

SKILLED**TRADES**^{BC}

PROGRAM OUTLINE

Auto Body and Collision Technician

The latest version of this document is available in PDF format on the SkilledTradesBC website
www.skilledtradesbc.ca

To order printed copies of Program Outlines
or learning resources (where available)
for BC trades contact:

Crown Publications, Queen's Printer
Web: www.crownpub.bc.ca
Email: crownpub@gov.bc.ca
Toll Free 1-800-663-6105

Copyright © 2019 SkilledTradesBC

This publication may not be modified in any way without permission of SkilledTradesBC

AUTO BODY AND COLLISION TECHNICIAN PROGRAM OUTLINE

**APPROVED BY INDUSTRY
MAY 2020**

**BASED ON
RSOS 2019**

**Developed by
SkilledTradesBC
Province of British Columbia**

TABLE OF CONTENTS

Section 1 INTRODUCTION.....	3
Foreword.....	4
Acknowledgements.....	5
How to Use this Document.....	6
Section 2 PROGRAM OVERVIEW	8
Program Credentialing Model	9
Occupational Analysis Chart.....	10
Training Topics and Suggested Time Allocation: Common Core Level 1.....	15
Training Topics and Suggested Time Allocation: Level 2.....	17
Training Topics and Suggested Time Allocation: Level 3.....	19
Training Topics and Suggested Time Allocation: Level 4.....	21
Section 3 PROGRAM CONTENT.....	22
Common Core Level 1 Automotive Collision and Refinishing	23
Level 2 Auto Body and Collision Technician.....	93
Level 3 Auto Body and Collision Technician.....	135
Level 4 Auto Body and Collision Technician.....	170
Section 4 ASSESSEMENT GUIDELINES.....	189
Assessment Guidelines – Common Core Level 1	190
Assessment Guidelines – Level 2.....	192
Assessment Guidelines – Level 3.....	194
Assessment Guidelines – Level 4.....	195
Section 5 TRAINING PROVIDER STANDARDS.....	196
Facility Requirements	197
Tools and Equipment.....	198
Reference Materials.....	203
Instructor Requirements.....	204
Appendices	205
Appendix A Acronyms and Glossary.....	206
Appendix B: Practical Assessments.....	210
Appendix C: Previous Contributors	212

Section 1

INTRODUCTION

Auto Body and Collision Technician

Foreword

This revised Program Outline is intended as a guide for instructors, apprentices, and employers of apprentices as well as for the use of industry organizations, regulatory bodies, and provincial and federal governments. It reflects updated standards based on the 2019 Red Seal Occupational Standard (RSOS). It was developed by British Columbia industry and instructor subject matter experts.

Practical instruction by demonstration and student participation should be integrated with classroom sessions. Safe working practices, even though not always specified in each operation or topic, are an implied part of the program and should be stressed throughout the apprenticeship.

This Program Outline includes a list of recommended reference textbooks that are available to support the learning objectives and the minimum shop requirements needed to support instruction.

Competencies are to be evaluated through written exams and practical assessments. A passing grade is achieved by getting an overall mark of 70%. See the Assessment Guidelines in Section 4 for more details.

Achievement Criteria are included for those competencies that require a practical assessment. The intent of including Achievement Criteria in the Program Outline is to ensure consistency in training across the many training institutions in British Columbia. Their purpose is to reinforce the theory and to provide a mechanism for evaluation of the learner's ability to apply the theory to practice. It is important that these performances be observable and measurable and that they reflect the skills spelled out in the competency. The conditions under which these performances will be observed and measured must be clear to the learner as well as the criteria by which the learner will be evaluated. The learner must also be given the evaluation criteria.

The performance spelled out in the Achievement Criteria is a suggested performance and is not meant to stifle flexibility of delivery. Training providers are welcome to substitute other practical performances that measure similar skills and attainment of the competency. Multiple performances may also be used to replace individual performances where appropriate.

SAFETY ADVISORY

Be advised that references to the WorkSafeBC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: <http://www.worksafebc.com>). Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.

Acknowledgements

The Credentialing Model was developed with the advice and direction of the Collision, Refinishing and Auto Glass focus group. Members include:

- Troy Campbell, Insurance Corporation of BC
- Darren Cox, Automotive Retailers Association
- Kyle Kushnir, Color Compass
- David Ribeiro, Automotive Retailers Association
- Kevin Walsh, Insurance Corporation of BC
- Tate Westerman, Doc's Autobody

The Program Outline was prepared with the advice and direction of a program review committee. Members include:

- Dave Cross, Vancouver Community College
- Mark Deroche, BC Institute Technology
- John Euloth, Okanagan College
- Byron Hyashi, College of New Caledonia
- Mike Japuncic, Craftsman Collision
- Kyle Kushnir, Color Compass
- Nick Penner, University of the Fraser Valley
- Oliver Teal, Auto Mind Collision Group
- Bianca Then, Craftsman Collision
- Norman Van der Linden, Don Beck Collision
- Tate Westerman, Doc's Auto Body

SkilledTradesBC would like to acknowledge the dedication and hard work of all representatives appointed to identify the training requirements of the Auto Body and Collision Technician occupation.

How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Program Credentialing Model	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
Occupational Analysis Chart (OAC)	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
Training Topics and Suggested Time Allocation	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the relative weightings of various competencies of the occupation on which assessment is based
Program Content	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measureable achievement criteria for objectives with a practical component.	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels
Training Provider Standards	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment

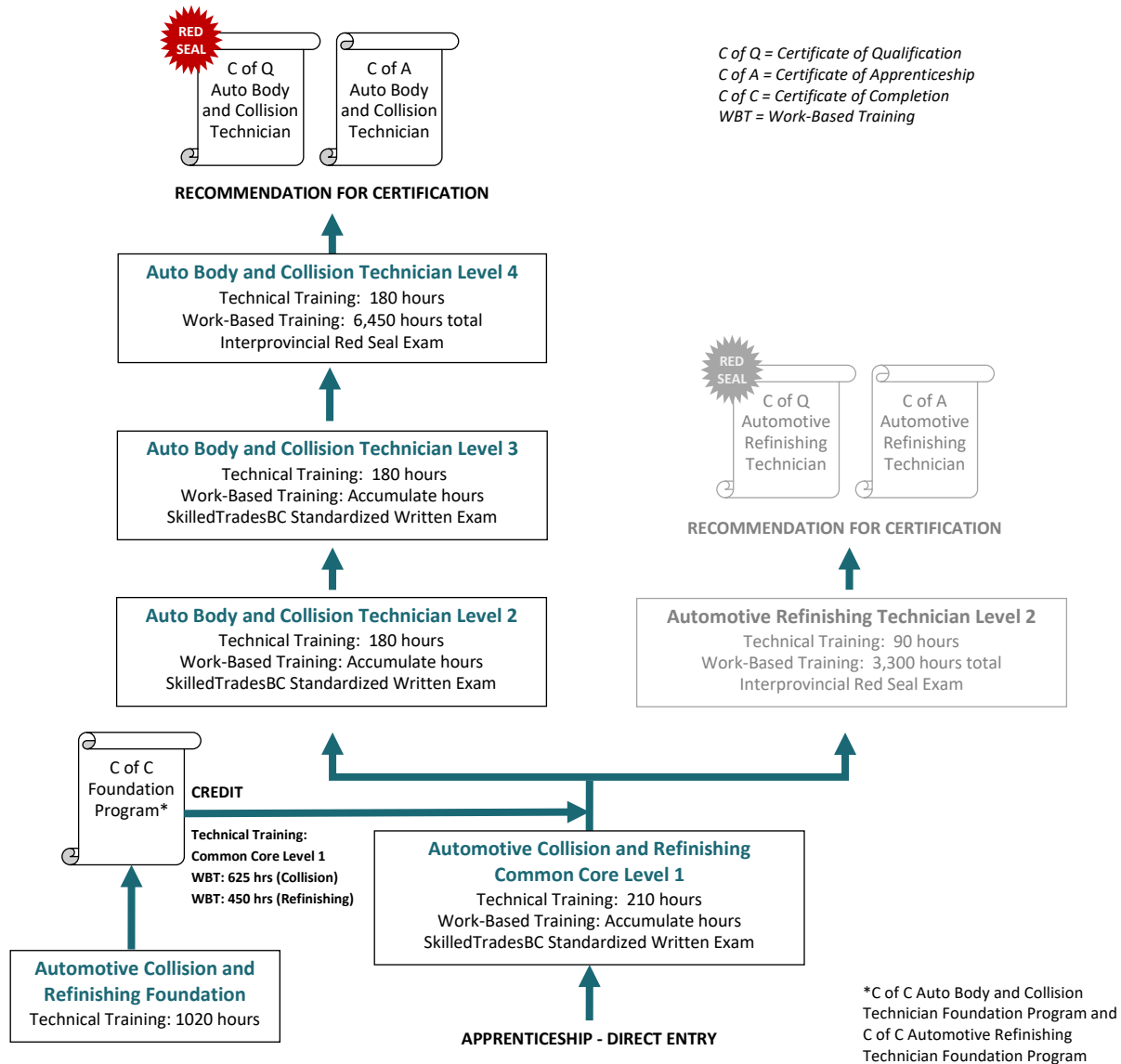
Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Appendix – Acronyms Glossary and			Defines program specific acronyms and terms	

Section 2

PROGRAM OVERVIEW

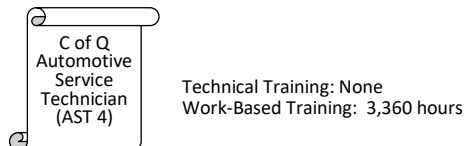
Auto Body and Collision Technician

Program Credentialing Model



CROSS-PROGRAM CREDITS INTO COLLISION PROGRAM

Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program. This credit does not apply to the Refinishing program.



Occupational Analysis Chart

AUTO BODY AND COLLISION TECHNICIAN

Occupation Description:

Auto body and collision technicians repair and restore damaged motor vehicles. They assess body damage and develop repair estimates and repair plans. Their repair work may include repairing scratches, minor damage, dents and extensive structural damage. Some components may need to be removed for access during repairs. Vehicle components that are damaged beyond repair are replaced. The alignment and replacement of suspension and steering components is also performed in this trade. Technicians may restore interior components of vehicles. They may work with mechanical and electronic components such as air conditioning (A/C) systems, exhaust systems, drivetrain, engine cooling systems, advanced electronic components (adaptive cruise control and lane departure features), and passenger restraint systems (seat belts and air bags).

Many auto body and collision technicians work in close contact with automotive refinishing technicians and tend to work in multi-shop companies, independent, restoration or dealership shops. They may also work with estimators, partspersons, detailers, preppers, glass installers and production managers. Some of the skills of this trade may be transferred to other occupations such as sheet metal worker, industrial painter, welder, automotive refinishing technician, truck and transport mechanic, recreation vehicle service technician, glazier or automotive service technician and to other sectors such as manufacturing, aviation and marine.

CC1 = Automotive Collision and Refinishing Common Core Level 1

R-2 = Automotive Refinishing Technician Level 2 **only**

C-2 = Auto Body and Collision Technician Level 2 only

2 = **Both** Refinishing and Collision Level 2

PERFORM SAFETY-RELATED FUNCTIONS A	Maintain safe work environment A1					Use personal protective equipment (PPE) and safety equipment A2				
	CC1					CC1				

USE TOOLS AND EQUIPMENT B	Maintain hand and power tools B1					Use lifting equipment B2					Maintain spray booth B3					Maintain spray equipment B4					Maintain mixing equipment B5					Maintain shop equipment B6				
	CC1					CC1	C-2				CC1					CC1	2				CC1	2				CC1				

Program Overview

	<div>Use curing and drying equipment</div> <div>B7</div> <div>CC1R-2</div>	<div>Maintain frame and unibody repair and measuring equipment</div> <div>B8</div> <div>34</div>	<div>Use diagnostic equipment</div> <div>B9</div> <div>3</div>		
USE WELDING EQUIPMENT C	<div>Use cutting and heating equipment</div> <div>C1</div> <div>CC1</div>	<div>Use welding equipment</div> <div>C2</div> <div>CC1C-23</div>	<div>Maintain welding equipment</div> <div>C3</div> <div>CC1C-2</div>		
ORGANIZE WORK AND USE DOCUMENTATION D	<div>Organize parts, materials and work area</div> <div>D1</div> <div>CC1C-2</div>	<div>Use documentation</div> <div>D2</div> <div>CC1R-2</div>	<div>Perform inspections</div> <div>D3</div> <div>CC1R-2</div>	<div>Organize production schedule</div> <div>D4</div> <div>CC1R-2</div>	<div>Prepare repair plan</div> <div>D5</div> <div>2</div>
					<div>Prepare estimates and supplements</div> <div>D6</div> <div>R-234</div>
USE COMMUNICATION AND MENTORING TECHNIQUES E	<div>Use communication techniques</div> <div>E1</div> <div>CC1</div>	<div>Use mentoring techniques</div> <div>E2</div> <div>R-24</div>			
REMOVE AND INSTALL VEHICLE COMPONENTS F	<div>Identify vehicle components</div> <div>F1</div> <div>CC1</div>	<div>Remove trim and hardware</div> <div>F2</div> <div>CC1</div>	<div>Install trim and hardware</div> <div>F3</div> <div>CC1</div>		
PREPARE SURFACE G	<div>Perform initial preparation</div> <div>G1</div> <div>CC1</div>	<div>Mask surface</div> <div>G2</div> <div>CC1R-2</div>	<div>Strip surface</div> <div>G3</div> <div>CC1</div>	<div>Sand surface</div> <div>G4</div> <div>CC1</div>	

Program Overview

USE REPAIR MATERIALS AND EQUIPMENT H	Mix repair materials H1	Prepare spray booth H2	Perform spray gun set up H3	Apply repair materials H4		
	CC1	2	2	2		
APPLY REFINISHING MATERIALS I	Mix refinishing materials I1	Apply primer sealers I2	Apply single-stage paint I3	Apply base coat/clear coat I4	Troubleshoot refinish problems I5	Perform colour adjustment I6
	CC1	2	2	2	R-2	2
PERFORM POST-REFINISHING FUNCTIONS J	Remove masking materials J1	Correct surface imperfections J2	Perform final check J3			
	R-2	2	R-2			
REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS K	Identify fundamentals of vehicle construction, metal and damage K1	Prepare metal panels and components for repair K2	Remove metal panels and components K3	Repair metal panels and components K4	Install metal panels and components K5	
	CC1	C-2	2	C-2	2	
REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS L	Identify fundamentals of plastics and composite panels and components L1	Prepare plastic and composite panels and components for repair L2	Remove plastic and composite panels and components L3	Repair plastic and composite panels and components L4	Install plastic and composite panels and components L5	
	CC1	C-2	C-2	C-2	C-2	
DETAIL EXTERIOR M	Remove minor imperfections M1	Clean exterior and interior of vehicle M2				
	CC1	2				

PERFORM FINAL INSPECTIONS N	Perform final operational check					Perform final quality control inspections				
	N1					N2				
			3						4	
APPLY CORROSION PROTECTION AND SOUND DEADENING MATERIALS O	Apply corrosion inhibitors and undercoats					Apply seam sealers and sound deadeners				
	O1					O2				
		C-2					C-2			
PREPARE FOR STRUCTURAL REPAIR P	Identify extent of damage					Remove components for access				
	P1					P2				
			3	4				3	4	
REMOVE, REPAIR AND INSTALL STRUCTURAL COMPONENTS Q	Repair structural components					Remove structural components				
	Q1					Q2				
			3	4				3		
REMOVE, INSTALL AND REPAIR STRUCTURAL AND LAMINATED GLASS R	Remove structural glass					Install structural glass				
	R1					R2				
		C-2					C-2			
REMOVE AND INSTALL NON-STRUCTURAL GLASS S	Remove non-structural glass					Install non-structural glass				
	S1					S2				
		C-2					C-2			
					Perform vehicle set up					
					P3					
								3	4	
					Install structural components					
					Q3					
								3		
					Repair laminated glass					
					R3					
							C-2			

Program Overview

DEACTIVATE AND REACTIVATE ALTERNATE-FUEL SYSTEMS T	Deactivate alternate-fuel systems					Reactivate alternate-fuel systems				
	T1					T2				
			3					3		
REMOVE AND INSTALL MECHANICAL COMPONENTS U	Identify fundamentals of heating and cooling systems and components					Identify fundamentals of powertrain systems and components				
	U1					U2				
			3					3		
									4	
REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS V	Identify fundamentals of electrical systems and components					Remove electrical components				
	V1					V2				
			3					3		
								3		
REPAIR AND REPLACE INTERIOR COMPONENTS W	Repair interior components					Replace interior components				
	W1					W2				
		C-2						C-2		
SERVICE SUPPLEMENTAL RESTRAINT SYSTEMS (SRS) X	Service seat belt restraint systems					Service air bags and related components				
	X1					X2				
			3					3		

Training Topics and Suggested Time Allocation

AUTOMOTIVE COLLISION AND REFINISHING – COMMON CORE LEVEL 1

		% of Time Allocated to:			
		% of Time	Theory	Practical*	Total
Line A	PERFORM SAFETY-RELATED FUNCTIONS	5%	100%	0%	100%
A1	Maintain safe work environment		✓		
A2	Use personal protective equipment (PPE) and safety equipment		✓		
Line B	USE TOOLS AND EQUIPMENT	8%	70%	30%	100%
B1	Maintain hand and power tools		✓		
B2	Use lifting equipment		✓	✓	
B3	Maintain spray booth		✓		
B4	Maintain spray equipment		✓	✓	
B5	Maintain mixing equipment		✓	✓	
B6	Maintain shop equipment		✓		
B7	Use curing and drying equipment		✓	✓	
Line C	USE WELDING EQUIPMENT	14%	50%	50%	100%
C1	Use cutting and heating equipment		✓	✓	
C2	Use welding equipment		✓	✓	
C3	Maintain welding equipment		✓		
Line D	ORGANIZE WORK AND USE DOCUMENTATION	3%	80%	20%	100%
D1	Organize parts, materials and work area		✓	✓	
D2	Use documentation		✓	✓	
D3	Perform inspections		✓	✓	
D4	Organize production schedule		✓		
Line E	USE COMMUNICATION AND MENTORING TECHNIQUES	3%	90%	10%	100%
E1	Use communication techniques		✓	✓	
Line F	REMOVE AND INSTALL VEHICLE COMPONENTS	13%	30%	70%	100%
F1	Identify vehicle components		✓		
F2	Remove trim and hardware		✓	✓	
F3	Install trim and hardware		✓	✓	
Line G	PREPARE SURFACE	18%	30%	70%	100%
G1	Perform initial preparation		✓	✓	
G2	Mask surface		✓	✓	
G3	Strip surface		✓		
G4	Sand surface		✓	✓	
Line H	USE REPAIR MATERIALS AND EQUIPMENT	5%	20%	80%	100%
H1	Mix repair materials		✓	✓	
H2	Prepare spray booth		✓	✓	
H3	Perform spray gun set up		✓	✓	
H4	Apply repair materials		✓	✓	

		% of Time Allocated to:			
		% of Time	Theory	Practical*	Total
Line I	APPLY REFINISHING MATERIALS	5%	60%	40%	100%
I1	Mix refinishing materials		✓	✓	
I2	Apply primer sealers		✓	✓	
I3	Apply single-stage paint		✓	✓	
I4	Apply base coat/clear coat		✓	✓	
Line K	REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS	15%	60%	40%	100%
K1	Identify fundamentals of vehicle construction, metal and damage		✓		
K2	Prepare metal panels and components for repair		✓	✓	
K3	Remove metal panels and components		✓	✓	
K4	Repair metal panels and components		✓	✓	
K5	Install metal panels and components		✓	✓	
Line L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS	7%	30%	70%	100%
L1	Identify fundamentals of plastics and composite panels and components		✓		
L2	Prepare plastic and composite panels and components for repair		✓	✓	
L3	Remove plastic and composite panels and components		✓		
L4	Repair plastic and composite panels and components		✓	✓	
L5	Install plastic and composite panels and components		✓		
Line M	DETAIL EXTERIOR	4%	50%	50%	100%
M1	Remove minor imperfections		✓	✓	
M2	Clean exterior and interior of vehicle		✓		
Total Percentage for Automotive Collision and Refinishing Common Core Level 1		100%			

***Note:** The checkmarks (✓) in the column titled *Practical* indicate that some of the learning tasks associated with the competency will be hands on; they do **not** indicate that a practical assessment, i.e. Achievement Criteria is expected. Achievement Criteria are reflected in the Assessment Guidelines towards the end of the document, and are summarized in the Appendix.

Training Topics and Suggested Time Allocation

AUTO BODY AND COLLISION TECHNICIAN – LEVEL 2

		% of Time Allocated to:			
		% of Time	Theory	Practical*	Total
Line B	USE TOOLS AND EQUIPMENT	3%	30%	70%	100%
B2	Use lifting equipment		✓	✓	
B4	Maintain spray equipment		✓	✓	
B5	Maintain mixing equipment		✓	✓	
Line C	USE WELDING EQUIPMENT	11%	30%	70%	100%
C2	Use welding equipment		✓	✓	
C3	Maintain welding equipment		✓		
Line D	ORGANIZE WORK AND USE DOCUMENTATION	2%	50%	50%	100%
D1	Organize parts, materials and work area		✓	✓	
D5	Prepare repair plan		✓	✓	
Line H	USE REPAIR MATERIALS AND EQUIPMENT	2%	10%	90%	100%
H2	Prepare spray booth		✓		
H3	Perform spray gun set up		✓	✓	
Line I	APPLY REFINISHING MATERIALS	14%	90%	10%	100%
I1	Mix refinishing materials		✓	✓	
I2	Apply primer sealers		✓	✓	
I3	Apply single-stage paint		✓		
I4	Apply base coat/clear coat		✓		
I6	Perform colour adjustment		✓		
Line J	PERFORM POST-REFINISHING FUNCTIONS	3%	25%	75%	100%
J2	Correct surface imperfections		✓	✓	
Line K	REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS	30%	40%	60%	100%
K1	Identify fundamentals of vehicle construction, metal and damage		✓		
K4	Repair metal panels and components		✓	✓	
Line L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS	10%	50%	50%	100%
L1	Identify fundamentals of plastics and composite panels and components		✓		
L2	Prepare plastic and composite panels and components for repair		✓	✓	
L3	Remove plastic and composite panels and components		✓		
L4	Repair plastic and composite panels and components		✓	✓	
L5	Install plastic and composite panels and components		✓		
Line O	APPLY CORROSION PROTECTION AND SOUND DEADENING MATERIALS	6%	60%	40%	100%

		% of Time Allocated to:			
		% of Time	Theory	Practical*	Total
O1	Apply corrosion inhibitors and undercoats		✓	✓	
O2	Apply seam sealers and sound deadeners		✓	✓	
Line R	REMOVE, INSTALL AND REPAIR STRUCTURAL AND LAMINATED GLASS	6%	100%	0%	100%
R1	Remove structural glass		✓		
R2	Install structural glass		✓		
R3	Repair laminated glass		✓		
Line S	REMOVE AND INSTALL NON-STRUCTURAL GLASS	7%	40%	60%	100%
S1	Remove non-structural glass		✓	✓	
S2	Install non-structural glass		✓		
Line W	REPAIR AND REPLACE INTERIOR COMPONENTS	6%	100%	0%	100%
W1	Repair interior components		✓		
W2	Replace interior components		✓		
Total Percentage for Auto Body and Collision Technician Level 2		100%			

***Note:** The checkmarks (✓) in the column titled Practical indicate that some of the learning tasks associated with the competency will be hands on; they do **not** indicate that a practical assessment, i.e. Achievement Criteria is expected. Achievement Criteria are reflected in the Assessment Guidelines towards the end of the document, and are summarized in the Appendix.

