

# STRANDS AND STANDARDS

## COLLISION NON-STRUCTURAL REPAIR



### Course Description

This course prepares individuals to perform non-structural repair, replacement, and adjustment of automotive outer body panels and uni-body components. 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://asestudentcertification.com)), ([http://pdmdev.i-car.com/pdf/education\\_foundation/natef\\_crosswalk\\_2006.pdf](http://pdmdev.i-car.com/pdf/education_foundation/natef_crosswalk_2006.pdf))



## COLLISION NON-STRUCTURAL REPAIR

<b>Intended Grade Level</b>	10-12
Units of Credit	0.5
Core Code	40.09.00.00.010
Concurrent Enrollment Core Code	40.09.00.13.010
Prerequisite	Basic Automotive Collision Repair
Skill Certification Test Number	N/A
Test Weight	N/A
<b>License Type</b>	CTE and/or Secondary Education 6-12
<b>Required Endorsement(s)</b>	
Endorsement 1	Automotive Collision Repair
Endorsement 2	N/A
Endorsement 3	N/A

### 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)

# COLLISION NON-STRUCTURAL REPAIR

## 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 vehicle preparation.**

### Standard 1

Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.

### Standard 2

Inspect, remove, store, and replace exterior trim and moldings.

### Standard 3

Inspect, remove, store, and replace interior trim and components.

### Standard 4

Inspect, remove, store, and replace non-structural body panels and components that may interfere with or be damaged during repair.

### Standard 5

Inspect, remove, store, and replace all vehicle mechanical and electrical components that may interfere with or be damaged during repair.

### Standard 6

Protect panels, glass, and parts adjacent to the repair area.

### Standard 7

Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants from those areas to be repaired.

# COLLISION NON-STRUCTURAL REPAIR

## Standard 8

Remove corrosion protection, undercoatings, sealers, and other protective coatings necessary to perform repairs.

## Standard 9

Inspect, remove, and replace repairable plastics and other components that are recommended for off-vehicle repair.

## Performance Skill

Understand and demonstrate vehicle preparation.

- Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.
- Inspect, remove, store, and replace exterior trim and moldings.
- Inspect, remove, store, and replace interior trim and components.
- Inspect, remove, store, and replace non-structural body panels and components that may interfere with or be damaged during repair.
- Inspect, remove, store, and replace all vehicle mechanical and electrical components that may interfere with or be damaged during repair.
- Protect panels, glass, and parts adjacent to the repair area.
- Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants from those areas to be repaired.
- Remove corrosion protection, undercoatings, sealers, and other protective coatings necessary to perform repairs.
- Inspect, remove, and replace repairable plastics and other components that are recommended for off-vehicle repair.

## STRAND 3

**Students will be able to understand and demonstrate outer body panel repairs, replacement, and adjustments.**

### Standard 1

Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan.

### Standard 2

Inspect, remove and replace bolted, bonded, and welded steel panel or panel assemblies.

### Standard 3

Determine the extent of damage to aluminum body panels; repair or replace.

### Standard 4

Inspect, remove, replace, and align hood, hood hinges, and hood latch.

### Standard 5

Inspect, remove, replace, and align deck lid, lid hinges, and lid latch.

# COLLISION NON-STRUCTURAL REPAIR

## Standard 6

Inspect, remove, replace, and align doors, tailgates, hatches, lift gates, latches, hinges, and related hardware.

## Standard 7

Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware.

## Standard 8

Inspect, remove, replace, and align front fenders, headers, and other panels.

## Standard 9

Straighten and rough-out contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments.

## Standard 10

Weld damaged or torn steel body panels; repair broken welds.

## Standard 11

Restore corrosion protection.

## Standard 12

Replace door skins.

## Standard 13

Restore sound deadeners and foam materials.

## Standard 14

Perform panel bonding.

## Standard 15

Diagnose and repair water leaks, dust leaks, and wind noise.

## Performance Skill

Understand and demonstrate outer body panel repairs, replacement, and adjustments.

- Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan.
- Inspect, remove and replace bolted, bonded, and welded steel panel or panel assemblies.
- Determine the extent of damage to aluminum body panels; repair or replace.
- Inspect, remove, replace, and align hood, hood hinges, and hood latch.
- Inspect, remove, replace, and align deck lid, lid hinges, and lid latch.
- Inspect, remove, replace, and align doors, tailgates, hatches, lift gates, latches, hinges, and related hardware.
- Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware.

## COLLISION NON-STRUCTURAL REPAIR

- Inspect, remove, replace, and align front fenders, headers, and other panels.
- Straighten and rough-out contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments.
- Weld damaged or torn steel body panels; repair broken welds.
- Restore corrosion protection.
- Replace door skins.
- Restore sound deadeners and foam materials.
- Perform panel bonding.
- Diagnose and repair water leaks, dust leaks, and wind noise.

