Structural Analysis and Damage Repair

Career Cluster	Transportation, Distribution & Logistics
Course Code	20117
Prerequisite(s)	Introduction to Auto Body & Estimating 20120
Credit	.5-1
Program of Study and Sequence	Introduction to Auto Body & Estimating – **Structural Analysis and Damage Repair** – Auto Body Painting & Refinishing
Student Organization	Skills USA
Coordinating Work-Based Learning	Youth Internships, Industry Guest Speakers and Tour of Local Industries.
Industry Certifications	Automotive Service of Excellence (ASE) and Occupational Safety and Health Administration (OSHA) 10
Dual Credit or Dual Enrollment	NA
Teacher Certification	Transportation, Distribution & Logistics Cluster Endorsement; Autobody Technology Pathway Endorsement; *Autobody Technology
Resources	

Course Description:

Students will measure and repair structural and frame damage. The desire for the students to receive industry based training at the basic level and step up to higher level of competency in this field is the ultimate goal of this course.

Program of Study Application

Structural Analysis and Damage Repair is an advanced pathway course in the Transportation, Distribution and Logistics career cluster, Automotive Body Collision and Refinishing pathway.

Career Cluster: Transportation, Distribution & Logistics

Course: Structural Analysis and Damage Repair

Course Standards

SA 1 Students will demonstrate auto body technology safety practices.

Webb Level	*Sub-indicator*	*Integrated Content*
Level 2: Skill/Concept	SA 1.1 Demonstrate auto body technology safety practices Examples: • Select and use proper personal safety equipment; take necessary precautions with hazardous operations and materials in accordance with federal, state, and local regulations. HP-I • Locate procedures and precautions that may apply to the vehicle being repaired. HP-I • Identify vehicle system hazard types (supplemental restraint system (SRS), hybrid/electric/alternative fuel vehicles), locations and recommended procedures. HP-I • Inspect or replace components. HP-I • Select and use a National Institute of Occupational Safety and Health (NIOSH) approved air purifying respirator. • Inspect condition and hazardous operations and materials in accordance with federal, state, and local regulation (e.g. OSHA Regulation 1910.134) and applicable state and local regulation. HP-I	• National Automotive Technicians Education Foundation (NATEF) Tasks that pertain to this indicator. • OSHA 10

Notes: HP-I – High Priority Individual and HP-G – High Priority Group

Career Cluster: Transportation, Distribution & Logistics

Course: Structural Analysis and Damage Repair

SA 2 Students will inspect and repair frames.

Webb Level	*Sub-indicator*	*Integrated Content*
Level 2: Skill/Concept	SA 2.1 Measure and analyze structural damage Examples: • Measure and diagnose structural damage using a tram gauge. HP-I • Analyze mash, sag, side sway, twist, and diamond damage. HP-G • Identify heat limitations and monitoring procedures for structural components. HP-G • Measure and diagnose structural damage using a three-dimensional measuring system (mechanical, electronic, laser) etc. HP-G • Determine the extent of direct and indirect damage and the direction of impact; document the methods and sequence of repair. HP-I • Analyze and identify crush/collapse zones. HP-I	• NATEF Tasks that pertain to this indicator.
Level 2: Skill/Concept	SA 2.2 Make necessary repairs to the frame Examples: • Attach vehicle to anchoring devices. HP-G • Demonstrate an understanding of structural foam applications. HP-G	• NATEF Tasks that pertain to this indicator.

Notes

SA 3 Students will inspect, measure and repair unibody and unitized structures.

Webb Level	*Sub-indicator*	*Integrated Content*
Level 2: Skill/Concept	SA 3.1 Analyze and determine unibody and unitized structural damage Examples: • Measure and diagnose unibody damage using a tram gauge. HP-I • Measure and diagnose unibody vehicles using a dedicated (fixture) measuring system. HP-G • Diagnose and measure unibody vehicles using a three-dimensional measuring system (mechanical, electronic, and laser etc.). HP-G • Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair. HP-I • Analyze and identify crush/collapse zones. HP-I	• NATEF Tasks that pertain to this indicator.
Level 2: Skill/Concept	SA 3.2 Repair unibody and unitized structures Examples: • Attach anchoring devices to vehicle; remove or reposition components as necessary. HP-I • Identify proper cold stress relief methods. HP-I • Determine sectioning procedures of a steel body structure. HP-I • Remove and replace damaged structural components. HP-G • Restore corrosion protection to repaired or replaced structural areas and anchoring locations. HP-I	• NATEF Tasks that pertain to this indicator.

Notes

SA 4 Students will inspect and repair or replace stationary glass.

Webb Level	*Sub-indicator*	*Integrated Content*
Level 2: Skill/Concept	SA 4.1 Inspect vehicles for glass damage and determine manufacturer's specifications for glass window replacement Examples: • Identify considerations for removal, handling, and installation of advanced glass systems (rain sensors, navigation, cameras, and collision avoidance systems). HP-G • Remove and reinstall or replace modular glass using recommended materials. HP-G • Check for water leaks, dust leaks, and wind noise. HP-G	• NATEF Tasks that pertain to this indicator.

Notes

SA 5 Students will demonstrate proficiency in welding, cutting and joining.

Webb Level	*Sub-indicator*	*Integrated Content*
Level 1: Recall	SA 5.1 Analyze and identify correct welding procedures to be used in auto body repair work Examples: • Identify the considerations for cutting, removing, and welding various types of steel, aluminum, and other metals. HP-G • Determine the correct Gas Metal Arc Welding (GMAW) welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation. HP-I • Identify hazards, foam coatings and flammable materials prior to welding/cutting procedures. HP-G • Determine the joint type (butt weld with backing, lap, etc.) for weld being made. HP-I • Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation. HP-I • Identify different methods of attaching structural components (squeeze type resistance spot welding, riveting, structural adhesive, Metal Inert Gas (MIG) bronze, etc.)	• NATEF Tasks that pertain to this indicator
Level 2: Skill/Concept	SA 5.2 Perform proper welding operations to specific auto body repairs Examples: • Set up attach work clamp (ground) and adjust the GMAW welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded. HP-I • Store, handle, and install high-pressure gas cylinders; test for leaks. HP-1 • Determine the proper angle of the gun to the joint and direction of gun travel for the type of weld being made. HP-I • Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. HP-I • Clean and prepare the metal to be welded, assure good metal fit-up, apply weld through primer if necessary, clamp or tack as required. HP-I • Perform the following welds: plug, butt weld with and without	• NATEF Tasks that pertain to this indicator

	backing, and fillet, in the flat, horizontal, vertical and overhead positions. HP-I • Perform visual evaluation and destructive test on each weld type. HP-I • Identify the causes of various welding defects; make necessary adjustments. HP-I • Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. HP-I • Identify cutting process for different substrates and locations; perform cutting operation. HP-I	

Notes