



## PURPOSE

To evaluate each competitor's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of collision repair technology.

First, download and review the General Regulations at: <http://updates.skillsusa.org>.

## ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with collision repair technology as the occupational objective.

## CLOTHING REQUIREMENT

### **Class D: Competition Specific – Blue Attire**

- Official SkillsUSA light blue work shirt.
- Navy pants.
- Black, brown or tan leather work safety shoes (with protective toe cap).

*Note:* Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: [www.skillsusastore.org](http://www.skillsusastore.org). If you have questions about clothing or other logo items, call 1-888-501-2183.

*Note:* Competitors must wear their official competition clothing to the competition orientation meeting.

## EQUIPMENT AND MATERIALS

1. Supplied by the technical committee: Basic equipment of a collision repair and refinishing laboratory
  - a. Materials for metalworking segment:
    - 1). Identical fenders to be repaired
    - 2). 3M Body filler
    - 3). 3M Glaze filler
    - 4). Body filler mixing boards and spreaders
    - 5). Towels for cleaning
    - 6). Particulate filter respirators
    - 7). Vapor respirators
    - 8). Safety glasses
    - 9). Nitrile gloves
    - 10). Keco glue pulling equipment and products
    - 11). Snap-on body hammers
    - 12). Snap-on dollies
    - 13). Picks and Spoons
    - 14). Heat gun
    - 15). Non-contact thermometer
    - 16). Masking Tape
    - 17). Dual-Action (DA) sander
  - b. Materials for plastic repair segment:
    - 1). Plastic repair cleaner
    - 2). 3M plastic repair material
    - 3). Mixing boards and spreaders
    - 4). Abrasive discs and sheets
    - 5). Plastic bumper fascias
    - 6). Clamps
    - 7). Vapor respirators
    - 8). Particulate filter respirators
    - 9). Safety glasses
    - 10). Polyvance nitrogen welders
    - 11). Plastic welding rods
    - 12). Plastic welding tools
    - 13). Drill and drill bits
    - 14). Angle-grinder with Roloc arbor
    - 15). Straight die grinder with carbide burr
  - c. Materials supplied for attachment methods segment:
    - 1). Auto-darkening welding helmets
    - 2). Particulate respirators
    - 3). Welding jackets
    - 4). Welding gloves

*Note:* competitors may bring their own welding helmets, jackets, and gloves

    - 5). Miller Electric GMA (MIG) welders
    - 6). 0.23-0.24" ER70S-6 electrode wire
    - 7). Access to OEM and SkillsUSA committee-developed collision repair information

- d. Materials supplied for structural analysis segment:
  - 1). Chief Automotive 3D measuring equipment
  - 2). Tram gauges and tape measures
  - 3). Access to OEM and SkillsUSA committee-developed collision repair information
2. Supplied by the competitor:
  - a. Bullseye pick, if desired.
  - b. All competitors must create a one-page resume. See “Resume Requirement” below for guidelines. Additionally, and as part of the competition, competitors will submit two hard copies of their resumes at orientation.

**Note:** No power hand tools required

## **RESUME REQUIREMENT**

Competitors must create a one-page resume to submit online. SkillsUSA national competitors should submit their resume by June 1. The link for resume submission will be published on <http://updates.skillsusa.org> on May 1. Failure to submit a resume will result in a 10-point penalty.

**Your resume must be saved as a PDF file type using file name format of “Last Name\_First Name.”** For example, “Amanda Smith” would save her resume as **Smith\_Amanda**. If you need assistance with saving your file as a PDF, visit [the Adobe website](#) for more information.

**Note:** Check the Competition Guidelines and/or the updates page on the SkillsUSA website at <http://updates.skillsusa.org>.

## **PROHIBITED DEVICES**

Cell phones or other electronic devices not approved by a competition’s national technical committee are **NOT** allowed in the competition area. Please follow the guidelines in each technical standard for approved exceptions. Technical committee members may also approve exceptions onsite during the SkillsUSA Championships if deemed appropriate.

### **Penalties for Prohibited Devices**

If a competitor’s electronic device makes noise or if the competitor is seen using it at any time during the competition, an official report will be documented for review by the SkillsUSA Championships director. If confirmed that the competitor used the device in a manner which compromised the integrity of the competition, the competitor’s scores may be canceled.