Training Topics and Suggested Time Allocation

AUTO BODY AND COLLISION TECHNICIAN – LEVEL 3

		% of Time Allocated to:			
		% of Time	Theory	Practical*	Total
Line B	USE TOOLS AND EQUIPMENT	8%	80%	20%	100%
B8	Maintain frame and unibody repair and measuring equipment		✓		
B9	Use diagnostic equipment		✓	✓	
Line C	USE WELDING EQUIPMENT	7%	20%	80%	100%
C2	Use welding equipment		✓	✓	
Line D	ORGANIZE WORK AND USE DOCUMENTATION	3%	40%	60%	100%
D6	Prepare estimates and supplements		✓	✓	
Line N	PERFORM FINAL INSPECTIONS	2%	20%	80%	100%
N1	Perform final operational check		✓	✓	
Line P	PREPARE FOR STRUCTURAL REPAIR	13%	50%	50%	100%
P1	Identify extent of damage		✓	✓	
P2	Remove components for access		✓		
P3	Perform vehicle set up		✓	✓	
Line Q	REMOVE, REPAIR AND INSTALL STRUCTURAL COMPONENTS	13%	50%	50%	100%
Q1	Repair structural components		✓		
Q2	Remove structural components		✓		
Q3	Install structural components		✓	✓	
Line T	DEACTIVATE AND REACTIVATE ALTERNATE-FUEL SYSTEMS	3%	90%	10%	100%
T1	Deactivate alternate-fuel systems		✓	✓	
T2	Reactivate alternate-fuel systems		✓		
Line U	REMOVE AND INSTALL MECHANICAL COMPONENTS	18%	100%	0%	100%
U1	Identify fundamentals of heating and cooling systems and components		✓		
U2	Identify fundamentals of powertrain systems and components		✓		
U4	Remove mechanical components		✓		
U5	Install mechanical components		✓		
Line V	REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS	26%	70%	30%	100%
V1	Identify fundamentals of electrical systems and components		✓	✓	
V2	Remove electrical components		✓		
V3	Repair damaged wires and protective coverings		✓	✓	
V4	Install electrical components		✓		
V5	Service advanced electronic components		✓		

		% of Time Allocated to:			
		% of Time	Theory	Practical*	Total
Line X	SERVICE SUPPLEMENTAL RESTRAINT SYSTEMS (SRS)	7%	100%	0%	100%
X1	Service seat belt restraint systems		✓		
X2	Service air bags and related components		✓		
Total Percentage for Auto Body and Collision Technician Level 3		100%			

***Note:** The checkmarks (✓) in the column titled Practical indicate that some of the learning tasks associated with the competency will be hands on; they do **not** indicate that a practical assessment, i.e. Achievement Criteria is expected. Achievement Criteria are reflected in the Assessment Guidelines towards the end of the document, and are summarized in the Appendix.

Training Topics and Suggested Time Allocation

AUTO BODY AND COLLISION TECHNICIAN – LEVEL 4

		% of Time Allocated to:			
		% of Time	Theory	Practical*	Total
Line B	USE TOOLS AND EQUIPMENT	3%	100%	0%	100%
B8	Maintain frame and unibody repair and measuring equipment		✓		
Line D	ORGANIZE WORK AND USE DOCUMENTATION	7%	50%	50%	100%
D6	Prepare estimates and supplements		✓	✓	
Line E	USE COMMUNICATION AND MENTORING TECHNIQUES	7%	100%	0%	100%
E2	Use mentoring techniques		✓		
Line N	PERFORM FINAL INSPECTIONS	2%	25%	75%	100%
N2	Perform final quality control inspections		✓	✓	
Line P	PREPARE FOR STRUCTURAL REPAIR	22%	40%	60%	100%
P1	Identify extent of damage		✓	✓	
P2	Remove components for access		✓		
P3	Perform vehicle set up		✓	✓	
Line Q	REMOVE, REPAIR AND INSTALL STRUCTURAL COMPONENTS	25%	25%	75%	100%
Q1	Repair structural components		✓	✓	
Line U	REMOVE AND INSTALL MECHANICAL COMPONENTS	20%	75%	25%	100%
U3	Identify fundamentals of steering, suspension and braking systems		✓		
U4	Remove mechanical components		✓	✓	
U5	Install mechanical components		✓	✓	
Line V	REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS	14%	100%	0%	100%
V5	Service advanced electronic components		✓		
Total Percentage for Auto Body and Collision Technician Level 4		100%			

***Note:** The checkmarks (✓) in the column titled Practical indicate that some of the learning tasks associated with the competency will be hands on; they do **not** indicate that a practical assessment, i.e. Achievement Criteria is expected. Achievement Criteria are reflected in the Assessment Guidelines towards the end of the document, and are summarized in the Appendix.

Section 3

PROGRAM CONTENT

Auto Body and Collision Technician

Common Core Level 1

Automotive Collision and Refinishing

Line (GAC): A PERFORM SAFETY-RELATED FUNCTIONS

Competency: A1 Maintain safe work environment

Objectives

To be competent in this area, the individual must be able to:

- Maintain safe work environment.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| <p>1. Describe WorkSafeBC and Occupational Health and Safety (OHS) regulations</p> | <ul style="list-style-type: none"> • Rights and responsibilities <ul style="list-style-type: none"> ○ Right to refuse work ○ Reporting accidents ○ Investigations • Substance use • Volatile Organic Compounds (VOC) • Spills • Eye wash facilities |
| <p>2. Describe safe work practices</p> | <ul style="list-style-type: none"> • Job Hazard Analysis (JHA) • Location of safety equipment and exits • Safe vehicle operation <ul style="list-style-type: none"> ○ Speed limit ○ Moving vehicles around shop • Vehicle hazards <ul style="list-style-type: none"> ○ Alternative fuels ○ Electrical components <ul style="list-style-type: none"> ▪ Battery disconnect ▪ Jump start a vehicle ▪ Surge protection ○ Supplemental Restraint Systems (SRS) ○ Heating, Ventilation and Air Conditioning (HVAC) • Clean and organized work area • Lockout procedures • Flammable, explosion, and electrical hazards • Using compressed air • Ventilation systems |
| <p>3. Describe fire safety procedures</p> | <ul style="list-style-type: none"> • Component and causes of fire <ul style="list-style-type: none"> ○ Fuel ○ Heat |

LEARNING TASKS

CONTENT

- | | |
|--|--|
| <p>4. Use Workplace Hazardous Materials Information System (WHMIS)</p> | <ul style="list-style-type: none"> ○ Oxygen • Flammability <ul style="list-style-type: none"> ○ Flash points • Types of fires <ul style="list-style-type: none"> ○ Class A, B, C and D fires • Fire extinguishers • Fire prevention equipment <ul style="list-style-type: none"> ○ Emergency fire blanket • Precautions when working with flammable substances • Storage of flammable materials <ul style="list-style-type: none"> ○ Gasoline ○ Solvents |
| <p></p> | <ul style="list-style-type: none"> • WHMIS <ul style="list-style-type: none"> ○ Right to know ○ Worker education ○ Product identification • Roles and responsibilities <ul style="list-style-type: none"> ○ Employers ○ Suppliers ○ Workers • Labelling <ul style="list-style-type: none"> ○ Symbols • Safety Data Sheets (SDS) <ul style="list-style-type: none"> ○ Hazards ○ Handling ○ Ingredients • Storage • Disposal |

Line (GAC):	A	PERFORM SAFETY-RELATED FUNCTIONS
Competency:	A2	Use personal protective equipment (PPE) and safety equipment

Objectives

To be competent in this area, the individual must be able to:

- Use PPE.
- Describe safety equipment.

LEARNING TASKS

1. Use PPE

CONTENT

- Canadian Standards Association (CSA) approved
- Eye protection
 - Goggles
 - Glasses
 - Face shields
- Respiratory protection
 - Particulate mask
 - Air-supplied/breathable air
 - Cartridge
 - Fit test
- Skin protection
 - Gloves
 - Insulated
 - Nitrile
 - Leather
 - Coveralls
 - Barrier creams
- Foot/knee protection
- Hearing protection
- Selection
- Storage
- Maintenance

2. Describe safety equipment

- Fire suppression systems
 - Extinguishers
 - Sprinklers
- Ventilation systems
- Eye wash stations
- Spill kits
- First aid kits

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B1 Maintain hand and power tools

Objectives

To be competent in this area, the individual must be able to:

- Describe the use of hand tools for collision and refinishing.
- Describe the use of power tools for collision and refinishing.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| 1. Describe hand tools for collision and refinishing | <ul style="list-style-type: none"> • Basic hand tools <ul style="list-style-type: none"> ○ Screwdrivers ○ Sockets ○ Wrenches ○ Pliers ○ Cutting tools ○ Scraping tools • Bumping and straightening tools <ul style="list-style-type: none"> ○ Hammers ○ Dollies ○ Spoons ○ Picks/pry bars • Material application tools • Removal and installation tools <ul style="list-style-type: none"> ○ Trim tools • Sanding blocks • Measuring equipment <ul style="list-style-type: none"> ○ Tape measure ○ Tram gauge ○ Metric/imperial |
| 2. Describe the use of hand tools | <ul style="list-style-type: none"> • Hazards/safety <ul style="list-style-type: none"> ○ Recognizing worn, broken and defective hand tools • Limitations • Torque specifications • Maintainance • Storage |
| 3. Describe power tools for refinishing and collision | <ul style="list-style-type: none"> • Power source <ul style="list-style-type: none"> ○ Electric/cordless ○ Pneumatic ○ Hydraulic |

LEARNING TASKS

CONTENT

- | | |
|---|---|
| <p>4. Describe the use of power tools</p> | <ul style="list-style-type: none"> • Function/type <ul style="list-style-type: none"> ○ Blow guns ○ Heat guns ○ Polishers ○ Sanders ○ Grinders ○ Ratchets ○ Eraser wheels ○ Impact guns ○ Cutting tools ○ Body jack ○ Riveters ○ Sealing guns ○ Static mixer
 • Hazards/safety <ul style="list-style-type: none"> ○ Frayed cords ○ Cracked casings ○ Leaking lines ○ Work environment
 • Operating procedures • Limitations • Maintenance • Sharpening/dressing • Storage |
|---|---|

Line (GAC): **B USE TOOLS AND EQUIPMENT**
Competency: **B2 Use lifting equipment**

Objectives

To be competent in this area, the individual must be able to:

- Use lifting equipment.

LEARNING TASKS

1. Describe lifting equipment

2. Use lifting equipment

CONTENT

- Types of equipment
 - Floor jacks/bottle jacks
 - Safety stands
 - Hoists
 - Air jacks
 - Frame bench/racks
 - Wheel dollies
- Inspections
- Limitations
- Applications (Apps)
- Placement
 - Lifting locations and points
- Maintenance
- Storage
- Lifting and jacking
- Raising and lowering
- Wheel removal and installation (R & I)
- Vehicle operation

Achievement Criteria

Performance The learner will perform vehicle lifting.

Conditions The learner will be given

- Vehicle
- Lifting equipment
- Supporting equipment
- Specifications

Criteria The learner will be evaluated on

- Safety
- Equipment selection
- Accuracy of lift points
- Lift and lowering techniques

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B3 Maintain spray booth

Objectives

To be competent in this area, the individual must be able to:

- Describe operation and maintenance of spray booths.

LEARNING TASKS

1. Describe spray booth types

2. Describe spray booth components

3. Describe the operation and maintenance of spray booths, mixing room and components

CONTENT

- Downdrafts
- Crossdrafts (crossflows)
- Semi-downdrafts
- Prep stations
- Side loading

- Intake
 - Air makeup
- Exhaust
- Manometers and magnehelics
- Filtration
 - Pre-intake
 - Intake
 - Exhaust
 - Air transformers
- Air blowers
- Lighting
- Seals and gaskets
- Belts
- Hoses and fittings
- Glass
- Curtains
- Controls

- Schedules
- Inspection
- Cleaning
- Replacement
 - Filters
 - Lights
 - Seals
 - Booth coating

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B4 Maintain spray equipment

Objectives

To be competent in this area, the individual must be able to:

- Maintain spray equipment.

LEARNING TASKS

1. Describe spray equipment

CONTENT

- Spray gun types
 - Gravity feed
 - Pressure feed
 - Siphon feed
 - Electrostatic
 - Spray gun components
 - Body
 - Trigger
 - Regulators
 - Air cap
 - Seals and packings
 - Spreader adjustment
 - Fluid adjustment
 - Fluid nozzle
 - Fluid needle
 - Cup
 - Nitrogen generators
 - Anti-static guns
-
- Inspection
 - Cleaning
 - Lubrication
 - Disassembly and reassembly
 - Specialty wrenches
 - Storage

2. Maintain spray equipment

Achievement Criteria

Performance The learner will perform spray equipment maintenance and test spray.

Conditions The learner will be given:

- Spray equipment
- Task guideline
- Necessary materials

Criteria	The learner will be evaluated on: <ul style="list-style-type: none">• Safety• Tool use• Environmental practices• Assembly and disassembly• Spray equipment cleanliness and performance
----------	--

Line (GAC): B USE TOOLS AND EQUIPMENT
Competency: B5 Maintain mixing equipment

Objectives

To be competent in this area, the individual must be able to:

- Use paint manufacturers' equipment.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe paint manufacturers' equipment | <ul style="list-style-type: none"> • Computers and software • Scales • Agitating machines • Mixing sticks • Cups • Shakers • Spectrophotometers • Colour corrective light • Colour chips/variant deck |
| 2. Use paint manufacturers' equipment | <ul style="list-style-type: none"> • Navigating software • Updating software • Mixing product • Equipment maintenance |

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B6 Maintain shop equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe shop equipment for collision and refinishing.
- Describe the maintenance of shop equipment for collision and refinishing.

LEARNING TASKS

1. Describe shop equipment for collision and refinishing

CONTENT

- Stud welder
- Dent puller
- Welding equipment
 - Resistance spot welders
 - Plastic welders
 - Gas Metal Arc Welding (GMAW)
 - Surge protectors
- Battery chargers and boosters
- Hydraulic body jack
- Stands
- Scan tools
- Pulling equipment
- Paintless
- Hydraulic
 - Jacks
 - Lifts
- Air dryer
 - Refrigerant
 - Dessicant
- Gun washers
- Track systems
- Drying equipment
 - Infra-red lamps
 - Ultra Violet (UV) lamps
- Extractors
- Masking machines
- Paper compactors

2. Describe air compressors

- Types
 - Diaphragm
 - Piston
 - Rotary

LEARNING TASKS

CONTENT

- | | |
|--|--|
| <p>3. Describe the maintenance of shop equipment for collision and refinishing</p> | <ul style="list-style-type: none"> • Properties <ul style="list-style-type: none"> ○ Air pressure ○ Volume ○ Displacement ○ Pressure loss
 • Lubrication • Cleaning • Consumables replacement • Unsafe tools • Storage |
|--|--|

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B7 Use curing and drying equipment

Objectives

To be competent in this area, the individual must be able to:

- Operate drying and curing equipment.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| 1. Describe drying and curing equipment | <ul style="list-style-type: none"> • Types <ul style="list-style-type: none"> ○ Infra-red ○ UV ○ Forced air (make up air) ○ Venturi • Thermometers |
| 2. Operate drying and curing equipment | <ul style="list-style-type: none"> • Paint manufacturers' specifications • Vehicle protection • Distance • Time • Temperature <ul style="list-style-type: none"> ○ Surface ○ Metal ○ Cool down |

Line (GAC): C **USE WELDING EQUIPMENT**
Competency: C1 **Use cutting and heating equipment**

Objectives

To be competent in this area, the individual must be able to:

- Use cutting and heating equipment.

LEARNING TASKS

CONTENT

- | | |
|-------------------------------------|--|
| 1. Describe oxyacetylene | <ul style="list-style-type: none"> • Safety <ul style="list-style-type: none"> ○ PPE ○ Leak test (soap and water) ○ Drop hazards ○ Surroundings ○ Flint strikers ○ Shields ○ Cool-down time ○ Fire suppression ○ Hazardous substrates ○ Ventilation ○ Flashback ○ Heating on concrete • Gas characteristics <ul style="list-style-type: none"> ○ Oxygen ○ Acetylene • Purposes <ul style="list-style-type: none"> ○ Cutting ○ Heating ○ Shrinking |
| 2. Describe oxyacetylene components | <ul style="list-style-type: none"> • Cylinders <ul style="list-style-type: none"> ○ Oxygen <ul style="list-style-type: none"> ▪ One-piece cylinder ▪ Safety devices ▪ High pressure ○ Acetylene <ul style="list-style-type: none"> ▪ Two-piece cylinder ▪ Safety devices ▪ Low pressure ▪ Filler material (acetone) |

LEARNING TASKS

CONTENT

- Regulators
 - Single stage
 - Two stage
 - Pressure adjustments
 - Cleanliness
 - Hoses
 - Colours
 - Maintenance
 - Fittings
 - Grooved (acetylene)
 - Smooth (oxygen)
 - Torches
 - Valves
 - Tips
 - Welding
 - Cutting
 - Heating
 - Flashback arresters
- 3. Perform oxyacetylene procedures
 - Cracking cylinders
 - Attaching regulators
 - Hoses, fittings and arresters
 - Regulator diaphragm care
 - Leak checks
 - Relationship between
 - Tip size and material thickness
 - Tip size and gas pressure
 - Lighting procedures
 - Flames
 - Carburizing
 - Neutral
 - Oxidizing
 - Shutdown procedures
 - Heating procedures
 - Controlling expansion
 - Shrinking
 - Cutting procedures
 - Storage of oxyacetylene equipment
- 4. Describe plasma arc cutting
 - Operating procedures

LEARNING TASKS

CONTENT

- Equipment set up
- Gun angle and speed
- Penetration
- Compressed air and tips
- Material identification
- Maintenance
- Storage
- Potential hazards
- Cutting area
- Limitations
- Gouging feature

Achievement Criteria

Performance	The learner will perform oxyacetylene set up, cutting, heating and shut down.
Conditions	<p>The learner will be given</p> <ul style="list-style-type: none"> • Oxyacetylene equipment • Steel
Criteria	<p>The learner will be evaluated on</p> <ul style="list-style-type: none"> • Safety • Procedure • Technique • Accuracy

Line (GAC): C USE WELDING EQUIPMENT

Competency: C2 Use welding equipment

Objectives

To be competent in this area, the individual must be able to:

- Perform welds on 22-gauge steel in flat position, including:
 - Butt weld **without** backing
 - Lap weld
 - Plug weld

LEARNING TASKS

1. Identify the components of a GMAW/Metal Inert Gas (MIG) welder

CONTENT

1. Identify the components of a GMAW/Metal Inert Gas (MIG) welder
 - Power supply
 - 110 volts
 - 220 volts
 - Cooling fan
 - Duty cycle
 - Parts
 - Wire sizes
 - Shielding gas
2. Describe GMAW/MIG transfer methods
 - Methods
 - Short arc
 - Spray arc
 - Stitch spray arc
 - Purpose
 - Uses
 - Voltage
 - Current
 - Ground (work) clamp
3. Describe the safety precautions involved with GMAW/MIG welding
 - PPE
 - Personal limitations
 - Pacemakers
 - Epilepsy
 - Ventilation
 - Grounded Alternating Current (AC) connections
 - Flash shield placement
 - Flammable fluids and coatings
 - Vehicle safety
 - Battery disconnect
 - Proximity to electronic

LEARNING TASKS	CONTENT
	components
	<ul style="list-style-type: none"> • Cool down time
4. Describe the set up procedures for GMAW/MIG welding	<ul style="list-style-type: none"> • Manufacturer suggested settings <ul style="list-style-type: none"> ◦ Chart • Drive roller pressure • Wire speed (current) • Wire stick out • Voltage (heat) selection • Shielding gas flow rate • Grounding methods <ul style="list-style-type: none"> ◦ Direct Current (DC) reverse polarity ◦ DC straight polarity • Troubleshooting weld defects
5. Perform a butt weld without backing	<ul style="list-style-type: none"> • Gun angle and speed • Penetration • Build-up • Consistent bead width
6. Perform a lap weld	<ul style="list-style-type: none"> • Gun angle and speed • Penetration • Build-up • Consistent bead width
7. Perform various size plug welds	<ul style="list-style-type: none"> • Gun angle and speed • Penetration • Build-up • Complete closure of plug hole

Achievement Criteria

Performance	<p>The learner will perform welds on 22-gauge steel in flat position, including</p> <ul style="list-style-type: none"> • Butt weld without backing • Lap weld • Plug weld
Conditions	<p>The learner will be given</p> <ul style="list-style-type: none"> • Welding equipment • Sheet metal
Criteria	<p>The learner will be evaluated on</p>

- Safety
- Procedure
- Technique
- Destructive testing

Line (GAC): **C USE WELDING EQUIPMENT**
Competency: **C3 Maintain welding equipment**

Objectives

To be competent in this area, the individual must be able to:

- Describe the maintenance of welding equipment.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe the maintenance of welding equipment | <ul style="list-style-type: none"> • Checking and replacing parts <ul style="list-style-type: none"> ○ Wire spool ○ Liner ○ Trigger connections ○ Main hose assembly ○ Gas diffuser ○ Contact tip ○ Nozzle ○ Ground (work) clamp ○ Cables ○ Drive rollers • Securing cylinders • Leak tests • Cleaning interior • Welding carts • Storage |
|--|--|

Line (GAC):	D	ORGANIZE WORK AND USE DOCUMENTATION
Competency:	D1	Organize parts, materials and work area

Objectives

To be competent in this area, the individual must be able to:

- Organize parts, materials and work area with close supervision.

