

STRANDS AND STANDARDS

COLLISION STRUCTURAL REPAIR



Course Description

This course prepares individuals to perform structural repairs on automobile uni-bodies, fixed glass, and frames. This course is based on the Automotive Service Excellence (ASE) automotive collision task list and the I-CAR training program. Work ethics and productivity are an integral part of the classroom and laboratory activities of this program. (asestudentcertification.com), (http://pdmdev.i-car.com/pdf/education_foundation/natef_crosswalk_2006.pdf)

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.09.00.00.013
Concurrent Enrollment Core Code	N/A
Prerequisite	Basic Automotive Collision Repair
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Automotive Collision Repair
Endorsement 2	N/A
Endorsement 3	N/A



COLLISION STRUCTURAL REPAIR

STRAND 1

Students will be able to understand and demonstrate safety and environmental practices.

Standard 1

Explain the need for regulations and safety devices such as Environment Protection, state and local environmental laws, and regulations involved with the refinishing department. (4A1)

Standard 2

Locate hazardous warning information for products used in refinishing. Be able to locate basic information from a Material Safety Data Sheet (MSDS). (4A2)

Standard 3

Identify and select the proper personal protection equipment, inspect it, and demonstrate its proper use. (4A3)

Standard 4

Identify the Volatile Organic Compound (VOC) content of paint products and explain the environmental concerns. (4A4)

Standard 5

Understand safety practices related to general shop, personal protection, vehicle lifts, and hand and power equipment. (1A1)

Standard 6

Understand and identify different fasteners and their applications and repair procedures. (1B2)

Standard 7

Understand how to select and properly use hand and select power tools. (1B7)

Performance Skill

Understand and demonstrate safety and environmental practices.

- Explain the need for regulations and safety devices such as Environment Protection, state and local environmental laws, and regulations involved with the refinishing department. (4A1)
- Locate hazardous warning information for products used in refinishing. Be able to locate basic information from a Material Safety Data Sheet (MSDS). (4A2)
- Identify and select the proper personal protection equipment, inspect it, and demonstrate its proper use. (4A3)
- Identify the Volatile Organic Compound (VOC) content of paint products and explain the environmental concerns. (4A4)
- Understand safety practices related to general shop, personal protection, vehicle lifts, and hand and power equipment. (1A1)
- Understand and identify different fasteners and their applications and repair procedures. (1B2)
- Understand how to select and properly use hand and select power tools. (1B7)

STRAND 2

Students will be able to understand and demonstrate frame inspection and repair.

Standard 1

Diagnose and measure structural damage using tram and self-centering gauges.

Standard 2

Attach vehicle to anchoring devices.

Standard 3

Analyze, straighten and align mash (collapse) damage.

Standard 4

Analyze, straighten and align sag damage.

Standard 5

Analyze, straighten and align sidesway damage.

Standard 6

Analyze, straighten and align twist damage.

Standard 7

Analyze, straighten and align diamond frame damage.

Standard 8

Remove and replace damaged structural components.

Standard 9

Restore corrosion protection to repaired or replaced frame areas.

Standard 10

Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.

Standard 11

Align or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.

Standard 12

Identify heart limitations in structural components.

Standard 13

Restore structural foam.

Standard 14

Diagnose and measure structural damage using a universal measuring system (mechanical, electrical, laser).

COLLISION STRUCTURAL REPAIR

Standard 15

Diagnose and measure structural damage to vehicles using a dedicated (fixture) measuring system.

Standard 16

Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair.

Standard 17

Analyze and identify crush/collapse zones.

Performance Skill

Understand and demonstrate frame inspection and repair.

- Diagnose and measure structural damage using tram and self-centering gauges.
- Attach vehicle to anchoring devices.
- Analyze, straighten and align mash (collapse) damage.
- Analyze, straighten and align sag damage.
- Analyze, straighten and align sidesway damage.
- Analyze, straighten and align twist damage.
- Analyze, straighten and align diamond frame damage.
- Remove and replace damaged structural components.
- Restore corrosion protection to repaired or replaced frame areas.
- Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.
- Align or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.
- Identify heart limitations in structural components.
- Restore structural foam.
- Diagnose and measure structural damage using a universal measuring system (mechanical, electrical, laser).
- Diagnose and measure structural damage to vehicles using a dedicated (fixture) measuring system.
- Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair.
- Analyze and identify crush/collapse zones.

STRAND 3

Students will be able to understand and demonstrate unibody inspection, measurement, and repair.

Standard 1

Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and chassis alignment problems.

COLLISION STRUCTURAL REPAIR

Standard 2

Realign or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering and chassis alignment problems.

Standard 3

Diagnose and measure unibody damage using tram and self-centering gauges.

