



9034

WELD-ON AND BOLT-ON
PANEL REPLACEMENT (12B)

40S/40E/40M

A Collision Repair and Refinishing Technology Course

9034: WELD-ON AND BOLT-ON PANEL REPLACEMENT (12B) 40S/40E/40M

Course Description

In this course, students will learn to remove and replace interior/exterior trim and hardware, and transfer components, replace bolt-on and weld-on body panels, replace outer door panels, and adjust body panels and bumper assemblies.

Goal 1: Describe and apply appropriate **health and safety** practices.

GLO 1.1: Describe and apply appropriate **health and safety** practices.

- SLO 12B.1.1.1: Identify safety and health requirements. (A2.1)
- SLO 12B.1.1.2: Describe the importance of using personal protective equipment (PPE), and identify PPE and procedures. (A2.2) (TSA 16)
- SLO 12B.1.1.3: Identify electrical safety, and outline the safety principles for working on and around electrical equipment. (A2.3) (TSA 18)
- SLO 12B.1.1.4: Identify fire safety, and outline workplace fire safety principles. (A2.4) (TSA 19)
- SLO 12B.1.1.5: Recognize and control hazards. (A2.6)
- SLO 12B.1.1.6: Demonstrate awareness of the hazards of confined space entry, and identify the hazards in confined spaces and the preparation needed to work in a confined space. (A2.7) (TSA 20)
- SLO 12B.1.1.7: Describe basic first aid and cardiopulmonary resuscitation (CPR) requirements and techniques. (A2.8)
- SLO 12B.1.1.8: Explain the Workplace Hazardous Material Information System (WHMIS), and identify the WHMIS safety requirements. (A2.9) (TSA 13)
- SLO 12B.1.1.9: Identify and control hazards. (A2.10)
- SLO 12B.1.1.10: Identify safety precautions related to gas metal arc welding. (C2.2)
- SLO 12B.1.1.11: Identify and describe safety considerations and procedures related to fasteners and adhesives. (D2.1)
- SLO 12B.1.1.12: Practise safety precautions related to batteries. (B2.8)

SLO 12B.1.1.13: Identify safety considerations when working with body fillers and abrasives. (F2.4)

SLO 12B.1.1.14: Create and maintain a safe and organized working environment.

SLO 12B.1.1.15: Follow guidelines listed in the Safe Work Procedure for specific tasks.

GLO 1.2: Demonstrate knowledge of the *Trade Safety Awareness Manual*.

No applicable SLOs.

Goal 2: Select, use, and manage **tools and equipment**.

GLO 2.1: Select and manage **tools and equipment**.

SLO 12B.2.1.1: Select and manage tools and equipment used in weld-on and bolt-on panel replacement.

SLO 12B.2.1.2: Identify and describe gas metal arc welding equipment and accessories. (C2.3)

GLO 2.2: Use **tools and equipment**.

SLO 12B.2.2.1: Use tools and equipment applicable to weld-on and bolt-on panel replacement.

Goal 3: Demonstrate vehicle **damage analysis** and **repair estimation**.

GLO 3.1: Demonstrate vehicle **damage analysis**.

SLO 12B.3.1.1: Access and inspect vehicles to determine the extent of damage.

SLO 12B.3.1.2: Evaluate damage in order to determine repair or replacement.

GLO 3.2: Demonstrate vehicle **repair estimation**.

SLO 12B.3.2.1: Estimate time and materials required to complete repairs.

SLO 12B.3.2.2: Create repair estimates.

Goal 4: Demonstrate **welding** procedures.

GLO 4.1: Demonstrate **welding** procedures.

- SLO 12B.4.1.1: Prepare surfaces for welding.
- SLO 12B.4.1.2: Define and describe GMAW (gas metal arc welding), related terminology, and its applications. (C2.1)
- SLO 12B.4.1.3: Identify the types of welds performed using GMAW equipment. (C2.4)
- SLO 12B.4.1.4: Describe the procedures used to gas metal arc weld various substrates. (C2.5)
- SLO 12B.4.1.5: Identify weld defects, their causes, and the procedures to prevent and correct them. (C2.6)
- SLO 12B.4.1.6: Operate, troubleshoot, and maintain GMAW equipment. (C2.7)
- SLO 12B.4.1.7: Describe and perform various types of welds (lap, butt, flat, plug, recessed, tack, stitch, and continuous) in various positions (overhead, horizontal, and vertical). (C2.8)

Goal 5: Demonstrate **structural repair**.

GLO 5.1: Demonstrate an understanding of **vehicle construction**.

- SLO 12B.5.1.1: Identify types of vehicle construction, and describe their characteristics. (D1.1)
 - SLO 12B.5.1.2: Identify body sections, and describe their components. (D1.2)
 - SLO 12B.5.1.3: Identify and describe structural and non-structural components. (D1.3)
 - SLO 12B.5.1.4: Identify and describe the types of materials used in vehicle construction. (D1.4)
 - SLO 12B.5.1.5: Demonstrate sheet metal panel adjustments. (D1.5)
 - SLO 12B.5.1.6: Identify and describe structural components. (Level 3, F5.1)
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GLO 5.2: Demonstrate **measuring and gauging**.

