

Non-Structural Analysis and Damage 1

Course Information

Developers: Automotive Collision and Repair State Curriculum Committee

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KBOR Facilitators: Shirley Antes/ April Henry

Credit Hours: 4

Description:

Through a variety of classroom and/or shop/lab learning and assessment activities, students in this course will: explore the components of safety pertaining to auto collision and repair; explore the parts and construction of vehicles; explore opportunities in the auto collision industry; identify metal straightening techniques; identify the application and use of body fillers; demonstrate proper use, set-up and storage of welding equipment; distinguish between weldable and non-weldable materials; demonstrate fundamental industry standard recommended welds; identify plastics and adhesives used in automotive industry; explain the general purpose of damage, estimation and repair orders; explore the processes required for outer body panel repairs, replacements and adjustments; and demonstrate fundamental cutting procedures.

Exit Learning Outcomes

Program Outcomes

- A Analyze automotive structural damage and repair requirements
- B Analyze automotive non-structural damage and repair requirements
- C Diagnose and repair collision-damaged mechanical and electrical components
- D Demonstrate automobile painting and refinishing skills
- E Demonstrate safe working habits and procedures within an auto collision/repair facility

External Standards

by meeting any institution-required NATEF Tasks from the criteria outlined below. NATEF Guidelines of: 95% of HP-I items must be taught in the curriculum; 90% of HP-G items must be taught in the curriculum

- 2.A Preparation
- 2.B Outer Body Panel Repairs, Replacements, and Adjustments
- 2.C Metal Finishing and Body Filling
- 2.E Metal Welding and Cutting
- 2.F Plastics and Adhesives
- 4.A Safety Precautions

Competencies

Explore the components of safety pertaining to auto collision and repair

Properties

Domain: Cognitive Level: Analysis

Linked Program Outcomes

Demonstrate safe working habits and procedures within an auto collision/repair facility

Linked External Standards

4.A Safety Precautions

DAM02: Frontal Impact Analysis

MEA01: Measuring

SSA01: Structural Straightening Aluminum

You will demonstrate your competence:

- o in the classroom or classroom shop setting

Your performance will be successful when:

- o you identify safety standards for the collision repair industry
- o you you identify safety equipment
- o you identify hazardous materials related to the collision repair industry
- o 4.A.1 Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations. HP-I
- o 4.A.2 Identify safety and personal health hazards according to OSHA guidelines. HP-I

Explore the parts and construction of vehicles

Properties

Domain: Cognitive Level: Analysis

Linked Program Outcomes

Analyze automotive structural damage and repair requirements

Analyze automotive non-structural damage and repair requirements

You will demonstrate your competence:

- o in the classroom or classroom shop setting
- o through an instructor-provided evaluation

Explore opportunities in the auto collision industry

Properties

Domain: Cognitive Level: Analysis

You will demonstrate your competence:

- o through an instructor-provided evaluation
- o in the classroom or classroom shop setting

Identify metal straightening techniques

Properties

Domain: Cognitive Level: Application

Linked Program Outcomes

Analyze automotive structural damage and repair requirements

Analyze automotive non-structural damage and repair requirements

Linked External Standards

2.B Outer Body Panel Repairs, Replacements, and Adjustments

2.C Metal Finishing and Body Filling

DAM02: Frontal Impact Analysis

DAM03: Mechanical Systems Analysis

DAM05: Aluminum Panels And Structures Damage Analysis

DAM06: Steering And Suspension Damage Analysis

DRT01: Drivetrains And Engine Mounts

FCR01: Fundamentals Of Collision Repair

MEA01: Measuring

PRA01: Replacing Aluminum Exterior Panels

STA01: Cosmetic Straightening Aluminum

STS01: Cosmetic Straightening Steel

EDSO1: Non-Structural Supplement Diagnose electrical concerns Complete headlamp and fog/driving lamp assemblies and repairs Demonstrate self-grounding procedures for handling electronic components Determine diagnosis, inspection and service needs for brake system hydraulic components Examine components of heating and air conditioning systems Determine the inspection, service and repair needs for collision damaged cooling system components Distinguish between the under car components and systems Determine the diagnosis, inspection and service requirements of active and passive restraint systems

You will demonstrate your competence:

- o in the classroom or classroom shop setting
- o by meeting any institution-required NATEF Tasks from the criteria outlined below. NATEF Guidelines of: 95% of HP-I items must be taught in the curriculum; 90% of HP-G items must be taught in the curriculum