## **SCOPE OF THE COMPETITION**

The competition will be consistent with the Collision Repair knowledge and skills requirements, as outlined in the guidelines published by the National Institute for Automotive Service Excellence (ASE), the I-CAR Knowledge and Skills Protocol (<https://www.icar.com/s/knowledge-skill-protocol>) and the ASE Education Foundation ([www.aseeducation.org/](http://www.aseeducation.org/).) Competitors will demonstrate their ability to perform jobs of skills selected from the standards mentioned above as determined by the SkillsUSA Championships technical committee.

**Committee membership includes:**

3M Co., American Iron and Steel Institute (AISI), Car-Part.com, Chief Automotive Technology, Collision Hub, Chippewa Valley Technical College, Farmers Insurance, General Motors Corp., I-CAR, Keiths Consulting, Miller Electric Mfg. Co. Inc., National Institute for Automotive Service Excellence (ASE), ASE Education Foundation, Polyvance, Saint-Gobain, Snap-on Inc., State Farm Insurance Companies, Toyota Motor Sales USA Inc., Keco Tabs, and the Women's Industry Network.

**KNOWLEDGE PERFORMANCE**

The competition includes a written knowledge test given by ASE covering three of the Collision Repair areas that are identified in the ASE Education Foundation Collision Repair/Refinishing Program Standards and the ASE Official Study Guide: Collision Repair/Refinish, and a structural test. The tests for the high school and college competitions will consist of diagnosis and repair content from these skill areas: Non-structural Analysis and Damage Repair, Structural Analysis and Damage Repair, Mechanical and Electrical Components.

1. **Nonstructural Analysis** — 22 questions in Nonstructural Analysis and Damage Repair (B3) ASE Certification Test in the content areas of: preparation, outer body panel repairs, replacements and adjustments, metal finishing and body filling, glass and hardware, welding, cutting and removal and plastic repair
2. **Structural Analysis** — 14 questions in Structural Analysis and Damage Repair (B4) ASE Certification Test in the content areas of: frame inspection and repair, unibody inspection, measurement and repair, stationary glass and metal welding and cutting
3. **Mechanical and Electrical Components** — 14 questions in Mechanical and Electrical Components (B5) ASE Certification Test in the content areas of: suspension and steering, electrical, brakes, heating and air conditioning, engine cooling systems, drivetrain, fuel intake and exhaust systems and restraint systems

**SKILL PERFORMANCE**

Competitors will demonstrate their ability to perform jobs and skills based on the task list outlined by I-CAR, ASE and the ASE Education Foundation. The competition includes a series of workstations to assess skills in the following areas: metal straightening, attachment methods, plastic repair and structural analysis. There will be a written test on structural analysis, and an ASE exam. The competitors will also participate in an interview. The overall appearance of the finished product, ability to follow published procedures, and proper safety practices will be judged.

**STANDARDS AND COMPETENCIES****CRT 1.0 — Repair depressed area(s) on a steel panel with hammer and dolly techniques and body filler.**

- 1.1. Model proper safety procedures.
- 1.2. Clean contaminants from a damaged panel.
- 1.3. Locate surface irregularities on a damaged panel.
- 1.4. Remove finish from the damaged area(s) as necessary.

- 1.5. Apply hammer and dolly techniques to repair damage.
  - 1.5.1. Straighten and rough out contours of damaged panels to a suitable condition for body filling using hand tools.
- 1.6. Mix and apply body filler on a steel panel.
  - 1.6.1. Determine the relative proportion of the desired versus the undesired ingredients or elements of a mixture, and determine if that proportion is within the manufacturer's specifications.
- 1.7. Sand cured body filler to contour.
- 1.8. Finish sand.