- SLO 12B.5.2.1: Identify and describe point-to-point measuring tools and accessories. (Level 3, F7.1)
 - SLO 12B.5.2.2: Identify and describe the procedures for making point-to-point measurements. (Level 3, F7.2)
 - SLO 12B.5.2.3: Identify and describe the three-section principle. (Level 3, F7.3)
 - SLO 12B.5.2.4: Identify and describe *datum* and *centreline*. (Level 3, F7.4)
 - SLO 12B.5.2.5: Identify and describe three-dimensional measuring systems. (Level 3, F7.5)
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GLO 5.3: Perform **structural repairs**.

- SLO 12B.5.3.1: Explain the importance of vehicle structures being dimensionally correct.
 - SLO 12B.5.3.2: Participate in aligning a vehicle to manufacturer's specifications.
 - SLO 12B.5.3.3: Perform fit-up on replacement sheet metal components.
 - SLO 12B.5.3.4: Describe the procedures and techniques used to repair structural components. (Level 3, F5.5)
 - SLO 12B.5.3.5: Describe the procedures used to remove and reinstall structural components. (Level 3, F5.6)
 - SLO 12B.5.3.6: Describe the procedures used to replace structural components. (Level 3, F5.7)
 - SLO 12B.5.3.7: Describe the procedures used to adjust and align structural components. (Level 3, F5.8)
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Goal 6: Demonstrate **sheet metal repair**.

GLO 6.1: Demonstrate an understanding of the **properties** of metal.

- SLO 12B.6.1.1: Describe the types of automotive sheet metal. (F1.1)
 - SLO 12B.6.1.2: Define and explain terms associated with metallurgy. (B2.1)
 - SLO 12B.6.1.3: Describe the properties of metals. (B1.1, B2.3)
 - SLO 12B.6.1.4: Describe heat and its effect on metals. (B1.2)
 - SLO 12B.6.1.5: Describe high strength steel (HSS) and its applications. (B1.3)
 - SLO 12B.6.1.6: Describe the effects metal working has on metallurgic properties. (B2.5)
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GLO 6.2: Repair sheet metal.

SLO 12B.6.2.1: Describe the repair procedures associated with paintless dent repair. (F1.5)

Goal 7: Select, use, and manage seam sealers, fillers, and adhesives.

GLO 7.1: Select, use, and manage seam sealers and adhesives.

SLO 12B.7.1.1: Demonstrate the identification, selection, application, maintenance, and management of seam sealers used in structural repairs.

SLO 12B.7.1.2: Demonstrate the identification, selection, application, maintenance, and management of adhesives used in structural repairs.

SLO 12B.7.1.3: Describe adhesives used in the installation of upholstery, trim, and hardware. (H3.3)

Goal 8: Select, use, and manage fasteners.

GLO 8.1: Select, use, and manage fasteners.

SLO 12B.8.1.1: Describe the identification, selection, and management of fasteners used in panel replacement.

SLO 12B.8.1.2: Describe fasteners used in the installation of upholstery, trim, and hardware. (H3.3)

SLO 12B.8.1.3: Demonstrate the utilization of fasteners used in panel replacement.

Goal 9: Demonstrate glass repair and replacement.

GLO 9.1: Demonstrate glass repair and replacement.

SLO 12B.9.1.1: Identify the types of stationary glass and describe their characteristics. (Level 2, D3.1)

SLO 12B.9.1.2: Describe stationary glass and its importance to the vehicle structure/integrity. (Level 2, D3.2)

SLO 12B.9.1.3: Describe the procedures used to determine if stationary glass can be repaired or if replacement is necessary. (Level 2, D3.3)

SLO 12B.9.1.4: Identify the installation methods for stationary glass, and describe the associated components. (Level 2, D3.4)

SLO 12B.9.1.5: Identify the types of movable glass and describe their characteristics. (Level 2, D4.1)

SLO 12B.9.1.6: Describe movable glass-related hardware. (Level 2, D4.2)

SLO 12B.9.1.7: Identify the fastening methods for movable glass, and describe the associated components. (Level 2, D4.3)

Goal 10: Demonstrate repair and replacement of **upholstery, trim, and hardware.**

GLO 10.1: Repair and replace **upholstery.**

- SLO 12B.10.1.1: Describe the procedures used to inspect interior upholstery for collision-related damage. (H3.6)
 - SLO 12B.10.1.2: Describe the procedure used to repair or replace upholstery. (H3.8)
 - SLO 12B.10.1.3: Inspect interior upholstery for collision damage. (H3.12)
 - SLO 12B.10.1.4: Repair and replace upholstery. (H3.14)
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GLO 10.2: Repair and replace **trim and hardware.**

- SLO 12B.10.2.1: Identify and describe exterior trim and hardware. (H3.1)
 - SLO 12B.10.2.2: Identify and describe interior upholstery, trim, and hardware. (H3.2)
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Goal 11: Demonstrate **surface preparation.**

GLO 11.1: Select, use, and manage **materials other than abrasives** used in surface preparation.