LEARNING TASKS

1. Organize parts, materials and work area with close supervision

CONTENT

- Repair planning
- Parts and equipment management
 - Storage location
 - Labelling
 - Tool and material requirements
 - Notifying supervisor of missing or damaged parts
- Time management
 - Work flow
 - Timing of repair steps
 - Avoidance of repetitive repair steps
- Work area preparation
 - Tool selection and layout
 - Housekeeping

Line (GAC): **D ORGANIZE WORK AND USE DOCUMENTATION**
Competency: **D2 Use documentation**

Objectives

To be competent in this area, the individual must be able to:

- Interpret specifications and procedures.
- Use paint manufacturers' software.

LEARNING TASKS

CONTENT

- | | |
|---|--|
| 1. Interpret trade terminology | <ul style="list-style-type: none"> • Removal and Repair (R & R) • R & I • Refinish • Edge/inner • Multi-stage • Overhaul (O/H) • Judgement Time (JT) • Old damage (OD) |
| 2. Locate and interpret vehicle information | <ul style="list-style-type: none"> • Paint code • Manufacturer • Model • Year • Vehicle Identification Number (VIN) |
| 3. Use specifications and procedures | <ul style="list-style-type: none"> • Original Equipment Manufacturer (OEM) • Non-OEM • Access <ul style="list-style-type: none"> ○ Online ○ Hard copy ○ Manuals ○ Bulletins • Interpretation <ul style="list-style-type: none"> ○ Paint formulas ○ Product information ○ Procedure • Application |
| 4. Identify environmental regulations | <ul style="list-style-type: none"> • Jurisdictional Regulations <ul style="list-style-type: none"> ○ National |

LEARNING TASKS

CONTENT

- | | |
|---|--|
| | <ul style="list-style-type: none"> ○ Provincial ○ Municipal • Hazardous waste disposal • VOC • Spills |
| 5. Describe compliance documentation | <ul style="list-style-type: none"> • Spill kit usage • Hazardous materials log • Booth filter replacement log • Service records |
| 6. Interpret repair documentation | <ul style="list-style-type: none"> • Damage report • Work order • Estimate |
| 7. Describe the insurance claim process in BC | <ul style="list-style-type: none"> • Accreditation • Public insurance • Private insurance |
| 8. Use paint manufacturers' software | <ul style="list-style-type: none"> • Software <ul style="list-style-type: none"> ○ Apps ○ Technical data sheets (TDS) ○ SDS ○ Mixing ratios ○ Tracking <ul style="list-style-type: none"> ▪ Product inventory ▪ Product usage ▪ VOC ▪ Cost |

Line (GAC): **D ORGANIZE WORK AND USE DOCUMENTATION**
Competency: **D3 Perform inspections**

Objectives

To be competent in this area, the individual must be able to:

- Perform inspections of coatings.
- Inspect body repairs.

LEARNING TASKS

1. Perform visual inspection of coatings

CONTENT

- Damage identification
 - Environmental
 - Acid rain
 - Tree sap
 - Industrial fall out
 - UV damage
 - Stone chips
 - Corrosion
 - Brake dust
 - Scratches and dents
- Surface conditions
 - Colour mismatch
 - Checking
 - Adhesion
- Confirmation of work order

2. Perform surface evaluation tests

- Solvent
- Tape
- Mil thickness

3. Inspect body repairs

- Sand scratches
- Featheredge
- Pinholes
- Panel alignment
- Body lines
- Contour
- Missed damage
- Pre-existing damage

Line (GAC): **D ORGANIZE WORK AND USE DOCUMENTATION**
Competency: **D4 Organize production schedule**

Objectives

To be competent in this area, the individual must be able to:

- Describe repair process and timelines.
- Communicate with technicians.

LEARNING TASKS

1. Describe repair process

CONTENT

- Shop layout
- Job duties
- Workflow
 - Inspection
 - Estimate
 - Order parts
 - Pre- and post- scan
 - Body repair
 - Prep
 - Refinish
 - Blend areas
 - Cut-off point
 - Colour match
 - Reassembly
 - Detail
 - Final inspection

2. Describe process timelines

- Cycle time
- Dry/cure time
- Flash time

3. Communicate with technicians

- Impacts on production schedule
- Impacts on costs
- Problem solving

Line (GAC):	E	USE COMMUNICATION AND MENTORING TECHNIQUES
Competency:	E1	Use communication techniques

Objectives

To be competent in this area, the individual must be able to:

- Use communication techniques.

LEARNING TASKS

CONTENT

- | | |
|---|--|
| 1. Describe shop roles and responsibilities | <ul style="list-style-type: none"> • Technicians • Estimators • Detailer • Parts person • Administration • Management |
| 2. Describe business relations | <ul style="list-style-type: none"> • Employer/employee relations • Staff morale • Customer service • Relationship with the insurance industry • Professionalism • Clear communication • Conflict resolution |
| 3. Use active listening | <ul style="list-style-type: none"> • Paying attention <ul style="list-style-type: none"> ○ Eye contact ○ Acknowledge speaker ○ Mindful listening ○ Don't interrupt • Non-confrontational • Reflecting • Responding <ul style="list-style-type: none"> ○ Verbally ○ Non-verbally ○ Appropriately |

Line (GAC): F REMOVE AND INSTALL VEHICLE COMPONENTS

Competency: F1 Identify vehicle components

Objectives

To be competent in this area, the individual must be able to:

- Identify vehicle components.

LEARNING TASKS

1. Describe interior vehicle components

CONTENT

- Components
 - Seats
 - Steering wheel
 - Dash
 - Console
 - Headliner
 - Door panels
 - Carpet
 - Switches
 - Trim
 - Spare tire
 - Accessories
 - Air bags
- Removal
 - Tool selection
- Installation
 - Tool selection

2. Describe automotive glass

- Movable
- Stationary
- Types
 - Tempered
 - Laminated
- Characteristics
 - Safety
 - Clear
 - Tinted
 - Shaded
 - Heated
 - Electronics
- Regulators
- Application
- NAGS (National Auto Glass)

LEARNING TASKS

CONTENT

	Specifications)
	<ul style="list-style-type: none"> • Mountings <ul style="list-style-type: none"> ○ Mechanical ○ Gasket ○ Adhesive
3. Describe exterior components	<ul style="list-style-type: none"> • Mouldings <ul style="list-style-type: none"> ○ Belt ○ Side ○ Rocker • Roof racks • Door handles • Mirrors • Wipers • Bumpers <ul style="list-style-type: none"> ○ Cover ○ Reinforcement bar ○ Filler panels ○ Impact absorbers ○ Sensors ○ Camera ○ Brackets or braces • Lights • Antennas • Cameras • Cladding • Emblems • Name plates • Badges • After market
4. Describe decals and striping	<ul style="list-style-type: none"> • Decals <ul style="list-style-type: none"> ○ OEM ○ Aftermarket ○ Vinyl ○ Clear/mylar (OEM stone guard) ○ Applique (black-out tape) ○ Pressure sensitive ○ Reactive (adhesive) • Striping <ul style="list-style-type: none"> ○ Accent stripes

LEARNING TASKS

CONTENT

- Wrapping
 - Full body graphic
 - Paint protection film

Line (GAC): **F REMOVE AND INSTALL VEHICLE COMPONENTS**
Competency: **F2 Remove trim and hardware**

Objectives

To be competent in this area, the individual must be able to:

- Remove trim and hardware.
- Remove decals and striping.

LEARNING TASKS

1. Describe fasteners

CONTENT

- Types
 - Bolts
 - Nuts
 - Washers/insulators
 - Clips
 - Rivets
 - Moulding clips
 - Adhesives
 - Screws

- One-time use
- Functions
- Costs

2. Remove trim and hardware

- Reference resources
- Repair planning
- Vehicle protection
- Identification of electronic components
- Fastener identification
 - One-time use
 - Torque
- Tool selection
- Organization and storage of removed parts
- Identification of fasteners needing replacement

3. Remove decals and striping

- Eraser wheel
- Heat gun
- Plastic razor blade
- Release solvent

Line (GAC): **F REMOVE AND INSTALL VEHICLE COMPONENTS**
Competency: **F3 Install trim and hardware**

Objectives

To be competent in this area, the individual must be able to:

- Install trim and accessories.
- Apply decals and striping.

LEARNING TASKS

CONTENT

- | | |
|-------------------------------------|--|
| 1. Describe installation procedures | <ul style="list-style-type: none"> • Fastener identification • Replacement procedures <ul style="list-style-type: none"> ○ Torque specifications • Replacement of retainers • Final operation/fit and finish |
| 2. Re-install reusable trim | <ul style="list-style-type: none"> • Mouldings • Name plates • Emblems • After-market trim and components |
| 3. Install trim and accessories | <ul style="list-style-type: none"> • Prep • Tools • Fasteners • Adhesives • Double-sided tape • Sequence to install • Prepare trim and accessories for installation • Fresh paint considerations • Protect surfaces |
| 4. Apply decals and striping | <ul style="list-style-type: none"> • Clean surface • Cured surface • Decal location • Backer removal • Surface temperature • Manufacturers' specifications • Remove air bubbles • Wet set • Dry set |

LEARNING TASKS

CONTENT

- Equipment and materials
 - Plastic razor blade/spreader
 - Detergent
 - Alcohol
 - Water
 - Tape
 - Squeegee
 - Knife
 - Heat gun
- Application techniques
 - Sequence
 - Hinge method
- Wrapping (sublet)

Achievement Criteria (FOR ALL OF LINE F)

Performance	<p>The learner will remove and install vehicle components, such as:</p> <ul style="list-style-type: none"> • Door handle • Side moulding • Side mirror
Conditions	<p>The learner will be given</p> <ul style="list-style-type: none"> • Reference resources • Vehicle • Trim and accessories • Tools
Criteria	<p>The learner will be evaluated on</p> <ul style="list-style-type: none"> • Safety • Method of removal • Method of installation • Fit and finish

Line (GAC): **G PREPARE SURFACE**
Competency: **G1 Perform initial preparation**

Objectives

To be competent in this area, the individual must be able to:

- Clean surface.
- Identify substrate condition.

LEARNING TASKS

1. Clean surface

CONTENT

- Water-borne contaminants
 - Dirt
 - Tree sap
 - Bugs
 - Blood
 - Salt
- Solvent-borne contaminants
 - Road tar
 - Oil
 - Paint sealants
 - Wax
 - Silicone
- Cleaning products
 - Chemical compatibility
 - Soap and water
 - Wax and grease remover
 - Solvents
 - Fall out removers
- Procedures
 - Compressed air
 - Chamois
 - Two towel system

2. Describe substrates

- Raw substrate
 - Steel
 - Aluminum
 - Plastics
- Topcoat
 - Thermoset
 - Thermoplastic
 - Single-stage
 - Base clear
 - Multi-stage

LEARNING TASKS**CONTENT**

3. Identify substrate condition

- Paint issues
 - Cracking
 - Rust
 - Checking
 - Excessive mil thickness
 - Poor adhesion
 - Checking
 - Bridging
 - Runs and sags
 - Orange peel
- Environmental damage

Line (GAC): G PREPARE SURFACE

Competency: G2 Mask surface

Objectives

To be competent in this area, the individual must be able to:

- Use masking techniques for primer.

LEARNING TASKS

1. Describe masking materials

CONTENT

- Tapes
 - Vinyl
 - Masking tape (crepe paper)
 - Soft edge (foam)
 - Hard edge
 - Size
- Paper
 - Coated
 - Non-coated
 - Size
- Plastics
 - Corona
 - Non-corona
- Lifting cord
- Liquid mask

2. Describe masking equipment

- Masking machine
- Paper dispenser
- Hand masker
- Razor blade

3. Use masking techniques for primer

- Edge
- Reverse mask
- Inners
- Back mask
- Aperture
- Flush mount
- Perimeter masking
- Fine line
- Two-tone

LEARNING TASKS

CONTENT

4. Describe masking deficiencies and corrective procedures

- Faults
 - Under mask
 - Over mask
 - Over spray
 - Bleed through
 - Bridging and peeling
- Corrective procedures
 - Re-do
 - Solvent cleaning
 - Polish
 - Clay bar

5. Remove masking for primer

- When to remove
- Techniques
 - Angle
 - Direction
- Disposal

Line (GAC): **G PREPARE SURFACE**
Competency: **G3 Strip surface**

Objectives

To be competent in this area, the individual must be able to:

- Describe paint removal techniques.

LEARNING TASKS

1. Describe paint removal techniques

CONTENT

- Chemical
 - Application
 - Neutralizing residue
- Mechanical
 - Sanding
 - Grinding
 - Scraping
 - Compressed air
- Media blasting
 - Silica
 - Plastic
 - Glass
 - Soda
- Considerations
 - Substrate
 - Heat management
 - Damage to adjacent panels
 - Cost
 - Time
 - Area

Line (GAC): **G PREPARE SURFACE**

Competency: **G4 Sand surface**

Objectives

To be competent in this area, the individual must be able to:

- Sand surface.

LEARNING TASKS

1. Describe sanding materials

CONTENT

- Paper
 - Open coat/closed coat
 - Wet/dry
 - Sizes
 - Grit
 - Backing
- Attachment methods
 - Velcro
 - Adhesive
 - Mandrel (twist on)
- Scuff pads
- Scuff paste
- Guide coats

2. Describe sanding equipment

- Machine
 - Single action
 - Dual action
 - Inline
- Blocks/pads
 - Soft
 - Hard
- Vacuum assist
- Ventilation

3. Use sanding techniques and procedures

- Sanding area
 - Existing finish
 - Repair area
 - Raw substrate
 - Blend panel
- Techniques
 - Wet or dry
 - Hand
 - Block
 - Cross-hatching

LEARNING TASKS

CONTENT

- Feather-edging
- Back sanding
- Scuff sanding
- Guide coating

ACHIEVEMENT CRITERIA

NOTE: See Competency H4 for an achievement criteria that assesses all of Line G PREPARE SURFACE and Line H USE REPAIR MATERIALS AND EQUIPMENT. Results will be applied to both Lines at a ratio of 50/50.

Line (GAC):	H	USE REPAIR MATERIALS AND EQUIPMENT
Competency:	H1	Mix repair materials

Objectives

To be competent in this area, the individual must be able to:

- Mix body fillers.
- Mix undercoats.

LEARNING TASKS

1. Describe body fillers

2. Mix body fillers

3. Describe undercoats

CONTENT

- Fibre reinforced
- Light weight
- Aluminium based
- Polyester
 - Sprayable
 - Spreadable
- Equipment
 - Non-porous mixing board
 - Static mixing tips
 - Spreaders
- Ratios
- Techniques
 - Folding vs. stirring
 - Uniform colour
- Working times
 - Mixing
 - Application
- Primer
 - Etch
 - Epoxy
- Primer surfacer
 - High build
 - Direct-to-metal (DTM)
 - Polyester
 - UV
 - Water-borne
- Primer sealer
- Metal treatments
- Chip guards
- Plastic adhesion promoters

LEARNING TASKS

CONTENT

- Brush
 - Spray
 - Wipe

- 4. Describe solvents and additives
 - Types of solvents
 - Reducer
 - Lacquer
 - Wax and grease remover
 - Acetone
 - Types of additives
 - Accelerators
 - Flex agents
 - Hardeners
 - Functions
 - Cleaning
 - Adhesion
 - Flexibility
 - Curing
 - Viscosity
 - VOC
 - Productivity

- 5. Mix undercoats
 - Manufacturers' specifications
 - Environmental factors
 - Temperature
 - Humidity
 - Pot life
 - Mix ratios
 - Basic calculations
 - Scale
 - Graduated cups
 - Mixing stick
 - Viscosity cup
 - Induction time
 - Mixing techniques
 - Mixing procedures
 - Ratios

Line (GAC): **H USE REPAIR MATERIALS AND EQUIPMENT**
Competency: **H2 Prepare spray booth**

Objectives

To be competent in this area, the individual must be able to:

- Operate a spray booth.

LEARNING TASKS

1. Describe spray booth operation

CONTENT

- Overall function of spray booth
 - Safety
 - Environmental considerations
 - Cost-effectiveness
 - Job quality
- Climate control
- Cycles
 - Spray
 - Purge
 - Bake
 - Ramp up times
 - Cool down
- Pressure adjustment
 - Negative
 - Positive
- Temperature adjustment
- Air flow
- Interlock switch

2. Describe the various spray booth controls

- Air flow direction
- Air flow controls
- Temperature controls
- Curing/drying times
- Filter types and changes
- Pressure readings
 - Manometer
 - Magnehelic
- Interlock switch
- Plenum fan
- Fire suppression systems

LEARNING TASKS

3. Operate a spray booth

CONTENT

- Inspect operating parameters
- Manage operation
 - Bake cycles
 - Temperature
 - Pressure

Line (GAC): **H USE REPAIR MATERIALS AND EQUIPMENT**
Competency: **H3 Perform spray gun set up**

Objectives

To be competent in this area, the individual must be able to:

- Set up and use spray guns for application of coatings.

LEARNING TASKS

CONTENT

- | | |
|-------------------------|--|
| 1. Select spray guns | <ul style="list-style-type: none"> • Types of materials • Types of guns |
| 2. Set up spray guns | <ul style="list-style-type: none"> • Fluid tips • Needle • Air cap • Air pressure • Fan adjustment • Fluid adjustment |
| 3. Use spray guns | <ul style="list-style-type: none"> • Test patterns • Troubleshooting gun operation • Techniques <ul style="list-style-type: none"> ○ Overlap ○ Gun distance ○ Travel speed ○ Gun position ○ Trigger control • Atomization • Transfer efficiency • Cleaning |

Line (GAC): **H USE REPAIR MATERIALS AND EQUIPMENT**
Competency: **H4 Apply repair materials**

Objectives

To be competent in this area, the individual must be able to:

- Apply body fillers.
- Apply undercoats.

LEARNING TASKS

1. Apply body fillers

2. Apply undercoats

CONTENT

- Techniques
 - Tool selection
 - Direction
 - Pressure
 - Area per application
 - Taping for body lines
 - Higher than countour
- Limitations
 - Thickness
 - Size of surface area
- Timing
- Troubleshooting
- Spray conditions
 - Size of repair
 - Temperature
 - Humidity
- Tool and equipment selection
 - Spray guns
 - Rollers
 - Brushes
- Aerosol
- TDS
 - Number of coats
 - Minimum dry times
 - Minimum flash times
 - Air pressure
- Limitations

Achievement Criteria (FOR ALL OF LINES G AND H)

NOTE TO INSTRUCTOR: Retain panel upon completion of project for later achievement criteria (LINE I).

Performance	<p>The learner will</p> <ul style="list-style-type: none"> • Prepare and mask a panel for a primer spot repair • Mix and apply repair materials
Conditions	<p>The learner will be given</p> <ul style="list-style-type: none"> • Imperfection to repair • Tools and equipment • Various repair materials • Access to manufacturers' specifications
Criteria	<p>The learner will be evaluated on</p> <ul style="list-style-type: none"> • Safety • Housekeeping • Selection of tools • Technique • Quality of repair

NOTE: Apply marks to both Line G and H at a ratio of 50/50.

Line (GAC): I APPLY REFINISHING MATERIALS

Competency: I1 Mix refinishing materials

Objectives

To be competent in this area, the individual must be able to:

- Mix refinishing materials, including sealers, primer sealers, single-stage, and base coat/clear coat.

LEARNING TASKS

1. Describe refinishing materials

CONTENT

- Types
 - Sealers
 - Primer sealers
 - Single-stage
 - Base coat
 - Clear coat
 - Under hood
- Characteristics
 - Durability
 - Adhesion
 - Chemical resistance
 - Viscosity
- Components
 - Binders
 - Resins
 - Solvents
 - Additives
 - Pigments
 - Metallics
 - Pearls
 - Micas
 - Dyes
- Additives
 - Hardeners
 - Reducers
 - Accelerators
 - Flattening agents
 - Retarders

2. Mix refinishing materials

- Manufacturers' software
- TDS
 - Ratios
- Factors
 - Size of job

LEARNING TASKS

CONTENT

- Coverage
- Reduction
- Ambient conditions
 - Temperature
 - Humidity
- Equipment
 - Scales
 - Sticks
 - Computer
 - Strainers
 - Cups
- Toners (tinters)
- Mixing techniques
 - Agitation
 - Non-agitation
- Clean up

Line (GAC):	I	APPLY REFINISHING MATERIALS
Competency:	I2	Apply primer sealers

Objectives

To be competent in this area, the individual must be able to:

- Apply primer sealers.

LEARNING TASKS

1. Use cleaning materials

2. Apply primer sealers

CONTENT

- Blow-off
- Pre-selection according to TDS
 - Solvent
 - Water-borne
 - Anti-static
- Tacking
 - Types
 - Techniques
- Final visual inspection
 - Sand scratches
 - Pin holes
- Spray technique
 - Distance
 - Overlap
 - Gun speed
 - Trigger control
 - Air pressure
- Coverage verification
- Flash-off time verification
- Open (recoat) time
 - Wet on wet

Line (GAC): I APPLY REFINISHING MATERIALS

Competency: I3 Apply single-stage paint

Objectives

To be competent in this area, the individual must be able to:

- Apply single-stage paint.

LEARNING TASKS

1. Use cleaning materials

CONTENT

- Blow-off
- Pre-selection according to TDS
 - Solvent
 - Anti-static
 - Low-lint wipes
- Tacking
 - Types
 - Techniques
- Final visual inspection
 - Sand scratches
 - Pin holes
- Spray technique
 - Distance
 - Overlap
 - Gun speed
 - Trigger control
 - Air pressure
- Flash-off time verification
- Force drying
- Defects
 - Dry-spray
 - Orange peel
 - Hiding

2. Apply single-stage paint

Line (GAC): I APPLY REFINISHING MATERIALS

Competency: I4 Apply base coat/clear coat

Objectives

To be competent in this area, the individual must be able to:

- Apply base coat/clear coat finish.

