Arkansas CTE

Collision Repair - Structural Analysis/Damage Repair: Grades 9, 10, 11, 12

Adopted 2014

Demonstrate appropriate safety procedures

1.1 Identify and demonstrate safe work practices.

1. Identify general shop safety rules and procedures. 1.1.1
2. Utilize safe procedures for handling of tools and equipment. 1.1.2
3. Identify and use proper placement of floor jacks and jack stands. 1.1.3
4. Identify and use proper procedures for safe lift operation. 1.1.4
5. Utilize proper ventilation procedures for working within the lab/shop area. 1.1.5
6. Identify marked safety areas. 1.1.6
7. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. 1.1.7

1.2 Practice personal safety.

1. Identify the location and use of eye wash stations. 1.2.1
2. Identify the location of the posted evacuation routes. 1.2.2
3. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities. 1.2.3
4. Identify and wear appropriate clothing for lab/shop activities. 1.2.4
5. Secure hair and jewelry for lab/shop activities. 1.2.5
6. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. 1.2.6
7. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.). 1.2.7
8. Locate and demonstrate knowledge of safety data sheets (SDS). 1.2.8

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Demonstrate knowledge of shop tools and equipment.

1. Identify tools and their usage in automotive applications. 2.1.1

2. Identify standard and metric designation. 2.1.2
3. Demonstrate safe handling and use of appropriate tools. 2.1.3
4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. 2.1.4

Demonstrate employability/leadership skills

3.1 Demonstrate employability skills.

1. Demonstrate a good work ethic (i.e., relations with other, dependability, attitude, and personal hygiene). 3.1.1
2. Demonstrate teamwork. 3.1.2
3. Demonstrate job-seeking techniques (i.e., write a resume, search for a job, arrange references, and apply interview techniques) 3.1.3
4. Describe legal issues of sexual harassment in the workplace. 3.1.4
5. Identify employment eligibility requirements (e.g. valid driver's license, background check etc.) 3.1.5

3.2 Demonstrate leadership skills.

1. Perform basic parliamentary procedures in a group meeting. 3.2.1
2. Demonstrate an understanding of one's personal values, interpersonal skills, etiquette, effectiveness in oral and written communication and courtesy. Develop and maintain a code of professional ethics. 3.2.2
3. Maintain a good professional appearance. 3.2.3
4. Perform basic tasks related to securing and terminating employees. 3.2.4

Perform vehicle structural repairs

4.1 Demonstrate frame inspection and repair.

1. Measure and diagnose structural damage using a tram gauge. 4.1.1
2. Attach vehicle to anchoring devices. 4.1.2
3. Analyze, straighten and align mash (collapse) damage. 4.1.3
4. Analyze, straighten and align sag damage. 4.1.4
5. Analyze, straighten and align sidesway damage. 4.1.5
6. Analyze, straighten and align twist damage. 4.1.6
7. Analyze, straighten and align diamond frame damage. 4.1.7
8. Remove and replace damaged structural components. 4.1.8
9. Restore corrosion protection to repaired or replaced frame areas. 4.1.9
10. Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems. 4.1.10
11. Align or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems. 4.1.11

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12. Identify heat limitations for structural components. 4.1.12
13. Demonstrate an understanding of structural foam applications. 4.1.13
14. Measure and diagnose structural damage using a three-dimensional measuring system (mechanical, electronic, laser), etc. 4.1.14
15. Measure and diagnose structural damage to vehicles using a dedicated (fixture) measuring system. 4.1.15
16. Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair. 4.1.16
17. Analyze and identify crush/collapse zones. 4.1.17

4.2 Demonstrate unibody and unitized structure inspection, measurement, and repair procedures.

1. Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and chassis alignment problems. 4.2.1
2. Realign or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering and chassis alignment problems. 4.2.2
3. Measure and diagnose unibody damage using tram gauge. 4.2.3
4. Determine and inspect the locations of all suspension, steering, and powertrain component attaching points on the vehicle. 4.2.4
5. Measure and diagnose unibody vehicles using a dedicated (fixture) measuring system. 4.2.5
6. Diagnose and measure unibody vehicles using a three-dimensional measuring system (mechanical, electronic, and laser, etc.). 4.2.6
7. Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair. 4.2.7
8. Attach anchoring devices to vehicle; remove or reposition components as necessary. 4.2.8
9. Straighten and align roof rails/headers and roof panels. 4.2.9
10. Straighten and align hinge and lock pillars. 4.2.10
11. Straighten and align vehicle openings, floor pans, and rocker panels. 4.2.11
12. Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points). 4.2.12
13. Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/power train mounting points, etc.). 4.2.13
14. Identify substrate and repair or replacement recommendations. 4.2.14
15. Identify proper cold stress relief methods. 4.2.15
16. Repair damage using power tools and hand tools to restore proper contours and dimensions. 4.2.16

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17. Remove and replace damaged sections of steel body structures. 4.2.17
18. Restore corrosion protection to repaired or replaced structural areas. 4.2.18
19. Determine the extent of damage to aluminum structural components; repair, weld, or replace. 4.2.19
20. Analyze and identify crush/collapse zones. 4.2.20
21. Restore mounting and anchoring locations. 4.2.21

Demonstrate glass replacement procedures

5.1 Demonstrate diagnostic and repair procedures for fixed glass.

1. Remove and reinstall or replace fixed glass (heated and non-heated) using recommended materials and techniques. 5.1.1
2. Remove and reinstall or replace modular glass using recommended materials. 5.1.2
3. Check for water leaks, dust leaks, and wind noise. 5.1.3

Perform welding auto body procedures

6.1 Demonstrate metal welding and cutting repair procedures.

1. Identify weldable and non-weldable substrates used in vehicle construction. 6.1.1
2. Weld and cut high-strength steel and other steels. 6.1.2
3. Weld and cut aluminum. 6.1.3
4. Determine the correct GMAW (MIG) welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation. 6.1.4
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 substrate being welded. 6.1.5
6. Store, handle, and install high-pressure gas cylinders. 6.1.6
7. Determine work clamp (ground) location and attach. 6.1.7
8. Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. 6.1.8
9. 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. 6.1.9
10. Protect computers and other electronic control modules during welding procedures. 6.1.10
11. Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, clamp or tack as required. 6.1.11
12. Determine the joint type (butt weld with backing, lap, etc.) for weld being made. 6.1.12
13. Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation. 6.1.13

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14. Perform the following welds: continuous, plug, butt weld with and without backing, fillet, etc. 6.1.14
15. Perform visual and destructive tests on each weld type. 6.1.15
16. Identify the causes of various welding defects; make necessary adjustments. 6.1.16
17. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. 6.1.17
18. Identify cutting process for different substrates and locations; perform cutting operation. 6.1.18
19. Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.) 6.1.19

Prepare vehicle for service/customer

7.1 Prepare vehicle for service as listed on the work order.

1. Identify information needed and the service requested on a repair order. 7.1.1
2. Identify purpose and demonstrate proper use of fender covers, mats. 7.1.2
3. Demonstrate use of the three C's (concern, cause, and correction). 7.1.3
4. Review vehicle service history. 7.1.4
5. Complete work order to include customer information, vehicle identifying information, customer concerns, related service history, cause, and correction. 7.1.5

7.2 Prepare vehicle for customer.

1. Ensure vehicle is prepared to return to customer per school or company policy (floor mats, steering wheel cover, etc.). 7.2.1