No applicable SLOs.

GLO 11.2: Select, use, and manage **abrasives** used in surface preparation.

SLO 12B.11.2.1: Select, use, and manage abrasives.

GLO 11.3: Prepare substrates.

SLO 12B.11.3.1: Prepare surfaces for welding and other forms of structural repair.

Goal 12: Demonstrate **refinishing.**

GLO 12.1: Demonstrate **refinishing** processes.

No applicable SLOs.

Goal 13: Demonstrate **cleaning and detailing.**

GLO 13.1: Demonstrate **cleaning and detailing.**

No applicable SLOs.

Goal 14: Describe **vehicle systems**.

GLO 14.1: Describe **vehicle systems**.

No applicable SLOs.

Goal 15: Describe and demonstrate transferable **cross-curricular** knowledge and skills.

GLO 15.1: Read, interpret, and communicate information.

SLO 12B.15.1.1: Read, interpret, and communicate information from technical service bulletins.

SLO 12B.15.1.2: Read, interpret, and communicate information from supplier labels.

GLO 15.2: Apply knowledge and skills from **mathematics**.

SLO 12B.15.2.1: Demonstrate the mathematical skills required to create vehicle repair estimates.

GLO 15.3: Apply knowledge and skills from **information and communication technology**.

No applicable SLOs.

GLO 15.4: Apply knowledge and skills from the **sciences**.

SLO 12B.15.4.1: Describe the effects of heat on metal.

SLO 12B.15.4.2: Discuss the effects of overcatalyzing fillers.

Goal 16: Understand **career opportunities** and the **working environment**.

GLO 16.1: Describe **education, career opportunities, professional organizations, and working environments** related to collision repair and refinishing technology and associated fields.

No applicable SLOs.

Goal 17: Demonstrate an awareness of **sustainability**.

GLO 17.1: Describe the effects of collision repair and refinishing technology on **human health and well-being**, including on tradespersons working in the field and those who use their services.

SLO 12B.17.1.1: Discuss long-term health concerns related to welding.

SLO 12B.17.1.2: Demonstrate the use of dust collection systems.

GLO 17.2: Describe collision repair and refinishing technology's **sustainability practices** and **impact on the environment**.

SLO 12B.17.2.1: Practise recycling materials.

GLO 17.3: Describe **sustainable business practices** within collision repair and refinishing technology.

SLO 12B.17.3.1: Discuss the importance of staying in touch with the needs of the clientele.

Goal 18: Demonstrate an awareness of **ethical and legal standards** as they pertain to collision repair and refinishing technology.

GLO 18.1: Practise **ethical and legal standards** as they pertain to collision repair and refinishing technology.

No applicable SLOs.

Goal 19: Demonstrate **employability skills**.

GLO 19.1: Demonstrate fundamental **employability skills**.

SLO 12B.19.1.1: Demonstrate regular and punctual attendance.

SLO 12B.19.1.2: Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, co-workers, and students.

SLO 12B.19.1.3: Demonstrate accountability by taking responsibility for own actions.

SLO 12B.19.1.4: Demonstrate adaptability, initiative, and effort.

SLO 12B.19.1.5: Demonstrate teamwork skills.

SLO 12B.19.1.6: Demonstrate the ability to stay on task and use time effectively in class and work environments.

SLO 12B.19.1.7: Demonstrate the responsible use of wireless communication devices.

GLO 19.2: Demonstrate an awareness of **cultural proficiency** and its importance in the workplace.

SLO 12B.19.2.1: Discuss the principles of cultural proficiency.

GLO 19.3: Demonstrate an understanding of the **business operation** of a collision repair and refinishing technology facility.

SLO 12B.19.3.1: Prepare documentation used in a collision repair and refinishing technology facility. (A5.4)

SLO 12B.19.3.2: Describe procedures for ordering parts and materials. (A5.5)

GLO 19.4: Demonstrate **critical thinking skills** in planning, procedures, analysis, and diagnosis.

SLO 12B.19.4.1: Demonstrate critical thinking skills.

SLO 12B.19.4.2: Use a variety of strategies in order to diagnose and solve problems.

Goal 20: Demonstrate an understanding of the **evolution** of collision repair and refinishing technology, including its **technological progression and emerging trends**.

GLO 20.1: Describe the **evolution** of collision repair and refinishing technology, including its **technological progression and emerging trends**.

SLO 12B.20.1.1: Discuss the evolution of panel replacement, including its technological progression and emerging trends.