LEARNING TASKS

1. Use cleaning materials

2. Apply base coat

3. Apply clear coat

CONTENT

- Blow-off
- Pre-selection according to TDS
 - Solvent
 - Water-borne
 - Anti-static
 - Low-lint wipes
- Tacking
 - Types
 - Techniques
- Visual inspection
 - Sand scratches
 - Pin holes
- Spray technique
 - Distance
 - Overlap
 - Gun speed
 - Trigger control
 - Air pressure
 - Drop/Orientation coat
- Flash-off time verification
- Force drying
- Defects
 - Mottling/stripping
 - Dry spray
 - Contamination
 - Dirt nib
 - Hiding
- Final visual inspection
 - Sand scratches
 - Pigment orientation
 - Dirt
- Spray technique

LEARNING TASKS

CONTENT

- Distance
- Overlap
- Gun speed
- Trigger control
- Air pressure
- Flash-off time verification
- Force drying
- Defects
 - Dry spray
 - Contamination
 - Orange peel
- Mil thickness

Achievement Criteria (FOR ALL OF LINE I)

**NOTE TO
INSTRUCTORS**

Use repaired panel from Line H for this achievement criteria.

Performance	The learner will perform base coat/clear coat refinishing procedures.
Conditions	The learner will be given <ul style="list-style-type: none"> • Repaired panel from LINE H • Materials and equipment • Access to manufacturers' specifications
Criteria	The learner will be evaluated on <ul style="list-style-type: none"> • Safety • Housekeeping • Selection of tools • Technique • Quality • Coverage

Line (GAC):	K REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS
Competency:	K1 Identify fundamentals of vehicle construction, metal and damage

Objectives

To be competent in this area, the individual must be able to:

- Identify types of body/frame construction.
- Describe characteristics of mild (low-carbon/low-alloy) steel.
- Identify types of sheet metal damage.

LEARNING TASKS

CONTENT

1. Identify types of body/frame construction	<ul style="list-style-type: none"> • Conventional • Unibody • Space
2. Describe sheet metal components	<ul style="list-style-type: none"> • Front end (cosmetic) <ul style="list-style-type: none"> ○ Fenders ○ Hood panel ○ Doors • Rear end <ul style="list-style-type: none"> ○ Trunk ○ Hatch ○ Box ○ Tail gate • Structural <ul style="list-style-type: none"> ○ Quarter panel ○ Rocker panel ○ Radiator supports ○ Frame rails ○ Cross members ○ Pillars (A,B,C,D) ○ Cowl
3. Describe metals	<ul style="list-style-type: none"> • Types • Characteristics • Location on vehicle
4. Describe characteristics of mild (low-carbon/low-alloy) steel	<ul style="list-style-type: none"> • Tensile strength • Yield strength • Spring-back • Composition

LEARNING TASKS

5. Identify types of sheet metal damage

CONTENT

- Work hardening
- Annealing
- Effects of heat

- Direct and indirect
- Displaced metal
- Hinge and roll buckle
- Stretched area
- Upset area
- Tears

Line (GAC):	K	REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS
Competency:	K2	Prepare metal panels and components for repair

Objectives

To be competent in this area, the individual must be able to:

- Prepare panel for repair.

LEARNING TASKS

1. Prepare panel for repair

CONTENT

- Cleaning
- Repair planning
 - Inspection
 - Topcoat identification
 - Substrate identification
 - Repair materials
 - Cleaning products
 - Abrasives and strippers
 - Panel composition
- Protecting surrounding area
- Gaining access (as needed)
 - Removal of panel
 - Removal of adjacent components

Line (GAC):	K	REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS
Competency:	K3	Remove metal panels and components

Objectives

To be competent in this area, the individual must be able to:

- Remove mechanically-fastened panel.

LEARNING TASKS

1. Remove panel

CONTENT

- Panel types
 - Bumper
 - Hood
 - Fender
 - Door
 - Trunk lid (hatch)
- Tool and equipment selection
- Reference materials
- Procedures
 - Mechanically-fastened (bolt on) vs. weld on
 - Noting panel alignment
 - Disconnection of electrical components
 - Sequence of removal
 - Fastener removal
 - Location
 - Identification
 - Labelling
 - Storage

2. Describe components of a door assembly and their functions

- Door latching hardware
- Door glass components
- Hinges and methods of attachment
- Door trim items
- Servicing operations
- Verifying alignment before removal

Line (GAC):	K	REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS
Competency:	K4	Repair metal panels and components

Objectives

To be competent in this area, the individual must be able to:

- Repair cosmetic sheet metal damage.

LEARNING TASKS

CONTENT

1. Describe repair methods	<ul style="list-style-type: none"> • Visualize desired outcome • Cold repair • Heat repair • Pushing/pulling • Roughing • On/off dolly • Patching
2. Describe shrinking procedures	<ul style="list-style-type: none"> • Expansion and contraction • Restricted and unrestricted sheet metal • Oxyacetylene • Spitznagel™ • Panel beater™ • Cold shrinking (stretching)
3. Demonstrate repair procedures	<ul style="list-style-type: none"> • Select <ul style="list-style-type: none"> ○ Equipment ○ Material ○ Technique • Perform repair • Control of panel movement

Achievement Criteria

NOTE TO INSTRUCTOR:	Keep panel for minor repair project.
Performance	The learner will perform a minor repair on a sheet metal panel.
Conditions	The learner will be given <ul style="list-style-type: none"> • A damaged panel • Materials and equipment • Access to manufacturers' specifications

Criteria	The learner will be evaluated on
	<ul style="list-style-type: none"> • Safety • Housekeeping • Selection of tools • Technique • Quality

Line (GAC): K REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS

Competency: K5 Install metal panels and components

Objectives

To be competent in this area, the individual must be able to:

- Perform metal panel alignment.

LEARNING TASKS

1. Describe panel alignment

CONTENT

- Operation
 - Moveable
 - Fixed
- Fit/alignment
- Seal
- Worn parts
- OEM and after market parts

2. Perform panel alignment

- Protection of adjacent panels
- Alignment sequence
- Method of fastening
- Adjusting
- Blocking
- Jacking
- Fitment/gap
- Lubrication
- Verify part movement (moveable parts)
 - Interference of adjacent components

Line (GAC):	L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS
Competency:	L1	Identify fundamentals of plastics and composite panels and components

Objectives

To be competent in this area, the individual must be able to:

- Describe and identify plastics and damage.

LEARNING TASKS

1. Describe plastics

CONTENT

- Types
 - Thermoset
 - Fibre reinforced plastics (FRP)
 - Resin and matte
 - Sheet-molded compound (SMC)
 - Carbon fibre
 - Thermoplastic
 - Olefin
 - Polypropylene
 - Non-Olefin
 - Acrylic butyle styrene (ABS)
 - Reinforced reaction injection moulded (RRIM)
- Characteristics
 - Rigid
 - Flexible
- Location on vehicle

2. Describe methods of identification

- International Organization for Standardization (ISO) code
- Manufacturers' service bulletins
- Grind test
- Float test

LEARNING TASKS

3. Describe types of plastic damage

CONTENT

- One-sided (cosmetic)
 - Gouge
- Two-sided (structural)
 - Tear
 - Tab
 - Puncture

Line (GAC):	L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS
Competency:	L2	Prepare plastic and composite panels and components for repair

Objectives

To be competent in this area, the individual must be able to:

- Prepare plastic panel for repair.

LEARNING TASKS

1. Prepare plastic panel for repair

CONTENT

- Cleaning
- Repair planning
 - Inspection
 - Topcoat identification
 - Substrate identification
 - Repair materials
 - Cleaning products
- Protecting surrounding area
- Gaining access (as needed)
 - Removal of panel
 - Removal of adjacent components

Line (GAC):	L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS
Competency:	L3	Remove plastic and composite panels and components

Objectives

To be competent in this area, the individual must be able to:

- Describe removal of plastic panel.

LEARNING TASKS

1. Describe removal of plastic panel

CONTENT

- Plastic panel types
 - Bumpers
 - Grills
 - Box liners
 - Fender liners
 - Hoods
 - Fenders
 - Door skins
 - Trunk lids/hatches
- Tool and equipment selection
- Reference materials
- Procedures
 - Bonded vs. non-bonded
 - Noting panel alignment
 - Disconnection of electrical components
 - Sequence of removal
 - Fastener removal
 - Location
 - Identification
 - Labelling
 - Storage

Line (GAC):	L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS
Competency:	L4	Repair plastic and composite panels and components

Objectives

To be competent in this area, the individual must be able to:

- Perform plastic repairs.

LEARNING TASKS

1. Describe tools, equipment, and materials for plastic repair

CONTENT

- Plastic welders
 - Hot air
 - Airless
 - Nitrogen
 - Staples
 - Grinders
 - Considerations
 - Speed
 - Bit
 - Die
 - Angle
 - Sanders
 - Belt
 - Dual-Action (DA)
 - Tape
 - Aluminum
 - Mesh
 - Backers
 - Adhesives
 - Epoxy
 - Urethane
 - Adhesion promoters
 - Welding rods/ribbons
 - Tab forming pliers
-
2. Describe plastic repair procedures
 - Manufacturers' training and recommendations
 - Tools, equipment and materials selection
 - Cleaning
 - Identification of types of damage
 - Cracks
 - Deep scratches
 - Tabs

LEARNING TASKS

CONTENT

- | | |
|---------------------------------------|---|
| | <ul style="list-style-type: none"> ○ Low/high spots ○ Dents ○ Deformations • Removal of imperfections <ul style="list-style-type: none"> ○ Heat re-shaping ○ Sanding ○ Coating removal |
| 3. Perform hot-air welding techniques | <ul style="list-style-type: none"> • Purpose and application • Potential risks to repair <ul style="list-style-type: none"> ○ Air pressure ○ Surface temperature |
| 4. Perform airless welding techniques | <ul style="list-style-type: none"> • Purpose and application • Thermoplastic and thermoset repair • Maintain welding equipment • Store welding equipment • Potential risks to repair <ul style="list-style-type: none"> ○ Surface temperature ○ Contamination |
| 5. Perform adhesive repairs | <ul style="list-style-type: none"> • Product manufacturers' specifications • Types of repairs • Types of adhesives • Adhesion promoters • Surface preparation steps • Application and finishing |

Achievement Criteria

- | | |
|-------------|--|
| Performance | The learner will perform plastic repairs, including <ul style="list-style-type: none"> • Welded • Adhesive |
| Conditions | The learner will be given <ul style="list-style-type: none"> • Welding equipment • Adhesive materials • Plastic panel |
| Criteria | The learner will be evaluated on <ul style="list-style-type: none"> • Safety • Procedure • Technique • Quality of repair |

Line (GAC):	L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS
Competency:	L5	Install plastic and composite panels and components

Objectives

To be competent in this area, the individual must be able to:

- Describe the methods of panel installation.

LEARNING TASKS

1. Describe the methods of panel installation

CONTENT

- Protection of surrounding area
- Fasteners
 - Sequence
 - Location
- Buddy system for installation
- Verification of fit and finish
- Verification of related component operation
 - Lights
 - Sensors
 - Washers

Line (GAC): **M DETAIL EXTERIOR**
Competency: **M1 Remove minor imperfections**

Objectives

To be competent in this area, the individual must be able to:

- Describe the post-refinish detailing process.
- Polish panel.

LEARNING TASKS

1. Describe the post-refinish detailing process

CONTENT

- Pre-delivery checklist
- Paint defects
 - Dirt nibs
 - Overspray
 - Stone chips
 - Scratches
 - Environmental contaminants
 - Oxidation
 - Tree sap
 - Rail dust
 - Brake dust
 - Industrial fall out
- Materials
 - Polish/compound
 - Sand paper
 - Clay bar
 - Pads
 - Razor blades
 - Microfibre cloths
 - Touch up paint
 - Steel wool
- Equipment
 - Polisher
 - Electric
 - Pneumatic
 - Blowers
 - Nib blocks
 - Touch up brush
- Sanding
 - Wet vs. dry
- Polishing
 - Speed
 - Direction

LEARNING TASKS

CONTENT

2. Polish fender

- Angle
- Polisher motion
- Sequencing
- Edges

- Equipment and tool selection
- Technique

NOTE TO INSTRUCTOR: Although there is no Achievement Criteria for this competency, you may wish to have students polish a fender. Use fender saved from Line H and K

Line (GAC): **M DETAIL EXTERIOR**
Competency: **M2 Clean exterior and interior of vehicle**

Objectives

To be competent in this area, the individual must be able to:

- Describe exterior vehicle cleaning.
- Describe interior vehicle cleaning.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| 1. Describe post-refinish exterior vehicle cleaning | <ul style="list-style-type: none"> • Cleaners <ul style="list-style-type: none"> ○ Tire ○ Engine ○ Soap ○ Window • Paint care procedures • Washing <ul style="list-style-type: none"> ○ Two bucket ○ Top to bottom ○ Equipment |
| 2. Describe post-refinish interior vehicle cleaning | <ul style="list-style-type: none"> • Cleaning products <ul style="list-style-type: none"> ○ pH scale • Stain removal products • Stain removal tools • Cleaning tools <ul style="list-style-type: none"> ○ Vacuum ○ Air blower ○ Extractors • Conditioners • Ozone generators • Deodorizers |

Level 2

Auto Body and Collision Technician

Competency: B2 Use lifting equipment

To be competent in this area, the individual must be able to:

- ## LEARNING TASKS

1. Describe specialty lifts

2. Lift and mount vehicle to install anchoring equipment

Line (GAC): **B USE TOOLS AND EQUIPMENT**
Competency: **B4 Maintain spray equipment**

Objectives

To be competent in this area, the individual must be able to:

- Describe recycling machines.

LEARNING TASKS

1. Describe recycling machines

CONTENT

- Solvent recycling
- Water borne recycling
- Manufacturers' specifications
- Environmental regulations
- Procedures

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B5 Maintain mixing equipment

Objectives:

To be competent in this area, the individual must be able to:

- Maintain mixing systems and room.

LEARNING TASKS

1. Describe mixing systems

CONTENT

- Manufacturers' specifications
- Components requiring maintenance
 - Mixing software
 - Product updates
 - Computer
 - Scales
 - Calibration
 - Spectrophotometers
 - Calibration
 - Toners
 - Agitators
 - Ratio sticks
 - Shakers
 - Mixing cups
- Technical information provided
 - TDS
 - SDS
 - Mixing ratios
 - Colour formulation
- Cleanliness
- Functioning

2. Maintain mixing room

Line (GAC):	C	USE WELDING EQUIPMENT
Competency:	C2	Use welding equipment

Objectives

To be competent in this area, the individual must be able to:

- Perform a lap weld and a plug weld on aluminum.

LEARNING TASKS

CONTENT

1. Describe set up procedures for MIG welding aluminum	<ul style="list-style-type: none"> • Drive roller pressure • Wire feed <ul style="list-style-type: none"> ○ Spool/machine fed ○ Spool gun fed • Wire speed (current) • Pulse • Voltage (heat) selection • Shielding gas <ul style="list-style-type: none"> ○ Flow rate ○ Type (100% Argon) • Liner selection • Temperature sticks • Conditioning of metal
2. Perform a lap weld on sheet aluminum	<ul style="list-style-type: none"> • Gun angle and speed • Build-up • Consistent width bead • Penetration • Destructive testing
3. Perform a plug weld on sheet aluminum (2 and 3 sheet thickness)	<ul style="list-style-type: none"> • Gun angle and speed • Arc start away from plug hole • Penetration • Build-up • Complete closure of plug hole • Complete closure of plug hole on top and bottom sides of a through weld • Destructive testing

Achievement Criteria

Performance	The learner will perform a lap weld and a plug weld on aluminum.
Conditions	<p>The learner will be given</p> <ul style="list-style-type: none"> • Welding equipment • Panels
Criteria	<p>The learner will be evaluated on</p> <ul style="list-style-type: none"> • Safety • Procedure • Technique • Quality of weld

Line (GAC): **C USE WELDING EQUIPMENT**
Competency: **C3 Maintain welding equipment**

Objectives

To be competent in this area, the individual must be able to:

- Describe the maintenance of welding equipment for non-ferrous processes.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe the maintenance of welding equipment for non-ferrous processes | <ul style="list-style-type: none"> • Checking and replacing parts <ul style="list-style-type: none"> ○ Wire spool ○ Liner ○ Trigger connections ○ Main hose assembly ○ Gas diffuser ○ Contact tip ○ Nozzle ○ Ground (work) clamp ○ Cables ○ Rollers • Securing cylinders • Leak tests • Cleaning interior • Welding carts • Storage |
|--|--|

Line (GAC):	D	ORGANIZE WORK AND USE DOCUMENTATION
Competency:	D1	Organize parts, materials and work area

Objectives

To be competent in this area, the individual must be able to:

- Organize parts, materials and work area with minimal supervision.

LEARNING TASKS

1. Organize parts, materials and work area with minimal supervision

CONTENT

- Repair planning
- Parts and equipment management
 - Storage location
 - Labelling
 - Tool and material requirements
 - Notifying supervisor of missing or damaged parts
- Time management
 - Work flow
 - Timing of repair steps
 - Avoidance of repetitive repair steps
- Work area preparation
 - Tool selection and layout
 - Housekeeping

Line (GAC): **D ORGANIZE WORK AND USE DOCUMENTATION**
Competency: **D5 Prepare repair plan**

Objectives

To be competent in this area, the individual must be able to:

- Prepare repair plan.

LEARNING TASKS

1. Refer to work order

2. Visualize process

3. Itemize requirements

4. Determine repair sequence

5. Describe productive organizational skills

CONTENT

- Protection of personal information
- Vehicle make, model and year
- Location of repair
- Paint codes
- VIN
- Expected delivery times
- Customer service notes

- Mapping out repair
 - Pre-existing damage
 - Priorities
 - Sub-lets
- Developing checklist
- Consultation with mentor
- Photo documentation

- Tools
- Materials
- Parts
 - Availability
 - Sacrificial (one time use)
 - Missing from vehicle

- Timing
 - Awareness of cycle times
 - Order of operations
 - Dry times
- Standard Operating Procedures (SOP)

- Repair analysis
- Repair plan
 - Production deadlines
 - Tools and materials required
- Timing of repair steps

Line (GAC): H USE REPAIR MATERIALS AND EQUIPMENT

Competency: H2 Prepare spray booth

Objectives

To be competent in this area, the individual must be able to:

- Describe preparation of spray booth.

LEARNING TASKS

1. Describe preparation of spray booth and equipment

CONTENT

- Spray booth cleaning
 - Ensuring a dust free environment prior to vehicle or part set up
- Booth space utilization
 - Accommodating work to be completed
 - Vehicle positioning
 - Parts placement
- Position of air movers
 - Optimal coverage
 - Decrease of flash times
- Tacking off equipment
 - Lines
 - Protection from dust

2. Describe spray booth pressure and temperature

- Manufacturers' specifications
- Product specific
 - TDS
- Purge times
- Effect on topcoat quality

3. Describe troubleshooting spray booth problems

- Corrective measures
- Reporting of issues

Line (GAC):	H	USE REPAIR MATERIALS AND EQUIPMENT
Competency:	H3	Perform spray gun set up

Objectives

To be competent in this area, the individual must be able to:

- Set up spray gun and components.
- Verify and troubleshoot spray pattern problems.

LEARNING TASKS

1. Set up spray gun and components

CONTENT

- Manufacturers' specifications
- Application requirements
- Adjustments
 - Air pressure
 - Fluid delivery
 - Fan width
- Flood test
- Matching pattern to manufacturers' specifications
- Factors affecting spray patterns
- Common problems
 - Heavy on top or bottom
 - Hourglass
 - Heavy in the middle
 - Crescent shape
 - Sputter
- Correction of problem

- ## 2. Verify and troubleshoot spray pattern problems

Line (GAC):	I	APPLY REFINISHING MATERIALS
Competency:	I1	Mix refinishing materials

Objectives

To be competent in this area, the individual must be able to:

- Mix refinishing materials, including sealers, primer sealers, single-stage, and base coat/clear coat.

LEARNING TASKS

1. Describe refinishing materials

CONTENT

- Types
 - Sealers
 - Primer sealers
 - Single-stage
 - Base coat
 - Clear coat
- Characteristics
 - Durability
 - Adhesion
 - Chemical resistance
 - Viscosity
- Components
 - Binders
 - Resins
 - Solvents
 - Additives
 - Pigments
 - Metallics
 - Pearls
 - Micas
 - Dyes
- Additives
 - Hardeners
 - Reducers
 - Accelerators
 - Flattening agents
 - Retarders

2. Mix refinishing materials

- Manufacturers' software
- TDS
 - Ratios
- Factors
 - Size of job
 - Coverage

LEARNING TASKS

CONTENT

- Reduction
- Ambient conditions
 - Temperature
 - Humidity
- Equipment
 - Scales
 - Sticks
 - Computer
 - Strainers
 - Cups
- Toners (tinters)
- Mixing techniques
 - Agitation
 - Non-agitation
- Clean up

Line (GAC):	I	APPLY REFINISHING MATERIALS
Competency:	I2	Apply primer sealers

Objectives

To be competent in this area, the individual must be able to:

- Select and apply primer sealers.

LEARNING TASKS

1. Select and apply primer sealer

CONTENT

- Substrate
 - Burn through
 - Plastic
- Primer sealer
- Transparent
- Tinting
- Value shade

Line (GAC): I APPLY REFINISHING MATERIALS

Competency: I3 Apply single-stage paint

Objectives

To be competent in this area, the individual must be able to:

- Describe single-stage paint.

LEARNING TASKS

1. Describe single-stage paint

CONTENT

- Contexts and uses
 - Heavy equipment
 - Aircraft
 - Commercial transport
 - Marine
 - Agriculture
- Matte finishes
- Textured finishes
- Spray equipment
 - Pressure feeds
 - Airless
 - Electrostatic
- Spray techniques
- Blending techniques
 - Reverse blending
 - Arcing
 - Trigger control
 - Melting in
 - Blending agents
- Avoiding halos and dry edges

2. Describe troubleshooting single-stage paint application

- Metallics
 - Mottling
 - Tiger striping
- Dry spray
- Runs and sags

Line (GAC): I APPLY REFINISHING MATERIALS

Competency: I4 Apply base coat/clear coat

Objectives

To be competent in this area, the individual must be able to:

- Describe applying and blending base coat/clear coat and multistage paint.

LEARNING TASKS

1. Describe base coat/clear coat application techniques

CONTENT

- Spray techniques
 - Distance
 - Overlap
 - Gun speed
 - Trigger control
 - Air pressure
 - Fanning/arcing
 - Heeling
- Job size
 - Spot repair
 - Partial
 - Complete
- Spray sequence
 - Routing
 - Wet edge
- Multi-stage
 - Let down panel
 - Specialty/candy
- Tacking between coats
- Blending
 - Orientation coat
 - Wet bed
 - Open blend (solvent blend)
- Matte finishes
- Textured finishes

Line (GAC):	I	APPLY REFINISHING MATERIALS
Competency:	I6	Perform colour adjustment

Objectives

To be competent in this area, the individual must be able to:

- Describe colour theory and adjustment.