Your performance will be successful when:

- o 2.B.1 Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan. HP-I
- o 2.B.3 Determine the extent of damage to aluminum body panels; repair or replace. HP-G
- o 2.C.1 Remove paint from the damaged area of a body panel. HP-I
- o 2.C.2 Locate and reduce surface irregularities on a damaged body panel. HP-I
- o 2.C.3 Demonstrate hammer and dolly techniques. HP-I

- o 2.C.9 Determine the proper metal finishing techniques for aluminum. HP-G

Identify the application and use of body fillers

Properties

Domain: Cognitive Level: Application

Linked Program Outcomes

Demonstrate automobile painting and refinishing skills

Linked External Standards

2.C Metal Finishing and Body Filling

DAM02: Frontal Impact Analysis

EDSO1: Non-Structural Supplement Diagnose electrical concerns Complete headlamp and fog/driving lamp assemblies and repairs Demonstrate self-grounding procedures for handling electronic components Determine diagnosis, inspection and service needs for brake system hydraulic components Examine components of heating and air conditioning systems Determine the inspection, service and repair needs for collision damaged cooling system components Distinguish between the under car components and systems Determine the diagnosis, inspection and service requirements of active and passive restraint systems

FCR01: Fundamentals Of Collision Repair

STS01: Cosmetic Straightening Steel

You will demonstrate your competence:

- o in the classroom or classroom shop setting

Your performance will be successful when:

- o 2.C.1 Remove paint from the damaged area of a body panel. HP-I
- o 2.C.2 Locate and reduce surface irregularities on a damaged body panel. HP-I
- o 2.C.3 Demonstrate hammer and dolly techniques. HP-I
- o 2.C.6 Mix body filler. HP-I
- o 2.C.7 Apply body filler; shape during curing. HP-I
- o 2.C.8 Rough sand cured body filler to contour; finish sand. HP-I

Demonstrate proper use, set-up and storage of welding equipment

Properties

Domain: Cognitive Level: Application

Linked Program Outcomes

Demonstrate safe working habits and procedures within an auto collision/repair facility

Linked External Standards

2.E Metal Welding and Cutting

ADH01: Adhesive Bonding

EXT02: Welded And Adhesively Bonded Panel Replacement

WCS01: Steel GMA (MIG) Welding

WCS04: Squeeze-Type Resistance Spot Welding

You will demonstrate your competence:

- o in the classroom or classroom shop setting

Your performance will be successful when:

- o 2.E.4 Determine the correct GMAW (Mig) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation. HP-I
- o 2.E.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. HP-I
- o 2.E.6 Store, handle, and install high-pressure gas cylinders. HP-I
- o 2.E.7 Determine work clamp (ground) location and attach. HP-I
- o 2.E.19 Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.) HP-G

Distinguish between weldable and non-weldable materials

Properties

Domain: Cognitive Level: Analysis

Linked Program Outcomes

Demonstrate safe working habits and procedures within an auto collision/repair facility

Linked External Standards

2.E Metal Welding and Cutting

EXT01: Bolted-On Part Replacement

FCR01: Fundamentals Of Collision Repair

You will demonstrate your competence:

- o in the classroom or classroom shop setting

Your performance will be successful when:

- o 2.E.1 Identify weldable and non-weldable materials used in collision repair. HP-I

Demonstrate fundamental industry standard recommended welds

Properties

Domain: Cognitive Level: Application

Linked Program Outcomes

Demonstrate safe working habits and procedures within an auto collision/repair facility

Linked External Standards

2.E Metal Welding and Cutting

EXT02: Welded And Adhesively Bonded Panel Replacement

WCS01: Steel GMA (MIG) Welding

You will demonstrate your competence:

- o in the classroom or classroom shop setting

Your performance will be successful when:

- o 2.E.2 Weld and cut high-strength steel and other steels. HP-I
- o 2.E.4 Determine the correct GMAW (Mig) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation. HP-I
- o 2.E.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. HP-I
- o 2.E.6 Store, handle, and install high-pressure gas cylinders. HP-I

- o 2.E.7 Determine work clamp (ground) location and attach. HP-I
- o 2.E.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. HP-I
- o 2.E.11 Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp as required. HP-I
- o 2.E.12 Determine the joint type (butt weld with backing, lap, etc.) for weld being made. HP-I
- o 2.E.13 Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation. HP-I
- o 2.E.14 Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet. HP-I
- o 2.E.16 Identify the causes of various welding defects; make necessary adjustments. HP-I
- o 2.E.17 Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. HP-I

