC III**

Nominal Training Duration: **20 Hours** (Basic Competencies)
 20 Hours (Common Competencies)
 440 Hours (Core Competencies)

Course Description:

This course is designed to enhance the knowledge, skills and attitudes of an individual in the field of automotive mechanical assembly in accordance with industry standards. It covers core competencies such as; conduct engine hot test, rectify assembly faults on assembled mechanical assemblies, rectify faults on mounted/installed brake and fuel system, rectify faults on mounted/installed power drive system and rectify faults on mounted/installed suspension drive train.

This course is also designed to enhance the basic and common knowledge, skills and attitudes of an individual in the field of automotive mechanical assembly.

To obtain this, all units prescribed for this qualification must be achieved.

BASIC COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Lead workplace communication	1.1 Communicate information about workplace processes. 1.2 Lead workplace discussions. 1.3 Identify and communicate issues arising in the workplace	<ul style="list-style-type: none"> • Group discussion • Role Play • Brainstorming 	<ul style="list-style-type: none"> • Observation • Interviews
2. Lead small teams	2.1 Provide team leadership. 2.2 Assign responsibilities among members. 2.3 Set performance expectation for team members. 2.4 Supervise team performance	<ul style="list-style-type: none"> • Lecture • Demonstration • Self-paced (modular) 	<ul style="list-style-type: none"> • Demonstration • Case studies
3. Develop and practice negotiation skills	3.1 Identify relevant information in planning negotiations 3.2 Participate in negotiations 3.3 Document areas for agreement	<ul style="list-style-type: none"> • Direct observation • Simulation/ role playing • Case studies 	<ul style="list-style-type: none"> • Written test • Practical/ performance test

4. Solve workplace problem related to work activities	4.1 Explain the analytical techniques. 4.2 Identify the problem. 4.3 Determine the possible cause/s of the problem.	<ul style="list-style-type: none"> • Direct observation • Simulation/role playing • Case studies 	<ul style="list-style-type: none"> • Written test • Practical/performance test
5. Use mathematical concepts and techniques	5.1 Identify mathematical tools and techniques to solve problem 5.2 Apply mathematical procedures/solution 5.3 Analyze results	<ul style="list-style-type: none"> • Direct observation • Simulation/role playing • Case studies 	<ul style="list-style-type: none"> • Written test • Practical/performance test
6. Use relevant technologies	6.1 Identify appropriate technology 6.2 Apply relevant technology 6.3 Maintain/enhance relevant technology	<ul style="list-style-type: none"> • Direct observation • Simulation/role playing • Case studies 	<ul style="list-style-type: none"> • Written test • Practical/performance test

COMMON COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Perform mensuration and calculation	1.1 Select measuring instruments 1.2 Carry out measurements and calculation 1.3 Maintain measuring instruments	<ul style="list-style-type: none"> • Lecture/Demonstration • Practical exercises • Simulation 	<ul style="list-style-type: none"> • Written test • Oral questioning • Direct observation
2. Read, interpret and apply engineering manuals / specifications	2.1 Identify/access engineering manuals / specification 2.2 Interpret manual 2.3 Apply information in manual 2.4 Store manuals	<ul style="list-style-type: none"> • Lecture/Demonstration • Dual training 	<ul style="list-style-type: none"> • Direct observation • Interview
3. Move and position vehicle	3.1 Prepare vehicle for driving 3.2 Move and position vehicle 3.3 Check the vehicle	<ul style="list-style-type: none"> • Lecture/Demonstration • Practical exercises • Simulation 	<ul style="list-style-type: none"> • Written test • Oral questioning • Direct observation
4. Apply appropriate sealant / adhesive	4.1 Identify appropriate sealant/adhesive 4.2.2 Prepare surface for sealant / adhesive application 4.3 Store unused and dispose used sealant/adhesive	<ul style="list-style-type: none"> • Lecture/Demonstration • Dual training • Distance learning 	<ul style="list-style-type: none"> • Written test • Oral questioning • Direct observation • Interview • Project method
5. Perform shop maintenance	5.1 Inspect/clean tools and work area 5.2 Store/arrange tools and shop equipment 5.3 Dispose waste/used lubricants 5.4 Report damaged tools/equipment	<ul style="list-style-type: none"> • Lecture/Demonstration • Dual training • Self-paced (modular) 	<ul style="list-style-type: none"> • Written test • Direct observation • Interview • Practical exercises