### STRAND 4

**Students will be able to understand and demonstrate metal finishing and body filler.**

#### Standard 1

Remove paint from the damaged area of a body panel.

#### Standard 2

Locate and reduce surface irregularities on a damaged body panel.

#### Standard 3

Demonstrate hammer and dolly techniques.

#### Standard 4

Heat shrink stretched panel areas to proper contour.

#### Standard 5

Cold shrink stretched panel areas to proper contour.

#### Standard 6

Mix body filler.

#### Standard 7

Apply body filler, shape during curing.

#### Standard 8

Rough sand cured body filler to contour; finish sand.

#### Standard 9

Determine the proper metal finishing techniques for aluminum.

#### Standard 10

Determine proper application of body filler to aluminum.

# COLLISION NON-STRUCTURAL REPAIR

## Performance Skill

Understand and demonstrate metal finishing and body filler.

- Remove paint from the damaged area of a body panel.
- Locate and reduce surface irregularities on a damaged body panel.
- Demonstrate hammer and dolly techniques.
- Heat shrink stretched panel areas to proper contour.
- Cold shrink stretched panel areas to proper contour.
- Mix body filler.
- Apply body filler, shape during curing.
- Rough sand cured body filler to contour; finish sand.
- Determine the proper metal finishing techniques for aluminum.
- Determine proper application of body filler to aluminum.

## STRAND 5

**Students will be able to understand and demonstrate repair, replacement, and adjustment of moveable glass and hardware.**

### Standard 1

Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls.

### Standard 2

Diagnose and repair water leaks, dust leaks, and wind noises; inspect, repair, and replace weather-stripping.

### Standard 3

Inspect, repair or replace, and adjust removable, manually or power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs.

## Performance Skill

Understand and demonstrate repair, replacement, and adjustment of moveable glass and hardware.

- Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls.
- Diagnose and repair water leaks, dust leaks, and wind noises; inspect, repair, and replace weather-stripping.
- Inspect, repair or replace, and adjust removable, manually or power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs.

## STRAND 6

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

### Standard 1

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

# COLLISION NON-STRUCTURAL 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.

## 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.

# COLLISION NON-STRUCTURAL REPAIR

## 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.).

## 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.

## COLLISION NON-STRUCTURAL REPAIR

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

### STRAND 7

**Students will be able to understand and demonstrate plastics using adhesives.**

#### Standard 1

Identify the types of plastics; determine reparability.

#### Standard 2

Identify the types of plastic repair procedures; clean and prepare the surface of plastic parts.

#### Standard 3

Replace or repair rigid, semi-rigid, and flexible plastic panels.

#### Standard 4

Remove or repair damaged areas from rigid exterior composite panels.

#### Standard 5

Replace bonded rigid exterior composite body panels; straighten or align panel supports.

#### Performance Skill

Understand and demonstrate how to repair plastics using adhesives.

- Identify the types of plastics; determine reparability.
- Identify the types of plastic repair procedures; clean and prepare the surface of plastic parts.
- Replace or repair rigid, semi-rigid, and flexible plastic panels.
- Remove or repair damaged areas from rigid exterior composite panels.
- Replace bonded rigid exterior composite body panels; straighten or align panel supports.

### STRAND 8

**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.

#### 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.

# COLLISION NON-STRUCTURAL REPAIR

## Standard 5

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

## Standard 6

Perform visual inspection of structural components and members.

## Standard 7

Identify structural damage using measuring tools and equipment.

## Standard 8

Perform visual inspection of non-structural components and members.

## Standard 9

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

## Standard 10

Identify suspension, electrical, and mechanical component physical damage.

## Standard 11

Identify safety systems physical damage.

## Standard 12

Identify interior component damage.

## Standard 13

Identify damage to add-on accessories and modifications.

## Standard 14

Identify single (one time) use components.

## Performance Skill

Understand and perform damage analysis.

- 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.
- 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 suspension, electrical, and mechanical component physical damage.

## COLLISION NON-STRUCTURAL REPAIR

- Identify safety systems physical damage.
- Identify interior component damage.
- Identify damage to add-on accessories and modifications.
- Identify single (one time) use components.

### STRAND 9

**Students will be able to 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.

#### 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.

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### 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.

# COLLISION NON-STRUCTURAL REPAIR

## 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.
- 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.

## COLLISION NON-STRUCTURAL REPAIR

- 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 10

**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.

#### 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.

# COLLISION NON-STRUCTURAL REPAIR

## 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 11

**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.

- 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.

# COLLISION NON-STRUCTURAL REPAIR

## 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.