Identify plastics and adhesives used in automotive industry

Properties

Domain: Cognitive Level: Application

Linked Program Outcomes

Analyze automotive structural damage and repair requirements

Analyze automotive non-structural damage and repair requirements

Demonstrate safe working habits and procedures within an auto collision/repair facility

Linked External Standards

2.F Plastics and Adhesives

DAM02: Frontal Impact Analysis

PLA01: Plastic Welding Repair

PLA02: Plastic Adhesive Repair

You will demonstrate your competence:

- o in the classroom or classroom shop setting

Your performance will be successful when:

- o 2.F.1 Identify the types of plastics; determine repairability. HP-I
- o 2.F.2 Identify the types of plastic repair procedures; clean and prepare the surface of plastic parts. HP-I

Explain the general purpose of damage, estimation and repair orders

Properties

Domain: Cognitive Level: Analysis

Linked Program Outcomes

Analyze automotive structural damage and repair requirements

Analyze automotive non-structural damage and repair requirements

Linked External Standards

2.A Preparation

DAM01: Vehicle Identification, Estimating Systems, And Terminology

EXT01: Bolted-On Part Replacement

You will demonstrate your competence:

o in the classroom or classroom shop setting

Your performance will be successful when:

o 2.A.1 Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan. HP-I

Explore the processes required for outer body panel repairs, replacements and adjustments

Properties

Domain: Cognitive Level: Analysis

Linked Program Outcomes

Analyze automotive structural damage and repair requirements

Linked External Standards

2.B Outer Body Panel Repairs, Replacements, and Adjustments

ADH01: Adhesive Bonding

DAM02: Frontal Impact Analysis

DAM04: Restraints, Interior, Glass, Side And Rear Impact Analysis

DAM05: Aluminum Panels And Structures Damage Analysis

EDSO1: Non-Structural Supplement Diagnose electrical concerns Complete headlamp and fog/driving lamp assemblies and repairs Demonstrate self-grounding procedures for handling electronic components Determine diagnosis, inspection and service needs for brake system hydraulic components Examine components of heating and air conditioning systems Determine the inspection, service and repair needs for collision damaged cooling system components Distinguish between the under car components and systems Determine the diagnosis, inspection and service requirements of active and passive restraint systems

EXT01: Bolted-On Part Replacement

EXT02: Welded And Adhesively Bonded Panel Replacement

FCR01: Fundamentals Of Collision Repair

PRA01: Replacing Aluminum Exterior Panels

STA01: Cosmetic Straightening Aluminum

STS01: Cosmetic Straightening Steel

You will demonstrate your competence:

o in the classroom or classroom shop setting

Your performance will be successful when:

o 2.B.1 Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan. HP-I

o 2.B.2 Inspect, remove and replace bolted, bonded, and welded steel panel or panel assemblies. HP-I

o 2.B.3 Determine the extent of damage to aluminum body panels; repair or replace. HP-G

o 2.B.4 Inspect, remove, replace, and align hood, hood hinges, and hood latch. HP-I

o 2.B.5 Inspect, remove, replace, and align deck lid, lid hinges, and lid latch. HP-I

- o 2.B.6 Inspect, remove, replace, and align doors, tailgates, hatches, lift gates, latches, hinges, and related hardware. HP-I
- o 2.B.7 Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware. HP-I
- o 2.B.8 Inspect, remove, replace and align front fenders, headers, and other panels. HP-I

Demonstrate fundamental cutting procedures

Properties

Domain: Cognitive Level: Application

Linked Program Outcomes

Analyze automotive structural damage and repair requirements

Demonstrate safe working habits and procedures within an auto collision/repair facility

Linked External Standards

2.E Metal Welding and Cutting

EXT02: Welded And Adhesively Bonded Panel Replacement

WCS01: Steel GMA (MIG) Welding

WCS05: Oxyacetylene/Plasma Arc Cutting

You will demonstrate your competence:

- o in the classroom or classroom shop setting

Your performance will be successful when:

- o 2.E.2 Weld and cut high-strength steel and other steels. HP-I
- o 2.E.3 Weld and cut aluminum. HP-G
- o 2.E.6 Store, handle, and install high-pressure gas cylinders. HP-I
- o 2.E.18 Identify cutting process for different materials and locations perform cutting operation. HP-I