CORE COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Conduct Engine Hot Test	1.1 Plan and prepare engine for hot test 1.2 Shift engine 1.3 Perform engine hot test	<ul style="list-style-type: none"> • Lecture/ Demonstration • Dualized training 	<ul style="list-style-type: none"> • Observation with questioning • Demonstration with questioning • Interview • Portfolio
2. Rectify Assembly Faults on Assembled Mechanical Assemblies	2.1 Prepare tools, materials and work area. 2.2 Locate and rectify faults on mechanical assembly 2.3 Locate and rectify sealing system faults	<ul style="list-style-type: none"> • Discussion • Dual training • Distance learning 	<ul style="list-style-type: none"> • Observation with questioning • Demonstration with questioning • Interview • Portfolio
3. Rectify Faults on Mounted / Installed Brake and Fuel System	3.1 Prepare tools, materials and work area 3.2 Diagnose and rectify mechanical fault	<ul style="list-style-type: none"> • Discussion • Dual training • Distance learning 	<ul style="list-style-type: none"> • Observation with questioning • Demonstration with questioning • Interview • Portfolio
4. Rectify Faults on Mounted / Installed Power Drive System	4.1 Prepare tools, materials and work area 4.2 Diagnose and rectify faults on power drive system	<ul style="list-style-type: none"> • Discussion • Dual training • Distance learning 	<ul style="list-style-type: none"> • Observation with questioning • Demonstration with questioning • Interview • Portfolio Interview
5. Rectify Faults on Mounted / Installed Suspension Drive Train	5.1 Plan and prepare tools, materials and work area 5.2 Diagnose and rectify fault on suspension drive train system	<ul style="list-style-type: none"> • Discussion • Dual training • Distance learning 	<ul style="list-style-type: none"> • Observation with questioning • Demonstration with questioning • Interview • Portfolio

3.2 TRAINING DELIVERY

The delivery of training should adhere to the design of the curriculum. Delivery should be guided by the 10 basic principles of competency-based TVET.

- The training is based on curriculum developed from the competency standards;
- Learning is modular in its structure;
- Training delivery is individualized and self-paced;
- Training is based on work that must be performed;
- Training materials are directly related to the competency standards and the curriculum modules;
- Assessment is based in the collection of evidence of the performance of work to the industry required standard;
- Training is based both on and off-the-job components;
- Allows for recognition of prior learning (RPL) or current competencies;
- Training allows for multiple entry and exit; and
- Approved training programs are nationally accredited.

The competency-based TVET system recognizes various types of delivery modes, both on and off-the-job as long as the learning is driven by the competency standards specified by the industry. The following training modalities may be adopted when designing training programs:

- The dualized mode of training delivery is preferred and recommended. Thus programs would contain both in-school and in-industry training or fieldwork components. Details can be referred to the Dual Training System (DTS) Implementing Rules and Regulations.
- Modular/self-paced learning is a competency-based training modality wherein the trainee is allowed to progress at his own pace. The trainer facilitates the training delivery
- Peer teaching/mentoring is a training modality wherein fast learners are given the opportunity to assist the slow learners.
- Supervised industry training or on-the-job training is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies prescribed in the training regulations.
- Distance learning is a formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may employ correspondence study, or audio, video or computer technologies.

3.3 TRAINEE ENTRY REQUIREMENTS

Trainees or students should possess the following requirements:

- can communicate both oral and written;
- physically and mentally fit; and
- can perform basic mathematical computation.
- Must possess the Automotive Mechanical Assembly National Certificate (NC) II

This list does not include specific institutional requirements such as educational attainment, appropriate work experience, and others that may be required of the trainees by the school or training center delivering the TVET program.