LEARNING TASKS

1. Describe colour theory
2. Describe colour adjustment

CONTENT

- Value
- Hue
- Chroma
- Colour spectrum (ROYGBIV)
- Primary and secondary colours
- Low and high strength colours
- Face, pitch, and flop of colour
- Variance
 - OEM level
 - Industry level
- Light source
- Metamerism
- Colour-perception testing
- Equipment
 - Spectrophotometer
 - Colour corrective lighting
- Spray out card
- Let down panel
- Colour chips
- Variance deck
- Colour formula adjustments
- Metallic size
- Formula parameters
- Tint characteristics
- Comparison of colour to vehicle
- Adequate hiding

Line (GAC):	J	PERFORM POST-REFINISING FUNCTIONS
Competency:	J2	Correct surface imperfections

Objectives

To be competent in this area, the individual must be able to:

- Recognize surface imperfections.
- Describe correcting surface imperfections.

LEARNING TASKS

1. Recognize post-paint defects

CONTENT

- Dust nibs
- Runs
- Orange peel
- Fish eyes
- Solvent pop
- Dye-back
- Scratches
- Contour mapping
- Bleed-through
- Masking problems
 - Over-spray/under-mask
 - Over-mask
- Colour mismatch
- Mottling
- Transparency

2. Describe evaluating surface imperfections

- Repairable
- Non-repairable

3. Describe removing surface imperfections

- Wet sanding
 - De-nib
 - Block
 - Hand
 - Machine
- Solvents
- Compounding
- Polishing
- Tools
 - Razor blades
 - Nib files
 - Clay product
 - Polishers

Line (GAC):	K	REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS
Competency:	K1	Identify fundamentals of vehicle construction, metal and damage

Objectives

To be competent in this area, the individual must be able to:

- Describe advanced steel and non-ferrous metals.
- Describe damage analysis.

LEARNING TASKS

1. Describe metals

CONTENT

- Types
 - Steel
 - Galvanized
 - Non-galvanized
 - Stainless
 - Magnesium
- Characteristics
- Location on vehicle

2. Describe aluminum

- Alloy series
- Manufacturing
 - Casting
 - Extruded
 - Stamping
- Considerations
 - Corrosion
 - Cross contamination
 - Equipment specific to aluminum
 - Clean room
 - Annealing

3. Describe the characteristics of high-strength steel

- Tensile strength
- Yield strength
- Spring-back
- Composition
- Characteristics
- Work hardening
- Affects of heat
- Hydro forming

LEARNING TASKS

4. Describe the characteristics of advanced and ultra-high strength steels

CONTENT

- Yield strength
- Tensile strength
- Spring-back
- Advanced high-strength steel examples
 - Martensitic (MART)
 - Isotropic (IS)
 - High strength, low alloy (HSLA)
 - Laminated
- Ultra-high strength steel
 - Boron
 - Dual/Complex phase
 - Transformation induced plasticity (TRIP)

5. Describe damage analysis

- Extent of damage
 - Cosmetic (minor)
 - Structural (major)
 - Kink versus bend (aluminum versus steel)
- Crush (collapse) zones
- Inertia
- Need for complete damage analysis
 - Visual
 - Touch

Line (GAC): K REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS

Competency: K4 Repair metal panels and components

Objectives

To be competent in this area, the individual must be able to:

- Repair complex sheet metal damage.
- Repair aluminum damage.
- Install door skin.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| 1. Describe the roughing procedures for repairing complex sheet metal damage on steel | <ul style="list-style-type: none"> • Hammer on dolly/hammer off dolly • Edge alignment • Body line alignment • Sheet metal clamps and pulling devices • Stud welder • Sequencing • Stress relieving <ul style="list-style-type: none"> ○ Heating ○ Shrinking ○ Hammering |
| 2. Describe filling procedures for repairing complex sheet metal damage on steel | <ul style="list-style-type: none"> • Cleaning • Surface preparation • Use of body fillers • Application • Abrasives • Contour blocking • Fit of adjacent parts |
| 3. Describe the procedure to prepare a door skin for replacement | <ul style="list-style-type: none"> • Repair materials • Cleaning products • Abrasives and strippers • Panel composition • Removal of panel components <ul style="list-style-type: none"> ○ SRS considerations |

- | | |
|--|--|
| 4. Describe the procedure to repair door shell | <ul style="list-style-type: none"> • Damaged door skin removal <ul style="list-style-type: none"> ○ Release adhesive ○ Grind hem flange ○ Spot weld removal • Damage analysis <ul style="list-style-type: none"> ○ Intrusion beam inspection ○ Window run channel inspection ○ Regulator inspections • Panel composition • Heating • Cold repair • Pushing/pulling • Shrinking • Hammer and dollying <ul style="list-style-type: none"> ○ Work hardening ○ Stress relieving |
| 5. Describe preparing new door skin for installation | <ul style="list-style-type: none"> • Adhesive removal • Seam sealer removal • Test fitting • Panel alignment • Plug weld preparation • Factory seams versus sectioning considerations • Fastening procedures and types • Panel inspection <ul style="list-style-type: none"> ○ Visual ○ Touch • Panel alignment and operation verification |
| 6. Install door skin | <ul style="list-style-type: none"> • Welding procedures • Bonding procedures • Hammering technique • Filling • Noise vibration harshness (NVH) application • Corrosion protection restoration <ul style="list-style-type: none"> ○ Seam sealing ○ Weld-thru primer |
| 7. Perform a complex sheet metal repair | <ul style="list-style-type: none"> • Cleaning |

- Analysis
 - Roughing
 - Shrinking
 - Adjacent part fit-up
 - Body filler
 - Sanding

- 8. Perform roughing procedures on aluminum
 - Hammering on dolly/off dolly
 - Pry tools
 - Stress relieving and annealing with heat
 - Contamination
 - Dedicated tools
 - Consumables

- 9. Perform shrinking procedures on aluminum
 - Expansion and contraction
 - Restricted and unrestricted
 - Hot
 - Cold
 - Thermometers

- 10. Perform body filling procedures on aluminum
 - Cleaning
 - Contamination
 - Surface preparation
 - Use of body fillers
 - Application
 - Contour blocking
 - Fit of adjacent parts

Achievement Criteria

NOTE TO INSTRUCTOR: Retain project for later achievement criteria in Line O.

Performance The learner will install a partial/simulated door skin (or equivalent).

Conditions The learner will be given

- Tools and materials
- Partial/simulated door skin (or equivalent)

Criteria The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of repair

Line (GAC):	L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS
Competency:	L1	Identify fundamentals of plastics and composite panels and components

Objectives

To be competent in this area, the individual must be able to:

- Describe composites.
- Describe composites damage.

LEARNING TASKS

CONTENT

1. Describe composites	<ul style="list-style-type: none"> • Types <ul style="list-style-type: none"> ○ SMC ○ FRP/fibreglass ○ Carbon fibre • Gel coats • Location on vehicle
2. Describe methods of identification	<ul style="list-style-type: none"> • Manufacturers' service bulletins • Touch • Visual • Smooth on both sides • Grind test
3. Describe types of composite damage	<ul style="list-style-type: none"> • One-sided (cosmetic) <ul style="list-style-type: none"> ○ Gouge • Two-sided (structural) <ul style="list-style-type: none"> ○ Fracture (spider crack) ○ Puncture

Line (GAC):	L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS
Competency:	L2	Prepare plastic and composite panels and components for repair

Objectives

To be competent in this area, the individual must be able to:

- Prepare composite (SMC) panels.

LEARNING TASKS

1. Prepare composite panel

CONTENT

- Cleaning
- Repair planning
 - Inspection
 - Topcoat identification
 - Substrate identification
 - Repair materials
 - Cleaning products
- Protecting surrounding area
- Gaining access (as needed)
 - Removal of panel
 - Removal of adjacent components

Line (GAC):	L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS
Competency:	L3	Remove plastic and composite panels and components

Objectives

To be competent in this area, the individual must be able to:

- Describe the removal of composite panels.

LEARNING TASKS

1. Describe removal of composite panel

CONTENT

- Composite panel types
 - Grills
 - Hoods
 - Fenders
 - Door skins
 - Roof panels
 - Trunk lid/hatch
 - Truck boxes
 - Motorcycle/power sport components
- Tool and equipment selection
- Reference materials
- Procedures
 - Bonded vs. non-bonded
 - Noting panel alignment
 - Disconnection of electrical components
 - Sequence of removal
 - Fastener removal
 - Location
 - Identification
 - Labelling
 - Storage

Line (GAC):	L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS
Competency:	L4	Repair plastic and composite panels and components

Objectives

To be competent in this area, the individual must be able to:

- Describe composite repairs.

LEARNING TASKS

CONTENT

1. Describe safety-considerations for working with composites	<ul style="list-style-type: none"> • PPE • Ventilation • Solvents (cleaning) • Static
2. Describe tools, equipment, and materials for composite repair	<ul style="list-style-type: none"> • Grinders <ul style="list-style-type: none"> ○ Considerations <ul style="list-style-type: none"> ▪ Speed ▪ Bit ○ Die ○ Angle • Sanders <ul style="list-style-type: none"> ○ Belt ○ DA • Tape <ul style="list-style-type: none"> ○ Aluminum ○ Mesh ○ Matting ○ Cloth • Backers • Adhesives <ul style="list-style-type: none"> ○ Epoxy ○ Urethane ○ Polyester • Saturation roller • Brushes • Plastic sheeting
3. Describe composite repair procedures	<ul style="list-style-type: none"> • Manufacturers' training and recommendations • Tools, equipment and materials selection • Cleaning

LEARNING TASKS

CONTENT

- | | |
|---|--|
| | <ul style="list-style-type: none"> • Identification of imperfections <ul style="list-style-type: none"> ○ Cracks ○ Deep scratches ○ Fractures • Removal of imperfections <ul style="list-style-type: none"> ○ Sanding ○ Grinding ○ Coating removal |
| 4. Describe adhesive repairs techniques | <ul style="list-style-type: none"> • Product manufacturers' specifications • Types of repairs • Types of adhesives • Surface preparation steps • Mixing <ul style="list-style-type: none"> ○ Environmental conditions <ul style="list-style-type: none"> ▪ Temperature ▪ Humidity ○ Ratios • Application and finishing |
| 5. Perform composite repairs | <ul style="list-style-type: none"> • Identification of composite • Considerations <ul style="list-style-type: none"> ○ Contamination containment ○ Fibre wicking • Repair or replacement • Adhesive repairs • Post-repair clean up |

Line (GAC):	L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS
Competency:	L5	Install plastic and composite panels and components

Objectives

To be competent in this area, the individual must be able to:

- Describe the methods for non-structural composite panel installation.

LEARNING TASKS

1. Describe methods for non-structural composite panel installation

CONTENT

- Manufacturers' product specifications
- Protection of surrounding area
- Fasteners
 - Sequence
 - Location
- Bonding
 - Dry fitting
 - Cure times
- Verification of fit and finish
- Verification of related component operation
 - Lights
 - Sensors
 - Washers

Line (GAC):	O	APPLY CORROSION PROTECTION AND SOUND DEADENING MATERIALS
Competency:	O1	Apply corrosion inhibitors and undercoats

Objectives

To be competent in this area, the individual must be able to:

- Apply corrosion protection.

LEARNING TASKS

CONTENT

1. Describe corrosion	<ul style="list-style-type: none"> • Causes <ul style="list-style-type: none"> ○ Environmental ○ Caustic fluids ○ Collision damage ○ Hot spots • Chemical reaction <ul style="list-style-type: none"> ○ Oxygen ○ Electrolytes ○ Bare metal • Types <ul style="list-style-type: none"> ○ Sacrificial ○ Galvanic • Effects on structural integrity
2. Describe galvanic corrosion	<ul style="list-style-type: none"> • Dissimilar metal contact • Chemical reactivity • Relationship to sacrificial corrosion
3. Describe sacrificial corrosion	<ul style="list-style-type: none"> • Galvanized metals • Zinc enriched materials • Relationship to galvanic corrosion • Sacrificial metals chart
4. Describe undercoats	<ul style="list-style-type: none"> • Primers <ul style="list-style-type: none"> ○ Weld-through primer ○ DTM <ul style="list-style-type: none"> ▪ Etch primer ▪ Epoxy • Seam sealers • Metal conditioners • Conversion coatings • Wax based

LEARNING TASKS

CONTENT

- | | |
|--|--|
| | <ul style="list-style-type: none"> • Urethane based • Petroleum based undercoating <ul style="list-style-type: none"> ○ Rubberized • Washers • Insulators |
| 5. Describe the areas of the vehicle requiring corrosion protection after repair | <ul style="list-style-type: none"> • Joints and seams • Inside closed sections • Exterior panels (inside and outside) • Hot spots |
| 6. Apply corrosion protection | <ul style="list-style-type: none"> • OEM requirements • Material and equipment selection • Liabilities • Vehicle components or areas requiring corrosion protection <ul style="list-style-type: none"> ○ Enclosed interior surfaces ○ Exposed interior surfaces ○ Exposed exterior surfaces ○ Exposed joints • Procedures <ul style="list-style-type: none"> ○ Safe handling ○ Application methods • Product selection • Tools <ul style="list-style-type: none"> ○ Spray gun ○ Sealing gun ○ Aerosol ○ Undercoat gun ○ Spray wand ○ Brush • Timelines between repair and application of corrosion protection • Quality control • Shop policy |

Line (GAC):	O	APPLY CORROSION PROTECTION AND SOUND DEADENING MATERIALS
Competency:	O2	Apply seam sealers and sound deadeners

Objectives

To be competent in this area, the individual must be able to:

- Apply seam sealers.
- Describe sound deadeners.

LEARNING TASKS

1. Describe seam sealers

CONTENT

- Purposes
 - Water and air leaks
 - Wind noise
 - Fumes
- Types
 - One-part
 - Two-part
 - DTM
 - Epoxy
 - Urethane
 - Thin bodied
 - Heavy bodied
 - Sprayable
 - Tape
 - Brushable
- Characteristics
 - Paintable
 - Flexible
 - Non-shrinking
- Locations
 - Welded seams
 - Engine compartments
 - Floor pans
 - Quarter panels
 - End panels
 - Joints
 - Door skins

2. Apply seam sealers

- Manufacturers' specifications
- Equipment
 - Spatter gun
 - Caulking gun

LEARNING TASKS
CONTENT

3. Describe sound deadeners

- Appearance
- Texture
- Colour
- Tooling

- Pads
- Foams
- Sprayables

Achievement Criteria

NOTE TO INSTRUCTOR Use door skin project from Line K for this achievement criteria.

Performance The learner will apply seam sealer to door skin.

Conditions The learner will be given

- Door skin
- Seam sealer
- Tools and equipment
- Access to OEM specifications

Criteria The learner will be evaluated on

- Safety
- Procedure
- Technique
- Appearance of repair

Line (GAC):	R	REMOVE, INSTALL AND REPAIR STRUCTURAL AND LAMINATED GLASS
Competency:	R1	Remove structural glass

Objectives

To be competent in this area, the individual must be able to:

- Describe removal of laminated, structural glass.

LEARNING TASKS

CONTENT

- | | |
|--|---|
| 1. Describe automotive laminated, structural glass | <ul style="list-style-type: none"> • Characteristics <ul style="list-style-type: none"> ○ Safety ○ Clear ○ Tinted ○ Shaded ○ Heated • H.U.D. (heads-up display) • Rain/moisture sensors • Acoustic inner layer • Anti-lacerative • Application • NAGS • Repairable |
| 2. Describe removal of laminated, structural glass | <ul style="list-style-type: none"> • Select removal method <ul style="list-style-type: none"> ○ Vehicle construction <ul style="list-style-type: none"> ▪ Exposed pinchweld ▪ Encapsulated ○ Replace vs. reinstall • Tools and equipment <ul style="list-style-type: none"> ○ Wire ○ Cold knife ○ Utility (razor) knife ○ Reciprocating tool • Remove bonded glass and material <ul style="list-style-type: none"> ○ Safety and PPE ○ Vehicle protection ○ Mark fastener locations and positions ○ Clean up ○ Storage |

NOTE: In order to deliver training on glass, it is expected that students will have the opportunity to observe a live demonstration of a removal and installation of bonded glass.

Line (GAC):	R	REMOVE, INSTALL AND REPAIR STRUCTURAL AND LAMINATED GLASS
Competency:	R2	Install structural glass

Objectives

To be competent in this area, the individual must be able to:

- Describe installation of laminated, structural glass.

LEARNING TASKS

1. Describe installation of laminated, structural glass

CONTENT

- Considerations
 - Safety and PPE
 - Environmental conditions
 - Drive away times
 - Contaminations
 - Electronics
 - Location
 - Calibration
- Vehicle construction
 - Exposed pinchweld
 - Encapsulated
 - Blocks
 - Pins
- Tools and equipment
 - Lifting devices
 - Suction cups
 - Ergonomic lift assists
 - Adhesive gun
 - Razor blades
 - Utility knife
 - Tape
- Materials
 - Urethane types
 - Primers
 - Adhesion promoters
 - Glass cleaner
- Installation
 - Vehicle protection
 - Buddy system
 - Prep surfaces
 - Dry fit
 - Reference fastener locations and positions
 - Adhesive application

LEARNING TASKS

CONTENT

- V-bead
- Clean up

NOTE: In order to deliver training on glass, it is expected that students will have the opportunity to observe a live demonstration of a removal and installation of bonded glass.

Line (GAC):	R	REMOVE, INSTALL AND REPAIR STRUCTURAL AND LAMINATED GLASS
Competency:	R3	Repair laminated glass

Objectives

To be competent in this area, the individual must be able to:

- Describe repair of laminated glass.

LEARNING TASKS

1. Describe repair of laminated glass

CONTENT

- Troubleshooting
 - Repairable or not
 - Line of vision
 - Leak check
 - Water
 - Wind
- Chip repair
 - Bullseye
 - Half moon
 - Star
- Mounting tabs (Mirror buttons)
- Tools and equipment
 - Bridge
 - Injector
 - UV lamp
 - Rotary tool
- Materials
 - Resins
 - Pit filler
 - Polish

Line (GAC): **S REMOVE AND INSTALL NON-STRUCTURAL GLASS**
Competency: **S1 Remove non-structural glass**

Objectives

To be competent in this area, the individual must be able to:

- Remove non-structural glass.

LEARNING TASKS

1. Describe removal procedures for non-structural glass

CONTENT

- Considerations
 - AS1, AS2, AS3
 - Bug (id tag)
 - Tint colour
- Types
 - Stationary/movable
 - Tempered
 - Laminated
 - Mounting method
 - Encapsulated
 - Roped in
- Location
 - Door
 - Truck cab back glass (sliders)
 - Hinged, vented
 - Lift gate
 - Sun roof
 - Hinged
 - Sliding
 - Panorama
 - Quarter glass
- Fasteners
 - Bolts
 - Clips
 - Rivets
 - Everseal
 - Gaskets
 - Bonded
- Sealants
- Removal procedures
- Run channel
- Sash channel
- Clean up and disposal

LEARNING TASKS

2. Remove non-structural glass

CONTENT

- Manufacturers' specifications
 - Selection of removal method
 - Identification of parts
- Tool selection
- Disabling SRS
- Vehicle protection
- Removal of glass
- Clean up
 - Disposal of glass
- Warehousing of parts

Line (GAC): **S** **REMOVE AND INSTALL NON-STRUCTURAL GLASS**
Competency: **S2** **Install non-structural glass**

Objectives

To be competent in this area, the individual must be able to:

- Describe the installation non-structural glass.

LEARNING TASKS

1. Describe the installation of non-structural glass

CONTENT

- Checking for glass defects
- Manufacturers' specifications
- Tool selection
- Vehicle protection
- Replacement of glass
- Torquing
- Fit, finish and operation
- Verification of calibration and synchronization of electronics
- Clean up

Line (GAC):	W REPAIR AND REPLACE INTERIOR COMPONENTS
Competency:	W1 Repair interior components

Objectives

To be competent in this area, the individual must be able to:

- Describe removal and repair of interior components.

LEARNING TASKS

1. Describe interior components

CONTENT

- Consoles
- Carpets
- Head liners
- Seats
- Trunks
- Trim panels
 - Pillars
 - Kick
 - Sill plates
 - Door
 - Lift gate
- Dash panels
 - Instrument clusters
- Attachment methods
 - Clips
 - Screws
 - Bolts
- Manufacturers' specifications
- Sublet
- Disabling SRS
- Tool selection
 - Upholstery
 - Non-marring
 - Battery saver
- Relieving stress lines (bruising)
- Stripping interiors
- Removal of head liner
 - Handling and storage
 - Visors
 - Dome lights
- Infant seat restraint brackets
- Clip and tab mounting surfaces
 - Hog rings
- Temporary warehousing (tag and bag)

2. Describe removal and repair of interior components

Line (GAC):	W REPAIR AND REPLACE INTERIOR COMPONENTS
Competency:	W2 Replace interior components

Objectives

To be competent in this area, the individual must be able to:

- Describe installation of interior components.

LEARNING TASKS

1. Describe installation of interior components

CONTENT

- Manufacturers' specifications
- Isolating (disconnecting) power source
- Tool selection
 - Upholstery
 - Non-marring
- Fasteners
 - OEM/approved equivalent
 - Identification
 - Transferring (O/H)
 - Torquing
- Installing components
- Reconnecting electrical components
- Reconnecting battery
- Clearing trouble codes

Level 3

Auto Body and Collision Technician

Line (GAC):	B	USE TOOLS AND EQUIPMENT
Competency:	B8	Maintain frame and unibody repair and measuring equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe the maintenance of measuring systems.

LEARNING TASKS

1. Identify measuring equipment

CONTENT

- Mechanical (2D)
 - Tape measure
 - Tram
 - Digital
 - Analog
 - Self-centering
- Electronic (3D)
 - Computerized
 - Laser
 - Target
 - Arm
 - Acoustic
 - Optic

2. Describe the purpose of measuring systems

- Design
- Advantages
- Disadvantages
- Method of length measurement
- Limitations of measuring equipment

3. Describe the maintenance of measuring systems

- Inspection
- Cleaning
- Smooth operation
- Calibration
- Updating software
- Storage

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B9 Use diagnostic equipment

Objectives

To be competent in this area, the individual must be able to:

- Maintain diagnostic equipment.
- Perform pre-scan and post-scan of vehicle.

