



# Introduction to Collision Repair

<b>Primary Career Cluster:</b>	Transportation
<b>Course Contact:</b>	<a href="mailto:CTE.Standards@tn.gov">CTE.Standards@tn.gov</a>
<b>Course Code(s):</b>	C20H20
<b>Prerequisite(s):</b>	None
<b>Credit:</b>	1
<b>Grade Level:</b>	9
<b>Elective Focus - Graduation Requirements:</b>	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Transportation courses.
<b>POS Concentrator:</b>	This course satisfies one out of two required courses that meet the Perkins V concentrator definition, when taken in sequence in the approved program of study.
<b>Programs of Study and Sequence:</b>	This is the first course in the <i>Automotive Collision Repair</i> program of study.
<b>Aligned Student Organization(s):</b>	SkillsUSA: <a href="http://www.skillsusatn.org/">http://www.skillsusatn.org/</a>
<b>Coordinating Work-Based Learning:</b>	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit <a href="https://www.tn.gov/content/tn/education/career-and-technical-education/work-based-learning.html">https://www.tn.gov/content/tn/education/career-and-technical-education/work-based-learning.html</a> .
<b>Promoted Tennessee Student Industry Credentials:</b>	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit <a href="https://www.tn.gov/education/career-and-technical-education/student-industry-certification.html">https://www.tn.gov/education/career-and-technical-education/student-industry-certification.html</a>
<b>Teacher Endorsement(s):</b>	507, 771
<b>Required Teacher Certifications/Training:</b>	ASE B-3 or ASE B-4 or I-CAR Industry Certification
<b>Teacher Resources:</b>	<a href="https://www.tn.gov/education/career-and-technical-education/career-clusters/cte-cluster-transportation-distribution-logistics.html">https://www.tn.gov/education/career-and-technical-education/career-clusters/cte-cluster-transportation-distribution-logistics.html</a> Best for All Central: <a href="https://bestforall.tnedu.gov/">https://bestforall.tnedu.gov/</a>

## Course at a Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st century skills necessary to be successful in career and in life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards which feed into intentionally designed programs of study.

Students engage in industry relevant content through general education integration and experiences such as career & technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry standard content and technology, solve industry-based problems, meaningfully interact with industry professionals and use/produce industry specific, informational texts.

### Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for your students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course, note this is not an exhaustive list.

- Participate in CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration. These include Career Pathways Showcase, Job Interview, Collision Damage Appraisal, Collision Repair Technology, and Automotive Refinishing Technology.

### Using a Work-based Learning (WB) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standard 1.1** | Include a safety briefing in a visit to an industry partner/job site.
- **Standards 3.1-3.2** | Have a technician talk with students about their career.
- **Standard 4.1** | Have a shop manager discuss how their collision repair operation works.
- **Standards 6.1-7.2** | Visit a shop to see the tools and materials used.
- **Standards 8.1-10.1** | Visit a shop and have a technician discuss the preparation process.

## Course Description

*Introduction to Collision Repair* is a foundational course in the *Automotive Collision Repair* program of study for students interested in learning more about automotive collision repair technician careers. Upon completion of this course, proficient students will be able to identify and explain the basic steps in the collision repair process, emphasizing the tools, equipment, and materials used. They will be able to describe the major parts of an automobile body and safely perform basic procedures in preparing automotive panels for repair, applying body filling, and preparing surfaces for painting. Standards in this course include career investigation of the opportunities in automotive collision repair as well as an overview of the history of automobile design and construction. Students completing the *Automotive Collision Repair* program of study will be eligible to take the examination for Automotive Student Excellence (ASE) Student Certification in Collision Repair. Some tasks are assigned a "High Priority (HP)" designation. NATEF accredited programs must include at least 95% of the HP-I (Individual) tasks and 90% of the HP-G (Group) tasks in the curriculum.

## Course Standards

### 1. Safety

- 1.1 Safety: Comply with personal and environmental **safety practices** associated with clothing and the use of gloves; respiratory protection; eye protection; hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations. Identify vehicle manufacturer's SRS (supplemental restraint system) types, locations, and recommended procedures before inspecting or replacing components.
- Use and inspect **personal protective equipment** every time equipment is used.
  - Inspect, maintain, and employ **safe operating procedures** with tools and equipment, such as hand and power tools, ladders, scaffolding, and lifting equipment.
  - Assume responsibilities under HazCom (Hazard Communication) regulations.
  - Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies regarding reporting of accidents and observed hazards, and regarding emergency response procedures.
  - Maintain a portfolio record of written safety examinations and equipment examination for which the student has passed an operational checkout by the instructor.
  - Utilize SDSs (safety data sheets), and identify the health hazards associated with hazardous material.

### 2. History of Automobiles

- 2.1 History of Automobiles: Explain the significant time periods in the development of automobile design and construction, emphasizing the **changing collision repair methods**. Analyze the impact of a particular event or time period on current **practices in the collision repair industry**.

### 3. Career Investigation

- 3.1 Career Plan: Summarize the **essential knowledge and skills** required for collision repair technicians. Identify and analyze areas of specialization within the Collision Repair field such as metal technician, structural technician, refinish technician, and detailing technician. Explain the aptitudes and training needed for a collision repair technician career. Devise a **tentative career plan** to reach employment goals.
- 3.2 Job Opportunities: Compile and analyze real-time and projected **labor market data** from public sources such as the U.S. Bureau of Labor Statistics to investigate local and regional occupational opportunities and trends in the field of collision repair. Synthesize collected data to explain **education requirements, job availability, salaries, and benefits**.