3.4 TOOLS, EQUIPMENT AND MATERIALS AUTOMOTIVE MECHANICAL ASSEMBLY – NC III

Recommended list of tools, equipment and materials for the training of 20 trainees for Automotive Mechanical Assembly – NC III

TOOLS		EQUIPMENT		MATERIALS	
Qty.	Description	Qty.	Description	Qty.	Description
5 sets	Hand Tools - Sockets (assorted) - Screw bits - Pliers - Screw drivers (+ / -) - Hammers - Extension sockets - Universal sockets	2 sets 1 set	Lifting Equipment • Hoist (1 to 3 Tons) • Hangers and gears	50 li. 10 li 5 tubes 50 li 50 li	- Engine oil - Grease - Sealant /adhesive - Hydraulic oils/gear Oil - Automatic transmission fluid
2 pcs	Impact wrench $\frac{3}{4}$ drive	1 unit	Forklift (2 to 3 Tons)	1set	Parts for suspension assembly
2 pcs	Impact wrench $\frac{1}{2}$ drive	2 units	Hand Pallet Truck	1 set	Parts for power drive assembly
2 pcs	Torque wrench - click type	1 set	Mechanized or manual conveyors (optional)	1 set	Parts for fuel tank assembly
2 pcs	Torque wrench – dial type	1 unit	Tow motor	1 set	Parts for brake, clutch and pedal assembly
2 sets	Special tools (assorted)	1 set	Robotic windshield sealer application (optional)	1 set	Trim parts and components
2 pcs	Rubber Mallet	1 set	Wheel Alignment machine	1 set	Parts for radiator cooling assembly

2 pcs	Paint brush 1 in.	1 set	Oil dispenser	1 set	Parts for Air conditioning system
		1 set	Grease gun	1 set	Parts for bumpers
		1 set	Manual air and hydraulic pressurized lubrication	1 set	Parts for wheel assembly
		1 lot	Assorted Jigs/fixtures	1 set	Parts for windshield and door glasses assembly
		1 set	Sealer gun - pneumatic	1 set	Parts for power drive system
		1 set	Jigs/fixtures	1 set	Lubricants
				1 set	Sealants
				1 set	Adhesives/tapes
				20 pairs	Gloves
				5 pcs.	Goggles
				20pairs	Safety shoes
				5 pcs.	Apron
				20pairs	Ear Plug
				5 pcs	Hard hat
				1 unit	Automotive vehicle body
				1 set	Training materials
				pairs	Office supplies
				1 lot	Hardware parts

3.5 TRAINING FACILITIES

AUTOMOTIVE MECHANICAL ASSEMBLY – NC III

The automotive workshop must be made of reinforced concrete or steel structure. The size must be suited on the requirements of the competencies. The class size of 25 students/trainees is reserved for the lecture room and the practical demonstration area for carrying out mechanical assembly of automotive vehicle body. Most of the learning activities such as on-vehicle mechanical assembly are performed in the workshop.

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	TOTAL AREA IN SQ. METERS
• Building (permanent)	12.00 x 32.00	-	384.00
• Student/Trainee Working Space	2.50 x 2.50 per student/trainee	6.25 per student	156.25
• Contextual Learning Laboratory	4.00 x 5.00	20.00	20.00
• Lecture Room	4.00 x 7.00	28.00	28.00
• Learning Resource Center	4.00 x 5.00	20.00	20.00
• Facilities/Equipment/ Circulation Area**	-	-	182.00

**** Area requirement is equivalent to 30% of the total teaching/learning areas**

3.6 TRAINERS' QUALIFICATION

AUTOMOTIVE/LAND TRANSPORT SECTOR AUTOMOTIVE MECHANICAL ASSEMBLY – NC III TRAINER QUALIFICATION (TQ II)

- Must be a holder of Automotive Mechanical Assembly NC III
- Must have undergone training on Training Methodology II (TM II)¹
- Must be computer literate
- Must be physically and mentally fit
- Must have at least 2 years job/industry experience²
- Must be a civil-service eligible or holder of appropriate professional license issued by the Professional Regulatory Commission (for government positions only)

¹ This shall be changed to “:Must be a holder of Trainer Qualification Level II (TQII) or equivalent” upon promulgation by the TESDA Board of the TQ/AQ training regulations