Standard 4

Determine and inspect the locations of all suspension, steering, and powertrain component attaching points on the vehicle.

Standard 5

Diagnose and measure unibody vehicles using a dedicated (fixture) measuring system.

Standard 6

Diagnose and measure unibody vehicles using a universal measuring system (mechanical, electronic, and laser).

Standard 7

Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair.

Standard 8

Attach anchoring devices to vehicle; remove or reposition components as necessary.

Standard 9

Straighten and align cowl assembly.

Standard 10

Straighten and align roof rails/headers and roof panels.

Standard 11

Straighten and align hinge and lock pillars.

Standard 12

Straighten and align vehicle openings, floor pans, and rocker panels.

Standard 13

Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points).

Standard 14

Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/power train mounting points, etc.).

Standard 15

Identify heat limitations in unibody vehicles.

COLLISION STRUCTURAL REPAIR

Standard 16

Identify proper cold stress relief methods.

Standard 17

Repair damage using power tools and hand tools to restore proper contours and dimensions.

Standard 18

Remove and replace damaged sections of structural steel body panels.

Standard 19

Restore corrosion protection to repaired or replaced unibody structural areas.

Standard 20

Determine the extent of damage to aluminum structural components; repair, weld, or replace.

Standard 21

Analyze and identify crush/collapse zones.

Performance Skill

Understand and demonstrate unibody inspection, measurement, and repair.

- Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and chassis alignment problems.
- Realign or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering and chassis alignment problems.
- Diagnose and measure unibody damage using tram and self-centering gauges.
- Determine and inspect the locations of all suspension, steering, and powertrain component attaching points on the vehicle.
- Diagnose and measure unibody vehicles using a dedicated (fixture) measuring system.
- Diagnose and measure unibody vehicles using a universal measuring system (mechanical, electronic, and laser).
- Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair.
- Attach anchoring devices to vehicle; remove or reposition components as necessary.
- Straighten and align cowl assembly.
- Straighten and align roof rails/headers and roof panels.
- Straighten and align hinge and lock pillars.
- Straighten and align vehicle openings, floor pans, and rocker panels.
- Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points).
- Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/power train mounting points, etc.).
- Identify heat limitations in unibody vehicles.
- Identify proper cold stress relief methods.

COLLISION STRUCTURAL REPAIR

- Repair damage using power tools and hand tools to restore proper contours and dimensions.
- Remove and replace damaged sections of structural steel body panels.
- Restore corrosion protection to repaired or replaced unibody structural areas.
- Determine the extent of damage to aluminum structural components; repair, weld, or replace.
- Analyze and identify crush/collapse zones.

STRAND 4

Students will be able to understand and demonstrate fixed glass removal, reinstallation, or replacement.

Standard 1

Remove and reinstall or replace fixed glass (heated and non-heated) using recommended materials.

Standard 2

Remove and reinstall or replace modular glass using recommended materials.

Performance Skill

Understand and demonstrate fixed glass removal, reinstallation, or replacement.

- Remove and reinstall or replace fixed glass (heated and non-heated) using recommended materials.
- Remove and reinstall or replace modular glass using recommended materials.

STRAND 5

Students will be able to understand and demonstrate metal welding and cutting.

Standard 1

Identify weldable and non-weldable materials used in collision repair.

Standard 2

Weld and cut high-strength steel and other steels.

Standard 3

Weld and cut aluminum.

Standard 4

Determine the correct GMAW (MIG) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation.

Standard 5

Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded.

COLLISION STRUCTURAL REPAIR

Standard 6

Store, handle, and install high-pressure gas cylinders.

Standard 7

Determine work clamp (ground) location and attach.

Standard 8

Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.

Standard 9

Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations.

Standard 10

Protect computers and other electronic control modules during welding procedures.

Standard 11

Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp as required.

Standard 12

Determine the joint type (butt weld with backing, lap, etc.) for weld being made.

Standard 13

Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation.

Standard 14

Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet.

Standard 15

Perform visual and destructive tests on each weld type.

Standard 16

Identify the causes of various welding defects; make necessary adjustments.

Standard 17

Identify the cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.

Standard 18

Identify the cutting process for different materials and locations; perform cutting operation.

Standard 19

Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.).

COLLISION STRUCTURAL REPAIR

Performance Skill

Understand and demonstrate metal welding and cutting.