LEARNING TASKS

CONTENT

- | | |
|--|---|
| 1. Describe diagnostic equipment | <ul style="list-style-type: none"> • Scan tools • Digital Volt-ohm-milliammeter (DVOM) • Laptops • Tablets |
| 2. Maintain diagnostic equipment | <ul style="list-style-type: none"> • Checking for defects • Calibration • Cleaning • Storing • Updating software |
| 3. Perform pre-scan and post-scan of vehicle | <ul style="list-style-type: none"> • Faults <ul style="list-style-type: none"> ○ Existing ○ Current • Diagnosing Advanced Driver Assistance Systems (ADAS) and safety features • Clearing fault codes • System calibrations <ul style="list-style-type: none"> ○ Resetting vehicle components ○ Lights/delays ○ Relearning • Confirming repairs |

Line (GAC):	C	USE WELDING EQUIPMENT
Competency:	C2	Use welding equipment

Objectives

To be competent in this area, the individual must be able to:

- Perform various welds, including:
 - Squeeze-type resistance spot weld (STRSW).
 - Vertical butt weld on steel using GMAW/MIG.
 - Vertical lap weld on steel using GMAW/MIG.
- Perform MIG brazing.

LEARNING TASKS

1. Describe resistance spot welders

CONTENT

- Components
 - Reach arms
 - Tips
 - Cooling systems
 - Pressurization handle
 - Transformer
 - Timer
 - Shunting clamp
 - Purpose
 - Use
 - Pressure
 - Time
 - Voltage
 - Current
 - Manufacturers' specifications
 - Destruction testing
-
2. Perform set up for STRSW
 - Vehicle and area preparation
 - Welding blankets
 - Spark paper
 - Flammables
 - Metal preparation
 - Joint
 - Clearance between surfaces
 - Anti-corrosion agents
 - Position of welds
 - Weld bond
 - Tip pressure and alignment
 - Weld time
 - Current
 - Test coupon

3. Perform STRSW procedures

LEARNING TASKS

CONTENT

- Evaluating weld
 - Spatter
 - Nugget size
 - Squeeze out (weld bond)
 - Blow throughs
 - Pinholes
 - Flange distortion
 - Destructive testing
 - Shear
 - Peel
 - Twist

- 4. Set up for out of position GMAW/MIG welding
 - Manufacturer suggested settings
 - Chart
 - Wire speed (current)
 - Wire stick out
 - Voltage (heat) selection
 - Shielding gas flow rate

- 5. Perform a vertical butt weld on steel
 - Gun angle and speed
 - Penetration
 - Build-up
 - Consistent bead width

- 6. Perform a vertical lap weld on steel
 - Gun angle and speed
 - Penetration
 - Build-up
 - Consistent bead width

- 7. Describe MIG brazing
 - Set up
 - Drive roller pressure
 - Wire feed
 - Spool/machine fed
 - Spool gun fed
 - Wire speed (current)
 - Voltage (heat) selection
 - Shielding gas
 - Flow rate
 - Type (100% Argon)
 - Liner selection

LEARNING TASKS

CONTENT

8. Perform MIG brazing

- Conditioning of metal
- Destructive testing of coupons

- Preparation checklist
- Plug
- Slotted
- Butt

Achievement Criteria

Performance The learner will perform welds on coupons in a vertical position:

- lap weld
- butt weld
- plug weld

Conditions The learner will be given

- Welding equipment
- 22 gauge coupons
- 16 gauge coupons

Criteria The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of weld (destructive test)

Line (GAC): D ORGANIZE WORK AND USE DOCUMENTATION

Competency: D6 Prepare estimates and supplements

Objectives

To be competent in this area, the individual must be able to:

- Create an estimate and supplement.

LEARNING TASKS

CONTENT

- | | |
|--|---|
| 1. Describe estimating terminology | <ul style="list-style-type: none"> • Removal & replacement (Re & Re) • R & I • JT • O/H • Repair • Sublet • Supplement • Access time |
| 2. Describe additional information contained in estimating systems | <ul style="list-style-type: none"> • Procedural pages (P Pages) • Vehicle systems information • Plastics identification • High strength steel locations • Computer module locations • 'Quick-check' under hood measurements • Airbag information |
| 3. Perform vehicle measurement point to point | <ul style="list-style-type: none"> • Length • Width • Height • Upper body misalignment • Tolerances |
| 4. Describe the parts of a damage estimate | <ul style="list-style-type: none"> • Estimate formats • Vehicle information • Customer information • Main body of estimate <ul style="list-style-type: none"> ○ Required parts and material <ul style="list-style-type: none"> ▪ New ▪ Used ▪ After market/Like kind quality (LKQ) ○ Required labour |

LEARNING TASKS

CONTENT

- Required sublet
 - Other costs
 - hazardous waste disposal
 - freight fees
 - taxes
 - Photographs
 - Cost calculations

- 5. Create estimates and supplements
 - Visual assessment
 - Previous or pre-existing damage
 - Tear down
 - Photo documentation
 - JT
 - Repair considerations
 - OEM specifications
 - After market accessories
 - R & I
 - Flexibility of components
 - O/H
 - Note-taking during inspection
 - On the vehicle (blueprinting)
 - For photos
 - For input into software
 - Customer requests
 - Entering information into software
 - Finalizing and printing estimate or supplement

Achievement Criteria

- | | |
|-------------|---|
| Performance | The learner will create an estimate. |
| Conditions | The learner will be given <ul style="list-style-type: none"> • A damaged vehicle or example of a damaged vehicle • Estimating software or manuals |
| Criteria | The learner will be evaluated on <ul style="list-style-type: none"> • Note-taking while inspecting • Accuracy of final estimate |

Line (GAC): N PERFORM FINAL INSPECTIONS

Competency: N1 Perform final operational check

Objectives

To be competent in this area, the individual must be able to:

- Perform final operational checks.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe pre-delivery inspection | <ul style="list-style-type: none"> • Inspection checklist • Value added <ul style="list-style-type: none"> ○ Touch up stone chips ○ Surface defects |
| 2. Check affected fluid levels | <ul style="list-style-type: none"> • Coolant • Windshield washer resevoir • Fluids <ul style="list-style-type: none"> ○ Transmission ○ Engine ○ Brakes |
| 3. Check operation of components that were repaired, replaced and calibrated | <ul style="list-style-type: none"> • A/C • Windows • Wipers • Lights <ul style="list-style-type: none"> ○ Headlight aim ○ Signals ○ Brakes ○ Interior • Accessories • Clocks • Radio codes • Water leaks • Battery connections • Horn |
| 4. Perform post-scan of vehicle | <ul style="list-style-type: none"> • Actuators • SRS • Fault codes |

5. Check tire pressure and wheel torque
 - Manufacturers' specifications
 - Warning lights
 - Tire Pressure Monitoring System (TPMS)
 - Lug nuts

6. Perform road test
 - Confirming ADAS are operational
 - Drivability
 - Vibrations
 - Alignment
 - Air leaks
 - Checklist
 - Fluid levels

Line (GAC): P PREPARE FOR STRUCTURAL REPAIR

Competency: P1 Identify extent of damage

Objectives

To be competent in this area, the individual must be able to:

- Identify types and patterns of damage.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe damage analysis procedures | <ul style="list-style-type: none"> • Purpose <ul style="list-style-type: none"> ○ Estimating ○ Creation of a repair plan • Need for a complete damage analysis • Damage analysis techniques • Technology and sources of information • Documentation <ul style="list-style-type: none"> ○ Improper previous repairs ○ Unrelated damage |
| 2. Describe conventional frame designs | <ul style="list-style-type: none"> • Ladder • Perimeter • “X” frame |
| 3. Describe unibody designs | <ul style="list-style-type: none"> • Semi-unitized • Composite • Torque box • Space frame |
| 4. Identify vehicle crush zones | <ul style="list-style-type: none"> • Energy management system • Types • Repairability |
| 5. Describe collision forces | <ul style="list-style-type: none"> • Mass • Momentum • Inertia |
| 6. Identify damage patterns | <ul style="list-style-type: none"> • Unibody and conventional frame • Types of impacts <ul style="list-style-type: none"> ○ Front end ○ Rear end ○ Offset ○ Side |

LEARNING TASKS
CONTENT

- | | |
|--|--|
| | <ul style="list-style-type: none"> ○ Roll over ○ Stationary or moving • Direction of damage • Crush zones • Deflection • Primary and secondary <ul style="list-style-type: none"> ○ Point of impact ○ Buckling ○ Gap misalignment ○ Stressed spot welds ○ Broken seam sealer ○ Cracked paint • Related and unrelated |
| 7. Identify type of damage | <ul style="list-style-type: none"> • Structural • Non-structural |
| 8. Describe cross-measurement techniques | <ul style="list-style-type: none"> • Limitations <ul style="list-style-type: none"> ○ Diamond checking ○ Asymmetrical • Sway checking |
| 9. Perform vehicle measurements | <ul style="list-style-type: none"> • Tram gauge <ul style="list-style-type: none"> ○ Length, width, cross |

Achievement Criteria

- | | |
|-------------|---|
| Performance | The learner will perform vehicle point to point measurements, such as <ul style="list-style-type: none"> • Door opening • Trunk • Under hood |
| Conditions | The learner will be given <ul style="list-style-type: none"> • Tram gauge • Tape measure • Specifications/comparative • Vehicle or equivalent |
| Criteria | The learner will be evaluated on <ul style="list-style-type: none"> • Procedure • Accuracy of measurements |

Line (GAC): P PREPARE FOR STRUCTURAL REPAIR

Competency: P2 Remove components for access

Objectives

To be competent in this area, the individual must be able to:

- Describe unibody components.
- Describe removal considerations.

LEARNING TASKS

1. Describe unibody components

CONTENT

- Cowl
- Apron assemblies
- Radiator supports
- Cross-members
- Pillars
- Shock towers
- Rocker panels
- SRS sensors

2. Describe removal considerations

- OEM recommendations
 - Warranty
- Customer expectations
- Replacement vs. repairability
- Part availability
- Liability
- Maintaining vehicle structural integrity
- Type of material
 - High strength steels
 - Composites
 - Ultra high strength steels
- Corrosion protection
 - Sound deadening application
 - Seam sealers
- Heating
- Joining and attachment methods

Line (GAC): **P PREPARE FOR STRUCTURAL REPAIR**
Competency: **P3 Perform vehicle set up**

Objectives

To be competent in this area, the individual must be able to:

- Perform a unibody vehicle set up for anchoring.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe types of anchoring systems | <ul style="list-style-type: none"> • Dedicated • Universal • Portable • Floor |
| 2. Describe unibody anchoring | <ul style="list-style-type: none"> • Purpose • Design • Anchoring locations <ul style="list-style-type: none"> ○ Manufacturers' recommendations ○ Structures ○ Frames • Center section principle |
| 3. Describe anchoring considerations | <ul style="list-style-type: none"> • Weight support • Vehicles without lower rocker panel pinch welds • Space frame • Types of clamps <ul style="list-style-type: none"> ○ OEM specific ○ Universal • Custom fit clamps • Weld-on flanges • Through-the-floor clamps • Suspension mount clamps • Jacking points • Safety considerations • Attachment and removal procedures • Rocker panel flange preparation • Weak rocker panels • Adjacent components <ul style="list-style-type: none"> ○ Brake lines ○ Wiring ○ Fuel lines |

LEARNING TASKS

4. Perform a unibody vehicle set up for anchoring

CONTENT

- Drain holes
- Unibody
- Floor
- Anchoring procedures

Line (GAC):	Q REMOVE, REPAIR AND INSTALL STRUCTURAL COMPONENTS
Competency:	Q1 Repair structural components

Objectives

To be competent in this area, the individual must be able to:

- Describe repairing structural components.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe straightening effects on damaged metal | <ul style="list-style-type: none"> Shape/dimension <ul style="list-style-type: none"> Spring back State/strength <ul style="list-style-type: none"> Work hardening High strength steel Aluminum |
| 2. Describe preparation for straightening | <ul style="list-style-type: none"> Removal for access <ul style="list-style-type: none"> Outer panel Mechanical components Glass Interior trim Visual inspection <ul style="list-style-type: none"> Door gaps Pinch weld flanges <ul style="list-style-type: none"> Wiring Trim |
| 3. Describe realignment equipment | <ul style="list-style-type: none"> Types <ul style="list-style-type: none"> Floor pullers Hydraulic Electric Pneumatic Chain Chainless Attachments <ul style="list-style-type: none"> Clamps Safety cables Hooks Turnbuckles Slings Brackets Plates Advantages |

LEARNING TASKS

CONTENT

- Time
 - Mobility

- 4. Describe realignment procedures
 - Types of pulls
 - Vector
 - Cowl
 - Up/down
 - Pillar
 - Push/pull
 - Inner structure
 - Pulling strategies
 - Angle
 - Chain alignment
 - Forces applied
 - Anchoring
 - Pulling
 - Blocking
 - Number of pulls
 - Kink vs. bend
 - Sectioning procedures
 - Pillar
 - A, B, C, D
 - Floor panel
 - Rocker panel

- 5. Describe stress-relieving considerations
 - Cold
 - Heat
 - Vehicle construction
 - Spring back
 - Proper control of panel movement

Line (GAC):	Q	REMOVE, REPAIR AND INSTALL STRUCTURAL COMPONENTS
Competency:	Q2	Remove structural components

Objectives

To be competent in this area, the individual must be able to:

- Describe procedures for structural panels removal.

LEARNING TASKS

1. Describe procedures for structural panels removal

CONTENT

- Analysis
 - Vehicle construction
- Reasons for sectioning
 - Time
 - Cost
 - Availability
 - Less disruption of OEM corrosion protection and coatings
- Identify areas for sectioning
 - Manufacturers' removal procedure and specifications
 - Layout
 - Foams
- Attachment methods
 - Spot weld
 - Location
 - Number
 - Rivets
 - Blind
 - SPR
 - Adhesive
 - Fasteners
 - One time
 - Bolts
- Removal methods
 - Cut off tool
 - Chiseling
 - Belt sanders
 - Drilling
 - Plasma torch
 - Heating

Line (GAC):	Q	REMOVE, REPAIR AND INSTALL STRUCTURAL COMPONENTS
Competency:	Q3	Install structural components

Objectives

To be competent in this area, the individual must be able to:

- Perform welded-on body panel sectioning.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Prepare structural components | <ul style="list-style-type: none"> • Seam and weld joint preparation <ul style="list-style-type: none"> ○ On vehicle ○ On replacement component • Replacement panel preparation <ul style="list-style-type: none"> ○ Dress time ○ Panel alignment ○ Attachment methods ○ Cleaning ○ Surface preparation ○ Corrosion protection |
| 2. Describe welded-on body panel replacement | <ul style="list-style-type: none"> • Considerations <ul style="list-style-type: none"> ○ OEM/industry guidelines ○ Sectioning locations ○ Attachment methods ○ Structural foam ○ NVH • Types of sectioning joints <ul style="list-style-type: none"> ○ Lap ○ Open butt ○ Butt joint with backer ○ Offset • Test fitting • Final measure • Attachment methods <ul style="list-style-type: none"> ○ Welding <ul style="list-style-type: none"> ▪ STRSW ▪ Traditional GMAW/MIG ○ Weld bonding ○ Mechanical |

3. Section a welded-on body panel

- Removal procedures
- Installation procedures
- Riveting coupons
- Caution areas
 - Existing body holes
 - Inner reinforcements
 - Panel design
 - Multiple layers
 - Seat belt assembly mounting locations

Achievement Criteria

Performance The learner will section a welded-on body panel, including

- One with a bond
- One with a weld

Conditions The learner will be given

- Closed box panel
- Tools and equipment
- Materials
- Repair procedures and specifications

Criteria The learner will be evaluated on

- Safety
- Accuracy
- Quality
- Appearance

Line (GAC):	T	DEACTIVATE AND REACTIVATE ALTERNATE-FUEL SYSTEMS
Competency:	T1	Deactivate alternate-fuel systems

Objectives

To be competent in this area, the individual must be able to:

- Follow safety procedures for alternate fuel systems.
- Describe deactivating alternate fuel systems

LEARNING TASKS

CONTENT

1. Identify type of alternate fuel system	<ul style="list-style-type: none"> • Electric • Hybrid • Propane • Compressed natural gas (CNG) • Hydrogen
2. Follow safety procedures for alternate fuel vehicles	<ul style="list-style-type: none"> • Manufacturers' safety procedures • Potential for damage to vehicle and people • Deactivation of battery packs • Curing cycles • PPE, especially high voltage gloves • Closing fuel supply valves • Placing vehicle on wheel dollies
3. Describe disabling high voltage systems	<ul style="list-style-type: none"> • OEM specifications <ul style="list-style-type: none"> ○ Shut down procedures ○ Switch location ○ Turning ignition off ○ Separating keys from vehicle • Ensuring zero energy • Colour identifier (orange) • Residual power after deactivation of power supply • Removing ignition circuit relay or fuse • Testing with DVOM • Battery pack removal
4. Describe removing alternate fuel cells	<ul style="list-style-type: none"> • OEM specifications • Handling and storage considerations

Line (GAC):	T	DEACTIVATE AND REACTIVATE ALTERNATE-FUEL SYSTEMS
Competency:	T2	Reactivate alternate-fuel systems

Objectives

To be competent in this area, the individual must be able to:

- Describe reactivating alternate fuel systems.

LEARNING TASKS

1. Describe reactivating alternate fuel systems

CONTENT

- Safety
- OEM specifications
- Installation of battery pack
- Enabling high voltage systems
- Opening alternate fuel supply valves
- Connecting low-voltage battery
- Charging low-voltage battery

Line (GAC):	U	REMOVE AND INSTALL MECHANICAL COMPONENTS
Competency:	U1	Identify fundamentals of heating and cooling systems and components

Objectives

To be competent in this area, the individual must be able to:

- Identify fundamentals of heating and cooling systems and components.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| 1. Describe heating and cooling systems | <ul style="list-style-type: none"> Oil cooling systems <ul style="list-style-type: none"> Transmission Engine Power steering Climate control systems |
| 2. Describe heating and cooling system components | <ul style="list-style-type: none"> Radiators Thermostat Hoses Water pump Fan assembly <ul style="list-style-type: none"> Electrical Mechanical Hydraulic Shrouds Block heater/expansion plug Intercoolers Coolant <ul style="list-style-type: none"> Types Surge tank Overflow tank Heater core Belts Pulleys |
| 3. Describe air conditioning system components | <ul style="list-style-type: none"> Condenser Receiver-drier Expansion valve Compressor Controls System Lines Refrigerant <ul style="list-style-type: none"> R134a 1234yf |

LEARNING TASKS

CONTENT

4. Identify safe handling procedures of air conditioning components

- Oil
- Dyes
- Belts
 - Serpentine
 - V-belt
- Evaporator
- Regulations and required certification
- Manufacturers' specifications
 - Weight
 - Identification
- Pressurized system
- Welding in vicinity
- Evacuating the system (recovery)
- Sealing system
- Recharging the system
- Dye
- Oil

Line (GAC):	U	REMOVE AND INSTALL MECHANICAL COMPONENTS
Competency:	U2	Identify fundamentals of powertrain systems and components

Objectives

To be competent in this area, the individual must be able to:

- Identify fundamentals of powertrain systems and components.

LEARNING TASKS

CONTENT

1. Describe powertrain components	<ul style="list-style-type: none"> Engine Transmission Axle Joints <ul style="list-style-type: none"> CV Universal Differentials Drive shaft
2. Describe exhaust system components	<ul style="list-style-type: none"> Muffler Exhaust manifold Exhaust pipe Tail pipe Catalytic converter Resonator Hangers Clamps Sensors Heat shields Insulators Gaskets
3. Describe fuel system components	<ul style="list-style-type: none"> Fuel pump Fuel injectors Fuel tank Fuel lines Throttle body Sending units Emergency shut-off switch Filters Air intake system

Line (GAC): **U REMOVE AND INSTALL MECHANICAL COMPONENTS**
Competency: **U4 Remove mechanical components**

Objectives

To be competent in this area, the individual must be able to:

- Describe removal of mechanical components.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| <p>1. Describe disassembly of cooling systems</p> | <ul style="list-style-type: none"> • Fluids <ul style="list-style-type: none"> ○ Draining ○ Recovery ○ Storage ○ Disposal ○ Containment • Manufacturers' specifications • Disconnecting hoses and lines • Gaining access • Unclipping fasteners • Protecting components • Labelling of components |
| <p>2. Describe removal of power train components</p> | <ul style="list-style-type: none"> • Coordination with other trades • Sublet • OEM specifications and sequence • Disassembly <ul style="list-style-type: none"> ○ Exhaust ○ Drive shaft ○ Disconnecting fuel systems ○ Engine cradle |

Line (GAC):	U	REMOVE AND INSTALL MECHANICAL COMPONENTS
Competency:	U5	Install mechanical components

Objectives

To be competent in this area, the individual must be able to:

- Describe installation of mechanical components.

LEARNING TASKS

CONTENT

1. Describe re-assembly of cooling systems	<ul style="list-style-type: none"> Manufacturers' specifications <ul style="list-style-type: none"> Fluid capacities Coolant types and mixture Radiator installation Filling procedures Troubleshooting <ul style="list-style-type: none"> Pressure testing Dye recognition
2. Describe installation procedures for suspension systems	<ul style="list-style-type: none"> Visual inspection Manufacturers' installation procedures <ul style="list-style-type: none"> Reusability of components Torquing fasteners Procedures <ul style="list-style-type: none"> Brake system disconnect Cleaning Installation sequence Realignment requirements Brake system assembly and bleeding Specialty tools Component storage Determine reusability of components
3. Describe installation of power train components	<ul style="list-style-type: none"> Coordination with other trades Sublet OEM specifications and sequence Reassembly <ul style="list-style-type: none"> Exhaust Drive shaft Re-connecting fuel systems Engine cradle

Line (GAC):	V	REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS
Competency:	V1	Identify fundamentals of electrical systems and components

Objectives

To be competent in this area, the individual must be able to:

- Identify fundamentals of electrical systems and components.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Test electrical circuits | <ul style="list-style-type: none"> • Voltage • Resistance • Current flow • Voltage drop • Power consumption • Circuits <ul style="list-style-type: none"> ○ Open ○ Closed ○ Series ○ Parallel • Short circuits <ul style="list-style-type: none"> ○ Dead/high resistance ○ Intermittent ○ Cross circuit • System schematics |
| 2. Identify the safety precautions when working around low-voltage batteries | <ul style="list-style-type: none"> • Gases present • Disconnecting • Removal • Charging • Welding near a battery • Computers/memory • Jump starting |
| 3. Describe electrical components | <ul style="list-style-type: none"> • Exterior and interior lighting • Power accessories • Antenna • Switches and gauges • Sending units • Fuse boxes and fuses • Fan motors • Relays • Horn |

Line (GAC):	V	REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS
Competency:	V2	Remove electrical components

Objectives

To be competent in this area, the individual must be able to:

- Describe removal of electrical components.