### **CRT 2.0 – Repair depressed area of an aluminum panel**

- 2.1. Model proper safety procedures.
- 2.2. Clean contaminants from a damaged panel.
- 2.3. Locate surface irregularities on a damaged panel
- 2.4. Remove finish from the damaged area(s) as necessary
- 2.5. Demonstrate the straightening process, with heat application as necessary

### **CRT 3.0 – Repair depressed areas using metal finishing techniques on a steel panel**

- 3.1. Model proper safety procedures.
- 3.2. Clean contaminants from a damaged panel.
- 3.3. Locate surface irregularities on a damaged panel.
- 3.4. Remove finish from the damaged area(s) as necessary.
- 3.5. Demonstrate various uses of the metal finishing tools.

### **CRT 4.0 – Repair depressed area(s) on a steel panel with glue pulling equipment and techniques.**

- 4.1. Model proper safety procedures.
- 4.2. Clean contaminants from a damaged panel.
- 4.3. Locate surface irregularities on a damaged panel.
- 4.4. Remove finish from the damaged area(s), as necessary.
- 4.5. Remove damage using glue pulling techniques.

### **CRT 5.0 – Prepare steel panel for primer**

- 5.1. Model proper safety procedures.
- 5.2. Clean contaminants from a damaged panel.
- 5.3. Featheredge paint/E-coat as necessary.
- 5.4. Sand/Scuff bare metal as necessary.

### **CRT 6.0 – Demonstrate the understanding and skills necessary for attachment methods needed for collision repair of steel and aluminum panels**

- 6.1. Model proper safety procedures.
- 6.2. Make a plug weld using steel coupons in the vertical and overhead positions using a GMA (MIG) welder.
- 6.3. Make a butt joint with backing weld using steel coupons in the vertical and overhead positions using a GMA (MIG) welder.
- 6.4. Make a fillet weld on lap using steel coupons in the vertical and overhead positions using a GMA (MIG) welder.

- 6.5. Make a plug weld using aluminum coupons in the vertical and overhead positions using a GMA (MIG) welder.
- 6.6. Make a butt joint with backing weld using aluminum coupons in the vertical and overhead positions using a GMA (MIG) welder.
- 6.7. Make a fillet weld on lap using aluminum coupons in the vertical and overhead positions using a GMA (MIG) welder.
- 6.8. Make a squeeze-type resistance spot weld (STRSW) using steel coupons.
- 6.9. Make MIG brazing joints using steel coupons.
- 6.10. Identify, remove and install self-piercing rivets (SPR).
- 6.11. Identify, remove and install blind rivets.
- 6.12. Identify and install solid rivets.
- 6.13. Install rivet bonded panel.
- 6.14. Install weld bonded panel.

**CRT 7.0 — Complete a two-sided repair on a plastic vehicle part. Mix and apply appropriate plastic repair material following product maker procedures.**

- 7.1. Model proper safety procedures.
- 7.2. Demonstrate an understanding of the importance to clean before making any repair.
- 7.3. Damage preparation before adhesive work
- 7.4. Demonstrate an understanding of appropriate abrasive grade sequence for reinforcing plastic repair (typically 50 and 80).
- 7.5. Apply a light coating of adhesion promoter and allow to dry adequately.
- 7.6. Demonstrate the ability to open, load, and equalize the cartridge, attach the mixing nozzle, and discard the first pump of material.
- 7.7. Demonstrate proper spreading techniques: Apply a thin, tight coat of material, then build a thin layer of adhesive followed by reinforcing mesh and an additional layer of adhesive.

**CRT 8.0 — Complete a front-side cosmetic surface repair on a plastic vehicle part.**

- 8.1. Demonstrate proper safety procedures
- 8.2. Demonstrate an understanding of the importance of cleaning before making any repair.
- 8.3. Damage preparation before adhesive work
- 8.4. Demonstrate an understanding of appropriate abrasive grade sequence for plastic repair (Typically 50, 80, adhesive application, 80, 180, 320).
- 8.5. Demonstrate an understanding of the need to keep very coarse grade scratches (80 grit) inside valley of repair and not on surrounding plastic, to avoid creating “fuzzies” that will be difficult to conceal within the finished paint work.
- 8.6. Demonstrate understanding of the difference between “Veeing Out” a repair (incorrect) and “Dishing Out” a repair (correct) and how that relates to the finished product (no ghost lines).
- 8.7. Apply a light coating of adhesion promoter and allow to dry adequately.
- 8.8. Demonstrate the ability to load, open and equalize the cartridge, attach the mixing nozzle, and discard the first pump of material.
- 8.9. Demonstrate proper spreading techniques: Apply a thin, tight coat of material; build in thin layers; and avoid air entrapment as they build slightly higher than the surrounding areas.
- 8.10. Demonstrate test to determine readiness to sand (check with fingernail, see if it leaves a white mark in the adhesive).