### 4. Overview of Collision Repair Operations

4.1 Overview: Research collision repair processes described in textbooks, repair center websites, or by interviewing technicians. Describe the **major steps involved in the collision repair process** including estimating, disassembling, performing repairs, refinishing, reassembling, detailing, and final inspection. Discriminate between the different types of repair work such as metal work, structural repairs, mechanical and electrical repairs, and refinishing.

## 5. Vehicle Construction

5.1 Vehicle Identification: Utilize appropriate terminology to classify and describe **vehicles** based on vehicle size, roof design, drive system type, and engine location. Compare and contrast the **major types of body frames** (i.e. body-over-frame, unibody, and space frame). Describe the **major structural parts, sections, and assemblies** of each type of body frame.

5.2 Vehicle Components: Identify and describe the **major parts and components** which make up an automobile body, analyzing the **purpose** of and interrelationships among each component and explaining the sequence in which each is put together in assembly.

## 6. Tools & Equipment

6.1 Identify Tools and Equipment: Accurately identify a wide range of hand tools, power tools, and equipment used in the collision repair industry. **Hand tools** should include wrenches, sockets, screwdrivers, pliers, files, holding tools, punches, chisels, and hammers in metric and/or Society of Automotive Engineers (SAE) sizes where appropriate/. **Power tools** should include air tools, grinders, polishers, blasters, and spray guns. **Equipment** should include spray booths, paint drying equipment, straightening systems, and lifts.

6.2 Use of Tools and Equipment: Assess a variety of situations requiring the use of hand tools, power tools, and equipment. **Select the proper tool**, critique the readiness of the tool, **use the tool** to accomplish the desired task, clean the tool, and then return the tool to its proper storage according to correct size and nomenclature. For example, demonstrate the ability to safely use an air ratchet to remove hood hinge bolts.

6.3 Measurement Devices: Use physical **measurement devices** typically employed in collision repair to complete accurate field measurements. Determine the appropriate units and record **accurate measurements** of lengths, angles, pressure, volume, and other measurements. Tools should include, but are not limited to: fractional rule, metric rule, measuring tape, dial caliper, micrometer, dial indicators, pressure gauges, and mixing cups.

6.4 Mathematics: Apply **mathematics concepts to solve collision repair problems**, distinguishing which principles apply to a given automotive problem. Concepts should include, but are not limited to:

- Operating with whole numbers, fractions, and decimals.
- Performing conversions between fractions, decimals, and percent. For example, convert a decimal to a fraction to prepare a unit for measurement on a fractional scale to the precision of 1/16 of an inch.

- c. Working with units such as feet, inches, meters, centimeters, and millimeters, and determining appropriate units for a given repair task. For example, convert fractions of an inch into millimeters to determine the appropriate size metric wrench to use to loosen a bolt.
- d. Performing proportionate reasoning to estimate quantities.

## 7. Collision Repair Materials

- 7.1 Use Fasteners: Distinguish between the **various types of fasteners** commonly used in vehicle construction, such as bolts, nuts, washers, screws, nonthreaded fasteners, and adhesives, by creating a visual display outlining the properties and uses of each type. Define torque and describe the procedures for applying the **appropriate torque** to tighten bolts. Demonstrate the ability to accurately **remove, reinstall, and select** the appropriate fastener in a variety of situations. For example, consult torque specifications to determine the torque value for a given size and grade of bolt and perform proper tightening sequences to secure bolts.
- 7.2 Materials: Compare and contrast the properties and uses of basic **materials employed in collision repair processes**, such as body fillers, putty, mashing materials, abrasives, sandpapers, primers, paint types, drying and curing materials, and sealers. Describe and demonstrate common procedures used by collision repair centers to clean and properly dispose of materials and supplies.

## 8. Preparation of Non-Structural Body Components

- 8.1 Prepare Non-Structural Body Components: Apply the basic steps necessary to prepare non-structural body components for repair.
  - a. Review damage report and **analyze damage** to determine appropriate methods for overall repair; develop and document a **repair plan**. HP-I
  - b. Inspect, remove, label, store, and reinstall exterior trim and moldings. HP-I
  - c. Protect panels, glass, interior parts, and other vehicles adjacent to the repair area. HP-I
  - d. Soap and water wash entire vehicle; complete pre-repair inspection checklist. HP-I

## 9. Metal Finishing and Body Filling of Non-Structural Body Components

- 9.1 Metal Finishing and Body Filling: Demonstrate the basic steps necessary to properly repair **surface irregularities on a damaged body panel**. Apply the appropriate tools, equipment, and procedures to safely perform **panel repairs**.
  - a. Remove paint from the damaged area of the body panel. HP-I
  - b. Locate and repair surface irregularities on a damaged body panel. HP-I
  - c. Heat shrink stretched panel areas to proper contour. HP-I
  - d. Identify different types of body fillers. HP-G
  - e. Prepare and apply body filler. HP-I
  - f. Rough sand body filler to contour; finish sand. HP-I

## 10. Surface Preparation for Painting and Refinishing

10.1 Prepare for Painting and Refinishing: Demonstrate the basic steps necessary to **prepare a surface for painting**. Apply the appropriate tools, equipment, and procedures to safely prepare a surface for painting.

- a. Mix primer, primer-surfacer, or primer-sealer. HP-I
- b. Apply primer onto surface of repaired area. HP-I
- c. Block sand area to which primer-surfacer has been applied. HP-I
- d. Dry sand area to which finishing filler has been applied. HP-I
- e. Clean area to be refinished using a final cleaning solution. HP-I

### Standards Alignment Notes

\*References to other standards include:

- Automotive Service Excellence (ASE) Education Foundation standards for [Collision Repair and Refinish](#).
- P21: Partnership for 21st Century Skills [Framework for 21st Century Learning](#)
  - Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.