LEARNING TASKS

1. Describe removal of damaged electrical components

CONTENT

- Inspection
- Identification of damaged component
- Manufacturers' removal procedure
- Disconnect components
- Storage and/or disposal of components
- Battery removal
- Wiring harnesses

Line (GAC): **V REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS**

Competency: **V3 Repair damaged wires and protective coverings**

Objectives

To be competent in this area, the individual must be able to:

- Repair damaged wires and protective coverings.
- Service low-voltage battery.

LEARNING TASKS

CONTENT

- | | |
|---|--|
| <p>1. Describe a minor electrical diagnosis on a simple circuit</p> | <ul style="list-style-type: none"> • Types of damage <ul style="list-style-type: none"> ○ Corrosion ○ Burning/melting ○ Chafing ○ Pinching ○ Broken • Fault codes • Voltage drop • Wiring harness repair • Checking for poor grounds <ul style="list-style-type: none"> ○ Corrosion ○ Damaged wires • Fuses/relays • Equipment and tools <ul style="list-style-type: none"> ○ DVOM <ul style="list-style-type: none"> ▪ Ammeter ▪ Volt ▪ Ohmmeter ○ Test lights ○ Jumper wires ○ Repair tools <ul style="list-style-type: none"> ▪ Crimpers ▪ Strippers ▪ Soldering equipment |
| <p>2. Repair damaged wires and exterior coatings</p> | <ul style="list-style-type: none"> • Types of wiring and coverings <ul style="list-style-type: none"> ○ Gauge ○ Composition <ul style="list-style-type: none"> ▪ Aluminum ▪ Copper • Types of connectors <ul style="list-style-type: none"> ○ Butt ○ Bullet |

LEARNING TASKS

CONTENT

- | | |
|----------------------------------|---|
| | <ul style="list-style-type: none"> ○ Spade type ○ Locking tabs • Determine repairability of wires • Volt meters and test lights • Splice, cut and solder • Reapply coverings <ul style="list-style-type: none"> ○ Electrical tape ○ Shrink tube |
| 3. Service low-voltage batteries | <ul style="list-style-type: none"> • Battery specifications <ul style="list-style-type: none"> ○ Grouping ○ Ratings • Visual inspection • State of charge test • Disconnection • Cleaning terminals • Charging • Load test • Reconnection • Parasitic draw test |

Achievement Criteria (This achievement criteria covers multiple competencies in Line V)

Performance The learner will repair a damaged wire.

Conditions The learner will be given

- Tools and materials
- A damaged wire

Criteria The learner will be evaluated on

- Safety
- Procedure
- Technique
- Quality of repair
 - Resistance of circuit

Line (GAC):	V	REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS
Competency:	V4	Install electrical components

Objectives

To be competent in this area, the individual must be able to:

- Describe installation of electrical components.

LEARNING TASKS

1. Describe installation of electrical components

CONTENT

- Part number verification
- Manufacturers' installation procedure
- Reconnection of components
 - Fasteners
- Battery installation
- Wiring harness
- Operational check
- Scanning vehicle for codes
- Reset if required

Line (GAC):	V	REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS
Competency:	V5	Service advanced electronic components

Objectives

To be competent in this area, the individual must be able to:

- Describe electronic components.

LEARNING TASKS

1. Describe electronic components

CONTENT

- Location
- Modules
- Sensors
- Cameras
- Static straps
- Entertainment systems
- Engine Control Module (ECM)/Computer

Line (GAC):	X	SERVICE SUPPLEMENTAL RESTRAINT SYSTEMS (SRS)
Competency:	X1	Service seat belt restraint systems

Objectives

To be competent in this area, the individual must be able to:

- Describe servicing seat belt restraint systems.

LEARNING TASKS

CONTENT

1. Describe types of seat belt assemblies and their components	<ul style="list-style-type: none"> • Active design • Passive design • Two-point lap • Three-point seatbelt • Continuous loop single retractor • Three-point dual retractor • Three-point passive • Motorized shoulder belt • Automatic tensioner • Seat integrated systems • Mounting hardware • Electrical connections
2. Describe inspection procedures for seat belt assembly	<ul style="list-style-type: none"> • Manufacturers' specifications • Examine seat belt restraint system • Tongue/buckle assembly • Retractor (tilt mechanism and inertia type) • Webbing • Anchoring points • Interior panel and upholstery removal • Inspection for secondary damage • Pre and post-scan and self-diagnostic check
3. Describe installation of seat belts and components	<ul style="list-style-type: none"> • OEM specifications and procedures <ul style="list-style-type: none"> ○ Torque ○ Thread lock sealant • Operational check

Line (GAC):	X	SERVICE SUPPLEMENTAL RESTRAINT SYSTEMS (SRS)
Competency:	X2	Service air bags and related components

Objectives

To be competent in this area, the individual must be able to:

- Follow safety procedures around air bags.
- Describe servicing air bags and related components.

LEARNING TASKS

CONTENT

1. Describe airbag system components	<ul style="list-style-type: none"> • Impact sensors • Control module • Energy reserve module • Voltage converter • Clock spring • Wiring harness • Airbag module • Inflator assembly
2. Follow safety procedures when working around an airbag system	<ul style="list-style-type: none"> • Disarm • Electrical disconnect • Discharge time • Impact sensors • Deployed inflator module • Un-deployed inflator module
3. Describe procedures to remove and replace airbag system components	<ul style="list-style-type: none"> • System scan • Manufacturer removal and replacement process • Required tools • Related components • Self-diagnostic system • Secondary damage

Level 4

Auto Body and Collision Technician

Line (GAC):	B	USE TOOLS AND EQUIPMENT
Competency:	B8	Maintain frame and unibody repair and measuring equipment

Objectives

To be competent in this area, the individual must be able to:

- Describe maintaining frame pulling equipment.

LEARNING TASKS

1. Describe frame pulling equipment

CONTENT

- Unibody/full frame
 - Rams
 - Pulling towers
 - Pneumatic
 - Hydraulic
 - Safety straps
 - Jack
 - Floor
 - Bottle
 - Porta power
 - Chains
 - Rating (load)
 - Pulling
 - Holding
 - Anchoring
 - Pinch weld clamps
 - Anchor pots
 - Floor rails
 - Turnbuckle/cinch
 - Bench (rack)
 - Drive on
 - Lifting
 - Fixtures
 - Hooks and clamps
 - Sill
 - Weld on
 - Specialty
 - Self-tightening
-
2. Describe maintaining frame pulling equipment
 - Manufacturers' specifications
 - Hydraulic fluid levels
 - Inspection for damage
 - Chains
 - Hooks
 - Clamps

LEARNING TASKS

CONTENT

- Pulleys
- Lines
- Fittings
- Anchor pots
- Safety locking mechanisms
- Cleaning
- Lubrication
- Calibration

Line (GAC): **D ORGANIZE WORK AND USE DOCUMENTATION**
Competency: **D6 Prepare estimates and supplements**

Objectives

To be competent in this area, the individual must be able to:

- Create supplements and sublets.

LEARNING TASKS

1. Create supplements

CONTENT

- Rationale for supplement
 - Missed damage
 - Price adjustments
 - Access time
- Criteria for determining total loss
 - Parts availability
 - Labour costs
 - Repairability
 - Safety
 - Liability

2. Create sublets

- Rationale for sublet
 - Cost
 - Equipment limitations
 - Parts availability
- Other trades
 - Wheel alignment
 - Mechanical repairs
 - OEM calibration
 - Interior repairers
- Warranty

Achievement Criteria

Performance	The learner will interpret an estimate and create a supplement and a sublet.
Conditions	The learner will be given <ul style="list-style-type: none"> • An estimate • A damaged vehicle or an example of a damage vehicle (pictures/video)
Criteria	The learner will be evaluated on <ul style="list-style-type: none"> • Safety • Accuracy of supplement • Accuracy of sublet

Line (GAC): E USE COMMUNICATION AND MENTORING TECHNIQUES
Competency: E2 Use mentoring techniques

Objectives

To be competent in this area, the individual must be able to:

- Use mentoring techniques.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| 1. Describe the role of mentor | <ul style="list-style-type: none"> • Valuing Apprentice • Identifying goals • Encouraging • Managing risk • Providing feedback • Developing capabilities • Maintaining confidentiality |
| 2. Describe mentoring skills and attributes | <ul style="list-style-type: none"> • Inspiration • Listen actively/Active listening • Building trust • Encouragement • Preparedness • Approachability • Objectiveness • Fairness • Compassionate |
| 3. Describe workplace diversity and inclusion | <ul style="list-style-type: none"> • Fair recruiting and hiring practices • Acceptance • Accommodations • Anti-harrassment/anti-bullying policies |

Line (GAC): **N PERFORM FINAL INSPECTIONS**
Competency: **N2 Perform final quality control inspections**

Objectives

To be competent in this area, the individual must be able to:

- Perform quality control.

LEARNING TASKS

1. Perform quality control

CONTENT

- Inspection
- Checklist
- Panel gaps
- Panel alignment
- Corrosion protection
- Quality of sublets
- Quality of repair
- Operation of latches, catches and locks
- Alignment of trims, headlights, grilles and bumpers
- SRS
- Colour matching
- Cleanliness
- Customer courtesies
- Determining completeness of work based on repair order

Line (GAC): P PREPARE FOR STRUCTURAL REPAIR

Competency: P1 Identify extent of damage

Objectives

To be competent in this area, the individual must be able to:

- Perform measurements, including 3D measuring.
- Prepare a damage analysis report.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe conventional frame designs | <ul style="list-style-type: none"> • Components <ul style="list-style-type: none"> ○ Body mounts ○ Cross members • Construction <ul style="list-style-type: none"> ○ Hydroformed ○ Steel ○ Aluminum |
| 2. Describe unibody designs | <ul style="list-style-type: none"> • Components <ul style="list-style-type: none"> ○ Cradle ○ Pillars • Construction <ul style="list-style-type: none"> ○ Steel ○ Aluminum ○ Ultra-high strength Steel (UHSS) ○ Composites ○ Overall structural integrity |
| 3. Describe measuring planes | <ul style="list-style-type: none"> • Datum plane • Center line • Zero or base plane • Length, width and height • X, Y, Z • Three section principle <ul style="list-style-type: none"> ○ Front ○ Centre ○ Rear |
| 4. Identify types of measurement | <ul style="list-style-type: none"> • Point-to-point • Parallel-to-datum • Parallel-to-center • Definition • Purpose |

LEARNING TASKS
CONTENT

5. Identify and perform 3D measurement

- Type of equipment used
- Examples of use

- System types
 - Universal mechanical measuring systems
 - Universal laser measuring systems
- Software/sheets
 - Under hood
 - Upper body
 - Symmetrical
 - Asymmetrical
 - Compensating for weight
 - Movable parts
- Equipment
 - Electronic
 - Digital
 - Sonar
- Procedures
- Considerations
- Limitations

6. Prepare a damage analysis report

- Visual damage
- Buckles, cracks, or panel distortion
- Mechanical mounts
- Visible wheelbase
- Dimensional analysis
- Formulate a repair plan

Achievement Criteria

Performance The learner will perform damage analysis using 3D measurement.

Conditions The learner will be given

- 3D measuring equipment
- A vehicle
- Access to specifications
- Damage analysis report

Criteria The learner will be evaluated on

- Safety
- Sequence of measurements
- Accuracy of measurement
- Accuracy of documentation

Line (GAC): P PREPARE FOR STRUCTURAL REPAIR

Competency: P2 Remove components for access

Objectives

To be competent in this area, the individual must be able to:

- Describe removing and handling components for access.

LEARNING TASKS

1. Describe removing components for access

CONTENT

- Procedures for disarming and disabling
- Inner and outer panel
 - Doors
 - Fenders
 - Bumper covers
 - Trunks
 - Hoods
 - After market accessories
 - Trim
 - Interior
 - Exterior
- Mechanical
 - Suspension
 - Cooling systems
 - Fuel lines
 - Fluids
- Electrical/electronic
 - Wiring
 - Batteries
 - Sensors
 - SRS
- Glass

2. Describe handling removed components

- Inspection
 - For damage
 - Serviceability
- Cleaning
- Disposal
- Label, organize and store components

Line (GAC): **P PREPARE FOR STRUCTURAL REPAIR**
Competency: **P3 Perform vehicle set up**

Objectives

To be competent in this area, the individual must be able to:

- Perform vehicle set up for conventional frame repair.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| 1. Describe chain wrapping techniques | <ul style="list-style-type: none"> • Purpose • Chain wrapping methods • Use with blocking |
| 2. Describe weight support techniques | <ul style="list-style-type: none"> • Loaded and unloaded suspension • Split between torque box and suspension areas • Even from side-to-side to prevent twisting • Use with blocking |
| 3. Describe blocking method | <ul style="list-style-type: none"> • Leverage principles • Twist removal |
| 4. Describe the use of plug hooks | <ul style="list-style-type: none"> • Fast, efficient anchor • Need for blocking • Level positioning |
| 5. Perform a conventional or full frame vehicle set up for anchoring | <ul style="list-style-type: none"> • Conventional • Full frame • Floor • Anchoring procedures |

Line (GAC):	Q REMOVE, REPAIR AND INSTALL STRUCTURAL COMPONENTS
Competency:	Q1 Repair structural components

Objectives

To be competent in this area, the individual must be able to:

- Describe pulling techniques.
- Perform structural sectioning.

LEARNING TASKS

1. Describe structural sectioning

CONTENT

- Frame
 - Conventional/full frame
 - Unitized
- Structural components
 - Apron assembly
 - Radiator supports
 - Shock towers
 - Rocker
 - Upper and lower rails
- Structural integrity
- Maintaining fit and clearances

2. Describe procedures for structural sectioning

- OEM sectioning recommendations
- Locate body seams
- Spot weld removal
- Panel preparation
- Component-specific procedures
 - Pillars
 - Rocker panels
 - Floor panels
 - Rails
 - Closed
 - Open hat
 - Full body
 - Cowl cut front
 - Rear body clip
 - Complete side section
- Panel alignment
 - Test fit
 - Final fit
- Attachment methods
 - Weld

LEARNING TASKS

CONTENT

- | | |
|---|---|
| | <ul style="list-style-type: none"> ○ Adhesive ○ Mechanical • Corrosion prevention |
| 3. Describe pulling procedures for structural repairs | <ul style="list-style-type: none"> • Types of frame damage <ul style="list-style-type: none"> ○ Mash ○ Sag ○ Sway ○ Diamond ○ Twist • Analysis • Set up • Pulling procedure |
| 4. Describe multiple-pulling | <ul style="list-style-type: none"> • Advantages <ul style="list-style-type: none"> ○ Reduction of pressure ○ Equalizing and dispersing energy ○ Control |
| 5. Describe the center-out pulling principle | <ul style="list-style-type: none"> • Need to establish true center-section • Effects of center-section misalignment on end sections |
| 6. Perform structural repair | <ul style="list-style-type: none"> • Frame rail • Sectioning |

Achievement Criteria

- | | |
|-------------|--|
| Performance | The learner will perform a complex frame structural repair. |
| Conditions | The learner will be given <ul style="list-style-type: none"> • Tools and equipment • Specifications • Damaged vehicle or equivalent, such as rail section |
| Criteria | The learner will be evaluated on <ul style="list-style-type: none"> • Safety • Procedure • Accuracy of repair |

Line (GAC):	U	REMOVE AND INSTALL MECHANICAL COMPONENTS
Competency:	U3	Identify fundamentals of steering, suspension and braking systems

Objectives

To be competent in this area, the individual must be able to:

- Identify fundamentals of steering, suspension and braking systems.

LEARNING TASKS

CONTENT

1. Describe rack and pinion steering systems	<ul style="list-style-type: none"> Steering column Pinion gear Rack gear Gear housing Tie rods <ul style="list-style-type: none"> Inner/outer Bellows Mounting points Input shaft
2. Describe the relationship between the rack and pinion assembly and the lower control arms	<ul style="list-style-type: none"> Misalignment angles Jounce rebound toe change Handling problems Methods of checking
3. Describe parallelogram steering systems	<ul style="list-style-type: none"> Steering gear Steering column Steering knuckle Pitman arm Idler arm Centre link/drag link Inner tie rods Outer tie rods Adjusting sleeves
4. Describe the relationship between the parallelogram steering system and the lower control arms	<ul style="list-style-type: none"> Misalignment angles Jounce and rebound toe change Handling problems Methods of checking

- | | |
|--|---|
| 5. Describe alignment angles | <ul style="list-style-type: none"> • Caster • Camber • Steering axis inclination • Toe • Turning radius • Thrust angle |
| 6. Describe handling and parts wear problems associated with each of the alignment angles | <ul style="list-style-type: none"> • Tire wear • Pulling problems • Drive line alignment • Steering wheel angle • Wheel bearings |
| 7. Describe tracking problems | <ul style="list-style-type: none"> • Alignment problems <ul style="list-style-type: none"> ○ Thrust angle • Drive line problems • Wheelbase • Tire wear |
| 8. Describe the effects of a misaligned unibody structure on the steering and suspension systems | <ul style="list-style-type: none"> • Handling • Parts wear • Jounce and rebound toe change • Steering wheel angle |
| 9. Describe diagnosis of wheel alignment | <ul style="list-style-type: none"> • Parts wear • Interpreting SAI readings • Caster • Camber |
| 10. Describe the MacPherson strut suspension system | <ul style="list-style-type: none"> • Components <ul style="list-style-type: none"> ○ Lower control arm ○ Lower ball joint ○ Strut assembly ○ Spring ○ Steering knuckle ○ Upper bearing ○ Bushings ○ Rack and pinion |
| 11. Describe short and long arm suspension systems | <ul style="list-style-type: none"> • Components <ul style="list-style-type: none"> ○ Control arms ○ Lower ball joint ○ Steering gear |

- Pitman arm
 - Idler arm
 - Spring
 - Steering knuckle
 - Torsion bar
 - Coil spring
 - Shock
 - Rack and pinion

- 12. Describe rear suspension systems
 - Front wheel drive design
 - Trailing arm
 - Strut type
 - Rear wheel drive design
 - Independent
 - Solid axle
 - All-wheel/four wheel drive design
 - Independent
 - Solid axle

- 13. Describe braking system components
 - Anti-lock brake (ABS)
 - Tone ring
 - Sensors
 - Wiring
 - Troublecodes
 - Wheel cylinder
 - Pads
 - Shoes
 - Drums
 - Rotors
 - Calipers
 - Master cylinder
 - Proportioning valves
 - Brake lines

Line (GAC): **U REMOVE AND INSTALL MECHANICAL COMPONENTS**
Competency: **U4 Remove mechanical components**

Objectives

To be competent in this area, the individual must be able to:

- Remove steering, suspension and braking systems.

LEARNING TASKS

1. Remove steering, suspension and braking systems

CONTENT

- Visual inspection
 - Physical damage
 - Nicks and cracks
 - Bent sections
- Gaining access
- Hidden damage
- Repair plan
- Manufacturers' removal procedures
- Specialty tools and equipment
 - Coil spring compressor
- Vehicle support
 - Safety considerations
 - Jacking points
- Protecting components
- Spring type
 - Leaf
 - Composite
 - Coil
 - Torsion
 - Air
- Constant velocity joints
- Linkages
- Sway bars
- Brake system disconnect
- Sensors
- Component storage

Line (GAC):	U	REMOVE AND INSTALL MECHANICAL COMPONENTS
Competency:	U5	Install mechanical components

Objectives

To be competent in this area, the individual must be able to:

- Install steering, suspension and braking systems.

LEARNING TASKS

1. Install steering, suspension and braking systems

CONTENT

- Repair plan
- Installation sequence
- Determine reusability of components
- Replacement of parts
 - Torquing
- Manufacturers' installation procedures
- Specialty tools and equipment
- Vehicle support
 - Safety considerations
 - Jacking points
- Protecting components
- Constant velocity joints
- Linkages
- Sway bars
- Brake system re-connect
 - Bleeding
- Sensors

Line (GAC):	V	REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS
Competency:	V5	Service advanced electronic components

Objectives

To be competent in this area, the individual must be able to:

- Describe servicing advanced electronic components.