**CRT 9.0 — Complete a tab repair on plastic vehicle part.**

- 9.1. Model proper safety procedures.
- 9.2. Demonstrate an understanding of the importance of cleaning before making any repair.
- 9.3. Demonstrate an understanding of appropriate abrasive grade sequence for tab repair (typically 50 and 80).
- 9.4. Apply a light coating of adhesion promoter and allow to dry adequately.
- 9.5. Demonstrate the ability to load, open and equalize the cartridge; attach the mixing nozzle; and discard the first pump of material.
- 9.6. Demonstrate proper “molding” techniques using contour sheeting and form a new tab.
- 9.7. Demonstrate test to determine readiness to sand (check with fingernail, see if it leaves a white mark in the adhesive).

**CRT 10.0 — Complete tab repair surface preparation.**

- 10.1. Demonstrate proper safety.
- 10.2. Demonstrate the ability to use 50-grit abrasive on a high-speed grinder to rough shape the formed tab, followed by 180-grit on a DA to finely shape the tab, and lastly, a 320-grit abrasive to prepare the featheredge for the painting process.
- 10.3. Demonstrate the ability to use an 80-grit abrasive to “knock down” the bulk of the excess cosmetic repair material without abrading the surrounding plastic, which would leave “fuzzies.”
- 10.4. Demonstrate the ability to use 180-grit abrasive to successfully level the repair material and feather into the surrounding area.
- 10.5. Finish sanding the repair and surrounding area with 320-grit abrasive to prepare for painting process.
- 10.6. Demonstrate the best practice of reapplying adhesion promoter after the final sanding step, to assure paint adhesion.

**CRT 11.0 — Complete a tear repair on a plastic vehicle part using a plastic nitrogen welder.**

- 11.1. Model proper safety procedures during the preparation and welding process.
- 11.2. Demonstrate proper cleaning of the surface.
- 11.3. Demonstrate proper backside surface preparation for plastic welding (e.g., grinding V-groove or abrading surface).
- 11.4. Demonstrate proper fixturing of tear with aluminum tape.
- 11.5. Demonstrate proper nitrogen welding technique on the backside of the plastic vehicle part. Reinforce if desired at the edge to ensure the integrity of the repair.
- 11.6. Demonstrate the V-grooving of the tear on the cosmetic side of the repair to the proper depth and width.
- 11.7. Demonstrate proper nitrogen plastic welding technique to the cosmetic side of the plastic vehicle part.
- 11.8. Demonstrate proper attention to cooling the welded area before finish sanding the plastic vehicle part.
- 11.9. Demonstrate proper finish sanding technique to prepare the repair area for application of cosmetic filler.

**CRT 12.0 — Demonstrate knowledge of basic steering and suspension parts**

- 12.1. Identify the illustrated steering and suspension components.

**CRT 13.0 — Demonstrate knowledge of steering and suspension geometry**

- 13.1. Identify steering and suspension.
- 13.2. Identify and analyze misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.

**CRT 14.0 — Perform structural damage analysis**

- 14.1. Identify structural damage types and corrections.

**CRT 15.0 — Demonstrate knowledge of vehicle structural realignment**

- 15.1. Identify anchoring and blocking locations for structural realignment.
- 15.2. Identify the extent of damage, the direction of impact, and direction of correction; document the methods and sequence of repair.

**CRT 16.0 — Measure and analyze structural, steering and suspension misalignment of a body on frame vehicle using a tram gauge measuring system.**

- 16.1. Using a tram gauge and tape measure, measure the damaged vehicle's upper body and steering and suspension control points.
- 16.2. Using a mechanical measuring system, determine the different types of misalignment that the vehicle's lower structure has sustained.