- Identify weldable and non-weldable materials used in collision repair.
- Weld and cut high-strength steel and other steels.
- Weld and cut aluminum.
- Determine the correct GMAW (MIG) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation.
- Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded.
- Store, handle, and install high-pressure gas cylinders.
- Determine work clamp (ground) location and attach.
- Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.
- Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations.
- Protect computers and other electronic control modules during welding procedures.
- Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp as required.
- Determine the joint type (butt weld with backing, lap, etc.) for weld being made.
- Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation.
- Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet.
- Perform visual and destructive tests on each weld type.
- Identify the causes of various welding defects; make necessary adjustments.
- Identify the cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.
- Identify the cutting process for different materials and locations; perform cutting operation.
- Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.).

STRAND 6

Students will be able to understand and perform damage analysis.

Standard 1

Position the vehicle for inspection.

Standard 2

Prepare vehicle for inspection by providing access to damaged areas.

COLLISION STRUCTURAL REPAIR

Standard 3

Analyze damage to determine appropriate methods for overall repairs.

Standard 4

Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage.

Standard 5

Gather details of the incident/accident necessary to determine the full extent of vehicle damage.

Standard 6

Identify and record pre-existing damage.

Standard 7

Identify and record prior repairs.

Standard 8

Perform visual inspection of structural components and members.

Standard 9

Identify structural damage using measuring tools and equipment.

Standard 10

Perform visual inspection of non-structural components and members.

Standard 11

Determine parts, components, material type(s) and procedures necessary for a proper repair.

Standard 12

Identify type and condition of finish; determine if refinishing is required.

Standard 13

Identify suspension, electrical, and mechanical component physical damage.

Standard 14

Identify safety systems physical damage.

Standard 15

Identify interior component damage.

Standard 16

Identify damage to add-on accessories and modifications.

Standard 17

Identify single (one time) use components.

Performance Skill

Understand and perform damage analysis.

COLLISION STRUCTURAL REPAIR

- Position the vehicle for inspection.
- Prepare vehicle for inspection by providing access to damaged areas.
- Analyze damage to determine appropriate methods for overall repairs.
- Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage.
- Gather details of the incident/accident necessary to determine the full extent of vehicle damage.
- Identify and record pre-existing damage.
- Identify and record prior repairs.
- Perform visual inspection of structural components and members.
- Identify structural damage using measuring tools and equipment.
- Perform visual inspection of non-structural components and members.
- Determine parts, components, material type(s) and procedures necessary for a proper repair.
- Identify type and condition of finish; determine if refinishing is required.
- Identify suspension, electrical, and mechanical component physical damage.
- Identify safety systems physical damage.
- Identify interior component damage.
- Identify damage to add-on accessories and modifications.
- Identify single (one time) use components.

STRAND 7

Students will understand and perform estimating.

Standard 1

Determine and record customer/vehicle owner information.

Standard 2

Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, and assembly plant.

Standard 3

Identify and record vehicle options, including trim level, paint code, transmission, accessories, and modifications.

Standard 4

Identify safety systems; determine replacement items.

Standard 5

Apply appropriate estimating and parts nomenclature (terminology).

Standard 6

Determine and apply appropriate estimating sequence.

COLLISION STRUCTURAL REPAIR

Standard 7

Utilize estimating guide procedure pages.

Standard 8

Apply estimating guide footnotes and headnotes as needed.

Standard 9

Estimate labor value for operations requiring judgement.

Standard 10

Select appropriate labor value for each operation (structural, non-structural, mechanical, and refinish).

Standard 11

Select and price OEM parts; verify availability, compatibility, and condition.

Standard 12

Select and price alternative/optional OEM parts; verify availability, compatibility and condition.

Standard 13

Select and price aftermarket parts; verify availability, compatibility, and condition.

Standard 14

Select and price recyclable/used parts; verify availability, compatibility and condition.

Standard 15

Select and price remanufactured, rebuilt, and reconditioned parts; verify availability, compatibility and condition.

Standard 16

Determine price and source of necessary sublet operations.

Standard 17

Determine labor value, prices, charges, allowances, or fees for non-included operations and miscellaneous items.

Standard 18

Recognize and apply overlay deductions, included operations, and additions.

Standard 19

Determine additional material and charges.

Standard 20

Determine refinishing material and charges.

Standard 21

Apply math skills to establish charges and totals.

Standard 22

Interpret computer-assisted and manually written estimates; verify the information is current.

Standard 23

Identify procedural differences between computer-assisted systems and manually written estimates.

Standard 24

Identify procedures to restore corrosion protection; establish labor values, and material charges.

Standard 25

Determine the cost effectiveness of the repair and determine the approximate vehicle retail, and repair value.

Standard 26

Recognize the differences in estimation procedures when using different information provider systems.

Standard 27

Verify accuracy of estimate compared to the actual repair and replacement operations.

Performance Skill

Understand and perform estimating.