LEARNING TASKS

CONTENT

- | | |
|---|--|
| 1. Describe advanced electronic systems and components that may need servicing after repairing vehicle damage | <ul style="list-style-type: none"> • Location • Modules • Sensors • Lane departure • Adaptive cruise control • Blind spot detection • Adaptive and auto-levelling headlights • Keyless entry • Traction control • Accident avoidance systems • Driver attention systems • Back up camera • Parking assist • Media systems <ul style="list-style-type: none"> ○ Entertainment ○ Navigation |
| 2. Describe construction features and applications of wiring diagrams | <ul style="list-style-type: none"> • Electrical symbols • Circuit identification methods • Colour codes • Circuit number codes, gauge and metric wire sizes • Connectors |
| 3. Describe on board computers | <ul style="list-style-type: none"> • Purpose • Types <ul style="list-style-type: none"> ○ Microprocessors ○ Inputs and sensors ○ Storage memory ○ Communication signals <ul style="list-style-type: none"> ▪ Controller Area Network bus (CANBUS) |

LEARNING TASKS

CONTENT

4. Describe removal and replacement of advanced electronic components

- Part number verification
- Calibration
- Post-scan
- Road test

- Multiplex

Section 4

ASSESSMENT GUIDELINES

Assessment Guidelines – Common Core Level 1

Common Core Level 1 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		AUTOMOTIVE COLLISION AND REFINISHING COMMON CORE LEVEL 1	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	PERFORM SAFETY-RELATED FUNCTIONS	4%	0%
B	USE TOOLS AND EQUIPMENT	6%	10%
C	USE WELDING EQUIPMENT	10%	20%
D	ORGANIZE WORK AND USE DOCUMENTATION	3%	0%
E	USE COMMUNICATION AND MENTORING TECHNIQUES	2%	0%
F	REMOVE AND INSTALL VEHICLE COMPONENTS	10%	10%
G	PREPARE SURFACE**	15%	10%
H	USE REPAIR MATERIALS AND EQUIPMENT**	10%	5%
I	APPLY REFINISHING MATERIALS	10%	15%
K	REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS	15%	20%
L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS	10%	10%
M	DETAIL EXTERIOR	5%	0%
	Total	100%	100%
In-school theory/practical subject competency weighting		60%	40%
Final in-school percentage score		IN-SCHOOL %	

****NOTE:** The Line H Achievement Criteria applies to both Line G and H at 50/50 ratio.

Common Core Level 1 Grading Sheet: Final Percentage Score

In-school Percentage Score Combined theory and practical subject competency multiplied by	80%
Standardized Level Exam Percentage Score The exam score is multiplied by	20%
Final Percentage Score	FINAL%

Assessment Guidelines – Level 2

Level 2 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		AUTO BODY AND COLLISION TECHNICIAN LEVEL 2	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
B	USE TOOLS AND EQUIPMENT	3%	0%
C	USE WELDING EQUIPMENT	15%	40%
D	ORGANIZE WORK AND USE DOCUMENTATION	5%	0%
H	USE REPAIR MATERIALS AND EQUIPMENT	4%	0%
I	APPLY REFINISHING MATERIALS	10%	0%
J	PERFORM POST-REFINISHING FUNCTIONS	4%	0%
K	REMOVE, REPAIR AND INSTALL METAL PANELS AND COMPONENTS	20%	50%
L	REMOVE, REPAIR AND INSTALL PLASTIC AND COMPOSITE PANELS AND COMPONENTS	15%	0%
O	APPLY CORROSION PROTECTION AND SOUND DEADENING MATERIALS	6%	10%
R	REMOVE, INSTALL AND REPAIR STRUCTURAL AND LAMINATED GLASS	6%	0%
S	REMOVE AND INSTALL NON-STRUCTURAL GLASS	7%	0%
W	REPAIR AND REPLACE INTERIOR COMPONENTS	5%	0%
	Total	100%	100%
In-school theory/practical subject competency weighting		50%	50%
Final in-school percentage score		IN-SCHOOL %	

Level 2 Grading Sheet: Final Percentage Score

In-school Percentage Score Combined theory and practical subject competency multiplied by	80%
Standardized Level Exam Percentage Score The exam score is multiplied by	20%
Final Percentage Score	FINAL%

Assessment Guidelines – Level 3

Level 3 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		AUTO BODY AND COLLISION TECHNICIAN LEVEL 3	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
B	USE TOOLS AND EQUIPMENT	10%	0%
C	USE WELDING EQUIPMENT	10%	20%
D	ORGANIZE WORK AND USE DOCUMENTATION	5%	15%
N	PERFORM FINAL INSPECTIONS	2%	0%
P	PREPARE FOR STRUCTURAL REPAIR	13%	25%
Q	REMOVE, REPAIR AND INSTALL STRUCTURAL COMPONENTS	13%	30%
T	DEACTIVATE AND REACTIVATE ALTERNATE-FUEL SYSTEMS	3%	0%
U	REMOVE AND INSTALL MECHANICAL COMPONENTS	17%	0%
V	REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS	20%	10%
X	SERVICE SUPPLEMENTAL RESTRAINT SYSTEMS (SRS)	7%	0%
	Total	100%	100%
In-school theory/practical subject competency weighting		50%	50%
Final in-school percentage score		IN-SCHOOL %	

In-school Percentage Score Combined theory and practical subject competency multiplied by	80%
Standardized Level Exam Percentage Score The exam score is multiplied by	20%
Final Percentage Score	FINAL%

Assessment Guidelines – Level 4

Level 4 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		AUTO BODY AND COLLISION TECHNICIAN LEVEL 4	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
B	USE TOOLS AND EQUIPMENT	5%	0%
D	ORGANIZE WORK AND USE DOCUMENTATION	10%	10%
E	USE COMMUNICATION AND MENTORING TECHNIQUES	5%	0%
N	PERFORM FINAL INSPECTIONS	5%	0%
P	PREPARE FOR STRUCTURAL REPAIR	20%	40%
Q	REMOVE, REPAIR AND INSTALL STRUCTURAL COMPONENTS	25%	50%
U	REMOVE AND INSTALL MECHANICAL COMPONENTS	20%	0%
V	REMOVE, REPAIR AND INSTALL ELECTRICAL AND ELECTRONIC COMPONENTS	10%	0%
	Total	100%	100%
In-school theory/practical subject competency weighting		40%	60%
Final in-school percentage score Apprentices must achieve a minimum 70% as the final in-school percentage score to be eligible to write the Interprovincial Red Seal exam.		IN-SCHOOL %	

All apprentices who complete Level 4 of the Auto Body and Collision Technician program with a FINAL level percentage score of 70% or greater will write the Interprovincial Red Seal examination as their final assessment.

SkilledTradesBC will enter the apprentices' Auto Body and Collision Technician Interprovincial Red Seal examination percentage score into SkilledTradesBC Portal.

A minimum percentage score of 70% on the examination is required for a pass.

Section 5

TRAINING PROVIDER STANDARDS

Facility Requirements

Classroom Area

- Comfortable seating and tables suitable for training, teaching, and lecturing.
- Compliance with all local and national fire codes and occupational safety requirements.
- Lighting controls to allow easy visibility of projection screen allowing students to take notes.
- Windows must have shades or blinds to adjust sunlight.
- Heating/air conditioning for comfort all year round.
- In-room temperature regulation and ventilation to ensure comfortable room temperature.
- Acoustics in the room must allow the instructor to be heard.
- White marking board with pens and eraser (optional: flipchart in similar size).
- Projection screen or projection area at front of classroom.
- Overhead projector and/or multi-media projector.

Shop Area

- Ceiling shall be a minimum height of sixteen feet or height approved through the building engineer.
- Suitable demonstration area.
- Lighting appropriate for good vision in ambient light.
- Compliance with all local and national fire codes and occupational safety requirements.
- Must meet Municipal and Provincial bylaws in regards to waste water management and environmental laws.
- Ability to enclose a separate aluminum repair area (i.e. curtained).

Lab Requirements

- Does not apply to this program.

Student Facilities

- Does not apply to this program.

Instructor's Office Space

- Does not apply to this program.

Tools and Equipment

This Tools and Equipment list is not exhaustive. Training providers may elect to have additional tools or equipment in excess of this list. The facilities and equipment must be in compliance with the appropriate zoning bylaws and safety regulations.

TOOLS AND EQUIPMENT – COMMON CORE LEVEL 1

Safety Equipment and PPE

- Battery surge protector
- Coveralls for students
- Dust extraction/ventilation
- Eye glasses/goggles
- Eyewash station
- Fire extinguisher (ABC)
- First aid kit
- Fresh air respirators/hoods
- Gloves/hand protection
- Respirators (P100)
- Spill kit
- Welding helmets

Hand Tools

- General hand tools/tool kit sets
- Riveter
- Torque wrenches
- Trim tools

Power Tools

- Cutting tools
- General power tool sets
- General air tool sets
- Die grinders
- Decal eraser wheel
- Heat guns
- Impact guns
- Media blaster
- Rotary buffer

Refinishing Equipment and Materials

- Complete primer/undercoat/base coat/clear coat system
- DA Sander
- General sanding block sets
- High volume, low pressure (HVLP) spray guns
- Polishes
- Straight line sanders
- Wet sand kit (de-nibbing kit)

Detailing and Cleaning Equipment

- Bucket
- Clay
- Hose
- Micro-fibre cloths
- Squeegees
- Surface detail kit (de-nibbing kit)
- Wash mitt

Shop Equipment

- 220V Dent pulling station (DentFix)/panel beater
- Air compressor
- Air jack
- Airless plastic welding units
- Battery charger
- Complete vehicles
- Floor jack
- Hammer and dolly sets
- Hoist
- Hot air plastic welding units
- Hydraulic jack units
- Jack stands
- MIG welder units with ventilation capable of welding steel
- Oxyacetylene welding units with ventilation
- Parts rack
- Plasma arc units
- Porta-power
- Printer
- Sheet metal brake
- Sheet metal stretcher/shrinker
- Spray booth
- Stud welder
- Vacuum
- Wheel dollies

Shop Tools and Equipment – Miscellaneous

- Adhesive and fibreglass material
- Body filler material
- Buffing materials
- Computer stations with all applicable software
- Infrared heat lamp
- Masking equipment and material
- Paint mixing equipment
- Plastic, adhesive and fibreglass material
- Push broom
- Refinishing material
- Sanding material
- Sheet metal material

TOOLS AND EQUIPMENT – LEVEL 2
Safety Equipment and PPE

- Battery surge protector
- Coveralls for students
- Dust extraction/ventilation
- Eye glasses/goggles
- Eyewash station
- Gloves/hand protection
- First aid kit
- Fire extinguisher (ABC)
- Fresh air respirators/hoods
- Spill kit
- Respirators (P100)
- Welding helmets
- Welding gloves

Hand Tools

- Autoglass extended utility knife
- Body hammer
- Caulking guns
- Glass removal knife
- Reciprocating removal knife
- Side cutters
- Tape measures

Power Tools

- 6" DA Sander with 80 grit paper
- Belt grinder
- Die Grinder
- Drill
- Grinder

Refinishing Equipment and Materials

- Anticorrosion application gun
- Polisher
- Saturation rollers
- Schutz (spatter) gun

Shop Equipment

- Aluminum-only body repair tools
 - Hammers
 - Dollies
 - Spools
 - Pullers
- Door lift
- Laminated glass repair unit
- Flat dolly (Toe or heel)
- Glass lifting suction cups
- MIG Welder (pulsed)
- Paint mixing system
- Parts rack
- Spectrophotometer (access to)
- Spool feed with aluminum setup
- Stainless steel wire brush

Shop Tools and Equipment – Miscellaneous

- Computer stations with all applicable software
- Corrosion protection material
- Stainless steel wire brush

TOOLS AND EQUIPMENT – LEVEL 3

Safety Equipment and PPE

- Battery surge protector
- Coveralls for students
- Dust extraction/ventilation
- Eye glasses/goggles
- Eyewash station
- Gloves/hand protection
- First aid kit
- Fire extinguisher (ABC)
- Fresh air respirators/hoods
- Spill kit
- Respirators (P100)
- Welding helmets
- High voltage gloves
- Welding blankets

Hand Tools

- Centering gauges (set)
- Computerized laser measuring system
- Digital tram gauges
- DVOM
- Mechanic measuring systems
- Shunting clamp
- Scan tools
- Strut tower gauges

Power Tools

- Portable pulling systems
- Aluminum self-piercing rivet (SPR) Gun
- Blind rivet guns

Shop Equipment

- Anchoring systems
- Dimension manuals
- Electric wire stripper/crimper
- MIG welder units with ventilation capable of welding aluminum and steel
- STRSW
- Vehicle with conventional frame design
- Vehicle with unibody design
- Wheel alignment rack

Shop Tools and Equipment – Miscellaneous

- Computer stations with all applicable software
- Coupons - 16g and 22g
- Insurance Corporation of British Columbia (ICBC)/BC Private insurance compatible estimating system
- Sheet metal material
- Squeeze-type resistance spot welder

TOOLS AND EQUIPMENT – LEVEL 4

Safety Equipment and PPE

- Battery surge protector
- Coveralls for students
- Dust extraction/ventilation
- Eye glasses/goggles
- Eyewash station
- Gloves/hand protection
- First aid kit
- Fire extinguisher (ABC)
- Fresh air respirators/hoods
- Spill kit
- Respirators (P100)
- Welding helmets
- PPE
- EV safety kit

Hand Tools

- Mil thickness gauge
- Scan tools
- Tram gauge

Shop Equipment

- Aluminum self-piercing rivet (SPR) Gun
- Clamps (full set)/Mo-Clamps
- Computerized measuring system
 - Measuring system capable of 3D measuring
- Full frame and unibody pulling equipment
- GMAW welder
- Lab scopes
- MIG welder capable of aluminum welding
- Pulling chains
- Silicone bronze welder
- Squeeze-type resistance spot welder
- Wheel alignment rack
- Wedge clamp (P-4 system)

Shop Tools and Equipment – Miscellaneous

- Computer stations with all applicable software
- Tablets
- I-CAR access
- OEM specifications access

Reference Materials

Recommended Resources

www.I-car.ca

Collision Repair and Refinishing: A foundation course for technicians
Alfred Thomas and Michael Jund
3rd Edition
ISBN-10: 13059943

Auto Body Repair Technology Hardcover, 6th Edition
James Duffy
ISBN-10: 1133702856

<https://www.alldata.com/alldata-collision>

www.tech-cor.com

Instructor Requirements

Occupation Qualification

The instructor must possess:

- Automotive Collision Repair Technician - Certificate of Qualification with an Interprovincial Red Seal endorsement, or
- Auto Body and Collision Technician - Certificate of Qualification with an Interprovincial Red Seal endorsement, or
- Certificate of Qualification from another Canadian jurisdiction complete with Interprovincial Red Seal endorsement.

Work Experience

- Must have a minimum of 5 years experience as an Automotive Collision Repair Technician/Auto Body and Collision Technician journey person.

Instructional Experience and Education

It is preferred that the instructor possesses one of the following:

- Instructor's Diploma or equivalent
- A degree in Education

Appendices

Appendix A Acronyms and Glossary

Acronyms

ABS	Anti-lock brake
A/C	Air Conditioning
AC	Alternating Current
ADAS	Advanced Driver Assistance Systems
Apps	Applications
CANBUS	Controller Area Network bus
CNG	Compressed natural gas
CSA	Canadian Standards Association
DA	Dual-Action
DC	Direct Current
DTM	Direct-to-metal
DVOM	Digital Volt-ohm-milliammeter
ECM	Engine Control Module
FRP	Fibre-reinforced plastics
GAC	General Area of Competency
GMAW	Gas Metal Arc Welding
H.U.D.	Heads-Up Display
HSLA	High strength, low alloy
HVAC	Heating, Ventilation and Air Conditioning
HVLP	High volume, low pressure
ICBC	Insurance Corporation of British Columbia
IS	Isotropic
ISO	International Organization for Standardization
JHA	Job Hazard Analysis
JT	Judgement Time
LKQ	Like kind quality
MART	Martensitic
MIG	Metal Inert Gas
NAGS	National Auto Glass Specifications
NVH	Noise vibration harshness
OAC	Occupational Analysis Chart
OD	Old damage
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
O/H	Overhaul
P Pages	Procedural Pages
PPE	Personal Protective Equipment
R & I	Remove and Install
R & R	Remove and Repair
Re & Re	Remove and Replace

RFC	Recommendation for Certification
RRIM	Reinforced reaction injection moulded
RSOS	Red Seal Occupational Standard
SAI	Steering Axis Inclination
SDS	Safety Data Sheets
SMC	Sheet-molded compound
SOP	Standard Operating Procedures
SRC	Standards Review Committee
SRS	Supplemental Restraint Systems
STRSW	Squeeze-type resistance spot weld
TDS	Technical Data Sheets
TPMS	Tire Pressure Monitoring System
TRIP	Transformation induced plasticity
UHSS	Ultra-high Strength Steel
UV	Ultra Violet
VIN	Vehicle Identification Number
VOC	Volatile Organic Compounds
WHMIS	Workplace Hazardous Materials Information System

Glossary

Abrasives

Material used for cleaning or surface roughening such as sand, aluminum oxide or silicone carbide.

Active restraint systems

A system that requires physical enabling, such as seat belts.

Air bag matrix

Manufacturers' specifications for components that need to be replaced or checked in the event of a deployment.

Air bags

Inflatable restraints located in steering wheels, dashes, seats, doors, pillars, roof rails, and headliners.

Detailing

All activities performed in final preparation for delivery to the customer; detailing includes but is not limited to installation of trim and accessories, cleaning and polishing.

Frame and structural components

Provides the vehicle with strength and structural integrity.

Glass

A hard transparent substance that is laminated or tempered and sometimes tinted. Motor vehicle glass can be fixed as in windshields and rear windows or moveable as in side windows.

Glass hardware

Glass hardware consists of moveable and adjustable parts and components that ensure the operation of moveable glass and consists of but is not limited to tracks, glass run channels, plastic guides, stops and regulators.

Interior components

Interior components consist of trim, upholstery and panels within the vehicle.

Mechanical and electrical components

Mechanical components are moving parts that produce motion or a state of balance including suspension systems (steering and suspension), cooling systems, air conditioning systems, brake systems, the power train and the exhaust system. Electrical components perform a specific function (e.g. radio, defrost, cruise control) or generate, store and distribute electricity (e.g. battery, charging system, relays).

Outer body panels

Portions of a motor vehicle that are attached to the frame or structural components of the vehicle by welding, bonding or by mechanical attachments.

Passive restraint systems

Passive restraint systems include components such as dash, pads, head rest, collapsible steering columns, knee bolsters, and motorized seat belts.

Refinishing

Provides a smooth and level surface upon which paint will adhere, by sanding, filling, cleaning and priming the surface prior to, and including, the application of a final colour coat.

Restraint systems (also see definition for active and passive restraint systems)

Restraint systems consist of passive or active safety components which provide occupants with injury protection in the event of a collision.

Structural components

Any primary-stress-bearing portion of the body structure that affects its over-the-road performance or crash-worthiness.

Structural glass

A specific type of glass with a special design and installation process that adds to the structural integrity of the vehicle.

Unibody motor vehicle

Vehicle design in which parts of the body structure serve as support for overall vehicle.

Appendix B: Practical Assessments

Achievement Criteria are included for those competencies that require a practical assessment. The intent of including Achievement Criteria in the Program Outline is to ensure consistency in training across the many training institutions in British Columbia. Their purpose is to reinforce the theory and to provide a mechanism for evaluation of the learner's ability to apply the theory to practice. It is important that these performances be observable and measurable and that they reflect the skills spelled out in the competency. The conditions under which these performances will be observed and measured must be clear to the learner as well as the criteria by which the learner will be evaluated. The learner must also be given the evaluation criteria.

The performance spelled out in the Achievement Criteria is a suggested performance and is not meant to stifle flexibility of delivery. Training providers are welcome to substitute other practical performances that measure similar skills and attainment of the competency. Multiple performances may also be used to replace individual performances where appropriate.

The following tables summarize the practical assessments for each level. **For details, please refer to the Achievement Criteria following the particular competency in the Program Content section.**

AUTOMOTIVE COLLISION AND REFINISHING – COMMON CORE LEVEL 1 SUMMARY OF PRACTICAL ASSESSMENTS	
SUBJECT COMPETENCY OR LINE	PRACTICAL ASSESSMENT TASK
B2 Use lifting equipment	The learner will perform vehicle lifting.
B4 Maintain spray equipment	The learner will perform spray equipment maintenance and test spray.
C1 Use cutting and heating equipment	The learner will perform oxyacetylene set up, cutting, heating and shut down.
C2 Use welding equipment	The learner will perform welds on 22-gauge steel in flat position, including butt weld without backing, lap weld, and plug weld.
LINE F* REMOVE AND INSTALL VEHICLE COMPONENTS	The learner will remove and install vehicle components, such as door handle, side moulding, and side mirror.
LINE H** USE REPAIR MATERIALS AND EQUIPMENT	The learner will prepare and mask a panel for a primer spot repair and mix and apply repair materials.
LINE I*** APPLY REFINISHING MATERIALS	The learner will perform base coat/clear coat refinishing procedures.
K4 Repair metal panels and components	The learner will perform a minor repair on a sheet metal panel.
L4 Repair plastic and composite panels and components	The learner will perform plastic repairs, including welded and adhesive.

*All of LINE F (F1, F2, F3)

**All of LINES G and H (G1, G2, G3, G4; H1, H2, H3, H4). Results applied to both lines at a ratio of 50/50.

Note to Instructor: Retain panel upon completion of project for later achievement criteria in LINE I.

***All of LINE I (I1, I2, I3, I4)

Note to Instructor: Use repaired panel from LINE H for this achievement criteria.

**AUTO BODY AND COLLISION TECHNICIAN – LEVEL 2
SUMMARY OF PRACTICAL ASSESSMENTS**

SUBJECT COMPETENCY	PRACTICAL ASSESSMENT TASK
C2 Use welding equipment	The learner will perform a lap weld and plug weld on aluminum.
K4* Repair metal panels and components	The learner will install a partial/simulated door skin (or equivalent).
O2** Apply seam sealers and sound deadeners	The learner will apply seam sealer to door skin.

***Note to Instructor:** Retain project for later achievement criteria in LINE O.

****Note to Instructor:** Use door skin project from LINE K for this achievement criteria.

**AUTO BODY AND COLLISION TECHNICIAN – LEVEL 3
SUMMARY OF PRACTICAL ASSESSMENTS**

SUBJECT COMPETENCY	PRACTICAL ASSESSMENT TASK
C2 Use welding equipment	The learner will perform welds on coupons in a vertical position: lap weld, butt weld, and plug weld.
D6 Prepare estimates and supplements	The learner will create an estimate.
P1 Identify extent of damage	The learner will perform vehicle point to point measurements, such as door opening, trunk and under hood.
Q3 Install structural components	The learner will section a welded-on body panel, including one with a bond and one with a weld.
V3* Repair damaged wires and protective coverings	The learner will repair a damaged wire.

***Note to Instructor:** This achievement criteria covers multiple competencies in LINE V.

**AUTO BODY AND COLLISION TECHNICIAN – LEVEL 4
SUMMARY OF PRACTICAL ASSESSMENTS**

SUBJECT COMPETENCY	PRACTICAL ASSESSMENT TASK
D6 Prepare estimates and supplements	The learner will interpret an estimate and create a supplement and a sublet.
P1 Identify extent of damage	The learner will perform damage analysis using 3D measurement.
Q1 Repair structural components	The learner will perform a complex frame structural repair.

Appendix C: Previous Contributors

Industry and Instructor Subject Matter Experts retained to assist in the development of the previous Program Outline (2017):

- Mark Deroche British Columbia Institute of Technology
- John Euloth Okanagan College
- Nick Penner University of the Fraser Valley
- Ranjot Sandhu Rapid Autobody

Industry and Instructor Subject Matter Experts retained to review the previous Program Outline (2017):

- Don Anderson Automotive Collision Repair Technician
- Mark Deroche British Columbia Institute of Technology
- John Euloth Okanagan College
- Nick Penner University of the Fraser Valley
- Ranjot Sandhu Rapid Autobody
- Tate Westerman Vancouver Community College

SkilledTradesBC would like to acknowledge the dedication and hard work of all the industry and training provider representatives appointed to identify the training requirements of this trade.