**CRT 17.0 — Measure and analyze structural, steering and suspension misalignment of a unitized body vehicle**

- 17.1. Identify the different types of misalignment to the vehicle's structure, steering and suspension.
- 17.2. Determine the material type and the sectioning or replacement procedures.

**18.0 — Access OEM repair information to determine a repair plan strategy.**

- 18.1. Identify material types.
- 18.2. Identify, measure, and mark sectioning locations.
- 18.3. Identify and execute attachment methods required for repair.

**CRT 19.0 — Demonstrate knowledge and skills required for collision repair diagnostics, including Advanced Driver Assistance Systems (ADAS)**

- 19.1. Identify vehicle electronic parts and systems.
- 19.2. Demonstrate proper use of a scan tool.
- 19.3. Identify conditions that necessitate aiming/calibration of ADAS sensors and cameras.
- 19.4. Perform ADAS aiming/calibration procedures.

**CRT 20.0 — Complete an oral assessment/interview**

- 20.1. Exhibit personal skills such as attendance, time management and individual responsibility.
  - 18.1.1. Demonstrate promptness when required to meet interviewer at specific time and location.

### **CRT 21.0 — Maintain professional conduct and appearance**

21.1. Demonstrate proper attire (SkillsUSA uniform light blue shirt, dark blue pants)

### **CRT 22.0 — Complete job application and resume**

22.1. Properly and legibly complete a job application and resume

### **CRT 23.0 — Demonstrate interview skills**

## **COMMITTEE IDENTIFIED ACADEMIC SKILLS**

The technical committee has identified that the following academic skills are embedded in this competition.

### **Math Skills**

- Understand the measurement angles on a three-dimensional object.
- Understand the surface area and perimeter of three-dimensional objects.
- Apply transformations (rotator turn, reflector flip, translator slide and dilator scale) to geometric figures.
- Solve problems involving complementary, supplementary and congruent angles.
- Solve problems involving symmetry and transformation.
- Use measures of interior and exterior angles of polygons to solve problems.
- Measure angles.
- Make predictions using knowledge of probability.
- Organize and describe data using matrices.
- Find surface area and perimeter of two-dimensional objects.
- Use fractions to solve practical problems.
- Solve practical problems using percentages.
- Make comparisons, predictions and inferences using graphs and charts.

### **Science Skills**

- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of principles of electricity and magnetism (practical example: current and amperage settings on the GMA [MIG] welder in relationship to weld penetration).
- Use knowledge of static electricity.
- Use knowledge of pressure in relation to the concept of force.
- Use knowledge of simple machines and compound machines.
- Use knowledge of potential and kinetic energy.
- Use of knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices.
- Describe characteristics of types of matter based on physical and chemical properties.
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point and color).
- Use knowledge of chemical properties.
- Describe and identify physical changes to matter.
- Use knowledge of heat, light and sound energy.
- Use knowledge of temperature scales, heat and heat transfer.

- Plan and conduct a scientific investigation.
- Use knowledge of work, force, mechanical advantage, efficiency and power.

### **Language Arts Skills**

- Demonstrate comprehension of a variety of informational text.
- Demonstrate knowledge of appropriate reference materials.
- Use print, electronic databases, online resources to access information in books and articles.
- Provide information in conversations and in group discussions.
- Provide information in oral presentations.
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice.
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information.
- Organize and synthesize information for use in written and oral presentations.
- Edit writing for grammar, capitalization, punctuation, spelling, sentence structure and paragraphing.

### **CONNECTIONS TO NATIONAL STANDARDS**

State-level academic curriculum specialists identified the following connections to national academic standards.

#### **Math Standards**

- Problem solving
- Numbers and operations
- Measurement
- Geometry
- Representation
- Communication
- Connections

*Source: NCTM Principles and Standards for School Mathematics. For more information, visit:*  
<http://www.nctm.org>.

#### **Science Standards**

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

*Source: McREL compendium of national science standards. To view and search the compendium, visit:*  
[www2.mcrel.org/compendium/browse.asp](http://www2.mcrel.org/compendium/browse.asp).

#### **Language Arts Standards**

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and

their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, and graphics).

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information).

*Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: [www.ncte.org/standards](http://www.ncte.org/standards).*