² Optional. Only when required by the hiring institution

Reference: TESDA Board Resolution No. 2004 03

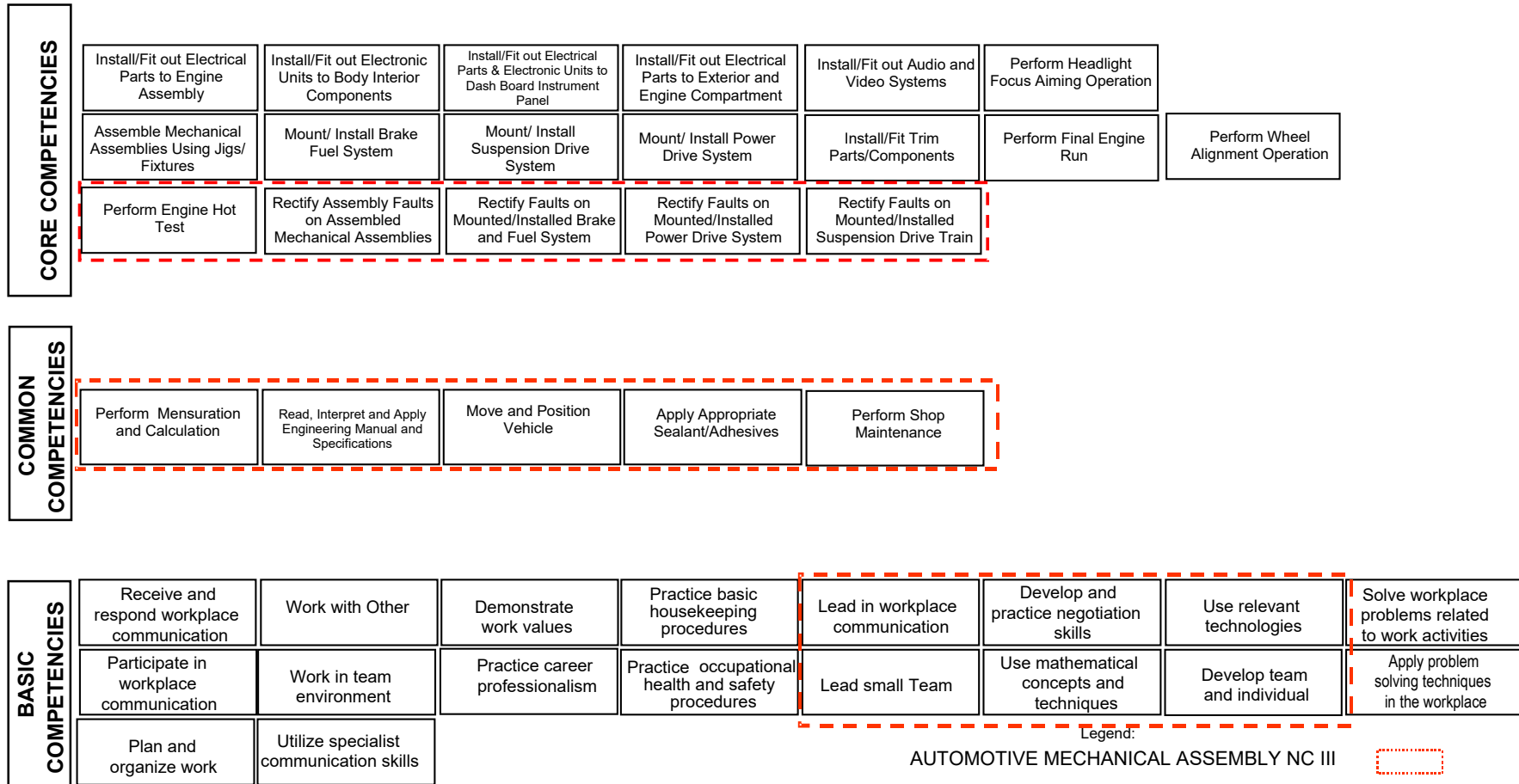
3.7 INSTITUTIONAL ASSESSMENT

Institutional assessment is undertaken by trainees to determine their achievement of units of competency. A certificate of achievement is issued for each unit of competency.