- Determine and record customer/vehicle owner information.
- Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, and assembly plant.
- Identify and record vehicle options, including trim level, paint code, transmission, accessories, and modifications.
- Identify safety systems; determine replacement items.
- Apply appropriate estimating and parts nomenclature (terminology).
- Determine and apply appropriate estimating sequence.
- Utilize estimating guide procedure pages.
- Apply estimating guide footnotes and headnotes as needed.
- Estimate labor value for operations requiring judgement.
- Select appropriate labor value for each operation (structural, non-structural, mechanical, and refinish).
- Select and price OEM parts; verify availability, compatibility, and condition.
- Select and price alternative/optional OEM parts; verify availability, compatibility and condition.
- Select and price aftermarket parts; verify availability, compatibility, and condition.
- Select and price recyclable/used parts; verify availability, compatibility and condition.

COLLISION STRUCTURAL REPAIR

- Select and price remanufactured, rebuilt, and reconditioned parts; verify availability, compatibility and condition.
- Determine price and source of necessary sublet operations.
- Determine labor value, prices, charges, allowances, or fees for non-included operations and miscellaneous items.
- Recognize and apply overlay deductions, included operations, and additions.
- Determine additional material and charges.
- Determine refinishing material and charges.
- Apply math skills to establish charges and totals.
- Interpret computer-assisted and manually written estimates; verify the information is current.
- Identify procedural differences between computer-assisted systems and manually written estimates.
- Identify procedures to restore corrosion protection; establish labor values, and material charges.
- Determine the cost effectiveness of the repair and determine the approximate vehicle retail, and repair value.
- Recognize the differences in estimation procedures when using different information provider systems.
- Verify accuracy of estimate compared to the actual repair and replacement operations.

STRAND 8

Students will be able to understand and perform customer relations and sales skills.

Standard 1

Acknowledge and/or greet customer/client.

Standard 2

Listen to customer/client; collect information and identify customers/client's concerns, needs and expectations.

Standard 3

Establish cooperative attitude with customer/client.

Standard 4

Identify yourself to customer/client; offer assistance.

Standard 5

Deal with angry customer/client.

Standard 6

Identify customer/client preferred communication method; follow up to keep customer/client informed about parts and the repair process.

COLLISION STRUCTURAL REPAIR

Standard 7

Recognize basic claims handling procedures; explain to customer/client.

Standard 8

Project positive attitude and professional appearance.

Standard 9

Provide and review warranty information.

Standard 10

Provide and review technical and consumer protection information.

Standard 11

Estimate and explain duration of out-of-service time.

Standard 12

Apply negotiation skills to obtain a mutual agreement.

Standard 13

Interpret and explain manual or computer-assisted estimate to customer/client.

Performance Skill

Understand and perform customer relations and sales skills.

- Acknowledge and/or greet customer/client.
- Listen to customer/client; collect information and identify customers/client's concerns, needs and expectations.
- Establish cooperative attitude with customer/client.
- Identify yourself to customer/client; offer assistance.
- Deal with angry customer/client.
- Identify customer/client preferred communication method; follow up to keep customer/client informed about parts and the repair process.
- Recognize basic claims handling procedures; explain to customer/client.
- Project positive attitude and professional appearance.
- Provide and review warranty information.
- Provide and review technical and consumer protection information.
- Estimate and explain duration of out-of-service time.
- Apply negotiation skills to obtain a mutual agreement.
- Interpret and explain manual or computer-assisted estimate to customer/client.

STRAND 9

Students will understand the importance of career readiness skills as it relates to the workplace and outlined in the SkillsUSA Framework – Level 2.

Standard 1

Understand and demonstrate reliability.

COLLISION STRUCTURAL REPAIR

- Determine individual time management skills.
- Explore what's ethical in the workplace or school.
- Demonstrate awareness of government.
- Demonstrate awareness of professional organizations and trade unions.

Standard 2

Understand and demonstrate responsiveness.

- Define the customer.
- Recognize benefits of doing a community service project.
- Demonstrate social etiquette.
- Identify customer expectations.

Standard 3

Understand resiliency.

- Discover self-motivation techniques and establish short-term goals.
- Select characters of a positive image.
- Identify a mentor.

Standard 4

Understand and demonstrate workplace habits.

- Participate in a shadowing activity.
- Explore workplace ethics: codes of conduct.
- Recognize safety issues.
- Perform a skill demonstration.
- Exercise your right to know.

Standard 5

Understand and develop initiative.

- Develop personal financial skills.
- Develop a business plan.
- Investigate entrepreneurship opportunities.

Standard 6

Understand and demonstrate continuous improvement.

- Conduct a worker interview.
- Demonstrate evaluation skills.
- Examine ethics and values in the workplace.
- Develop a working relationship with a mentor.
- Construct a job search network.