SECTION 4 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

- 4.1 To attain the National Qualification of AUTOMOTIVE MECHANICAL ASSEMBLY NC III, the candidate must demonstrate competence through assessment covering all the units of competency listed in Section 1. Successful candidates shall be awarded a National Certificate signed by the TESDA Director General.
- 4.2 Individual aspiring to be awarded the qualification of AUTOMOTIVE MECHANICAL ASSEMBLY NC III must acquire Certificates of Competency (COC) in all the following core units of the Qualification. Candidates may apply for assessment in any accredited assessment center.
- 4.2.1 Conduct Engine Hot Test
 - Perform Engine Hot Test
 - 4.2.2 Rectify Assembly Faults on Assembled Mechanical Assemblies
 - Rectify Assembly Faults on Assembled Mechanical Assemblies
 - 4.2.3 Rectify Faults on Mounted/Installed Brake and Fuel System
 - Rectify Faults on Mounted/Installed Brake and Fuel System
 - 4.2.4 Rectify Faults on Mounted/Installed Power Drive System
 - Rectify Faults on Mounted/Installed Power Drive System
 - 4.2.5 Rectify Faults on Mounted/Installed Suspension Drive Train
 - Rectify Faults on Mounted/Installed Suspension Drive Train
- 4.3 Accumulation and submission of all COCs acquired for the relevant units of competency comprising a qualification, an individual shall be issued the corresponding National Certificate.
- 4.4 Assessment shall focus on the core units of competency. The basic and common units shall be integrated or assessed concurrently with the core units.
- 4.5 The following are qualified to apply for assessment and certification:
- 4.5.1 Holder of Automotive Mechanical Assembly NC II or equivalent qualification; or
 - 4.5.2 Graduates of formal, non-formal and informal including enterprise-based training programs.
 - 4.5.3 Experienced workers (wage employed or self employed)
- 4.6 The guidelines on assessment and certification are discussed in detail in the *“Procedures Manual on Assessment and Certification”* and *“Guidelines on the Implementation of the Philippine TVET Qualification and Certification System (PTQCS)”*.

COMPETENCY MAP- AUTOMOTIVE SECTOR MANUFACTURING SUB SECTOR (PARTS ASSEMBLY)



DEFINITION OF TERMS

1. **Automotive Vehicles** These are motor vehicles whose gross vehicle weight is equal or less than 3,500 kgs. Powered by a gas or diesel engine. It could be a passenger car or a light utility vehicle
2. **Automotive Mechanical Assembly Technician** Refers to an all around auto mechanical assembly man that can perform all mechanical assembly works from assembling of mechanical assemblies to mounting and installation to automotive vehicle body.
3. **Adhesives** Substance used to hold gasket in place during assembly. It also maintains a tight seal by filling in small irregularities on a surface and prevents gasket from shifting due to vibration.
4. **Point of Fit** Refers to the assembly area where parts / materials / assemblies are used or consumed
5. **Mechanical Assemblies** Type of construction in which different and related parts/components are converted into sub-assembly form.
6. **Hardware Parts** Refers to bolts, nuts, screws, washers and other small parts
7. **Catalytic Converter** The control device fitted in the exhaust system of an internal combustion engine. The converter reduces the toxicity of products of combustion by catalytic re-combination
8. **Assembly Manuals** Reference manuals with illustration or drawings of parts/components and its direction on how they are mounted or installed on the automotive vehicle or certain assemblies.
9. **Quality Inspection Manuals** Reference manuals with explanation on what quality standards have to be maintained in the conduct of assembling automotive vehicle
10. **Work Order** A work order is a form of instruction that is broadcasted either by manual or by electronic system by preceding stations to the next stations regarding on what model sequence to produce on a timely-structured manner.
11. **Job Requirements** Refers to specific specifications of model/variant to be assembled.
12. **Standard Operation Sheet** Is a listing of process elements arrange according to the assembly sequence for a given job requirements
13. **Intake Manifold** Tubing attached to the engine through which the air/fuel mixture reaches the cylinder.
14. **Master Cylinder** The liquid-filled cylinder in the hydraulic brake system or

clutch, where hydraulic pressure is developed when depresses a foot pedal.

15. Power Steering column

Steering that has been designed to make the wheel move more easily than in a manual steering system. Hydraulic assists the process utilizing hydraulic fluid. The fluid increases pressure in the power steering pump and aids in the movement of the steering mechanism. This fluid, called power steering fluid, is what is replaced at regular intervals to keep steering soft and comfortable.

16. Jigs/fixtures

Kind of equipment that is used for sub-assembly operations in order to meet the desired dimensions and outcome of a certain assembly.

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