

TRANSPORTATION AND LOGISTICS

# Autobody Repair



## WorldSkills Occupational Standards

# WorldSkills Occupational Standards (WSOS)

## Occupation description and WSOS

### The name of the occupation is

Autobody Repair

### Description of the associated work role(s) or occupation(s)

Autobody repairers realign both the structure and the panelling of both light and heavy-duty vehicles after they have been involved in collisions. This can often be a complex process as each collision will present different degrees and directions of damage. The repaired vehicle must conform to the stringent specifications established by the vehicle manufacturer and meet both their tolerances and their safety specifications. An autobody repairer needs to be familiar with MET (mechanical/electrical/trim) components and their function as well as the specific and often complex safety restraint systems (SRS) fitted to modern vehicles. The autobody repairer returns the vehicle to a condition where it is ready for refinishing.

An autobody repairer works in a facility dedicated to repair and is equipped with the machinery and equipment suitable to repair a wide variety of modern passenger cars. An autobody repairer's work is often divided between major and minor collision damage; however, skills in both areas may often be used on the same vehicle. In a major collision repair the autobody repairer will mount the vehicle onto a specialized body jig with which he or she can diagnose the direction and extent of the misalignment to the car body structure. He or she then attaches heavy hydraulic pulling equipment to the body and uses this pulling force to reverse the damaging force.

After the misalignment has been rectified to the structure the repairer will normally have to remove damaged structural and non-structural members which are replaced with new sections or part sections using various welding processes and/or riveting and bonding. For a minor collision an autobody repairer may replace or repair non-structural panels to a condition suitable for refinishing. Repairers must be able to use vehicle body alignment benches and associated measuring equipment (universal and fixed bracket) as a means of assessing the extent of damage and reinstating the structure to its original specifications. An autobody repairer must be a skilled welder who is capable of joining a variety of metals such as low carbon steel, high strength steels or aluminium alloys using metal active gas welding (MAG), and resistance/inverter spot welding.

He or she must be able to select the correct consumables for the metal being welded and adjust the machine to provide an efficient high quality weld. In some circumstances body panels may be replaced using bonding and riveting equipment. The repairer must be able to prepare, adjust and use this equipment effectively following manufacturers specifications to reinstate damage panels.

Autobody repairers must be able to remove damaged sections with minimum disruption to surrounding body work and re-attach/re-align the parts to reinstate the integrity of the body shell. These parts or panels may be welded, bolted or riveted.

For minor damage that does not require the replacement of a part or panel an autobody repairer will use a variety of repair tools to remove the damage and reinstate the panel's original contours. These may involve a range of shaped hammers and 'dollies', bumping files, body files, pry bars and oil stones.

## General notes on the WSOS

The WSOS specifies the knowledge, understanding, and specific skills that underpin international best practice in technical and vocational performance. It should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business ([www.worldskills.org/WSOS](http://www.worldskills.org/WSOS)).

The skill competition is intended to reflect international best practice as described by the WSOS, and to the extent that it is able to. The Standard is therefore a guide to the required training and preparation for the skill competition.

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance. There will only be separate tests of knowledge and understanding where there is an overwhelming reason for these.

The Standard is divided into distinct sections with headings and reference numbers added.

Each section is assigned a percentage of the total marks to indicate its relative importance within the Standards. This is often referred to as the “weighting”. The sum of all the percentage marks is 100. The weightings determine the distribution of marks within the Marking Scheme.

Through the Test Project, the Marking Scheme will assess only those skills that are set out in the Standards Specification. They will reflect the Standards as comprehensively as possible within the constraints of the skill competition.

The Marking Scheme will follow the allocation of marks within the Standards to the extent practically possible. A variation of up to five percent is allowed, provided that this does not distort the weightings assigned by the Standards.

# WorldSkills Occupational Standards

Section	Relative importance (%)
<b>1 Work organization, management and communication, and interpersonal skills</b>	<b>10</b>

The individual needs to know and understand:

- Current occupational health and safety regulations relating to the autobody repair industry
- Correct use and maintenance of all personal protective equipment and clothing
- All recommendations and information published by the suppliers or manufacturers of products and equipment
- The process for maintaining and using specialized equipment
- Terminology that relates to body repair processes
- Terminology that relates to the car body structure and its construction
- The importance of the correct handling and disposal of environmentally harmful products
- The basis for communication and interpersonal skills
- The potential harmful impact that repair products and processes can have upon the environment
- The range and purposes of documentation, including written and technical drawings including schematic and wiring diagrams, in both paper based and electronic forms
- The technical language associated with the occupation
- The industry standards required for inspection and fault reporting in oral, written, and electronic formats
- The required standards for customer service and care.

The individual shall be able to:

- Apply occupational health and safety regulations and best practice to the autobody repair industry
- Use correctly and maintain personal protective clothing and equipment
- Set-up, use, adjust, and maintain all specialist repair equipment, promote health and safety practices in the workplace, apply all recommendations and guidance provided by suppliers and manufacturers of equipment or products
- Adhere to MSDS (manufacturers safety data sheets)
- Adopt correct procedures for handling and disposing of environmentally harmful products
- Select and use products that are environmentally acceptable
- Dispose of environmentally harmful products in a safe and responsible way

Section	Relative importance (%)
<b>2    Diagnosis and correction</b>	<b>20</b>

The individual needs to know and understand:

- The safety recommendations associated with mounting and pulling damaged vehicle bodies
- Manufacturers' data and how this is translated to the vehicle body
- The principles surrounding the construction of vehicle bodies, including light passenger, light commercial and commercial
- Characteristics of body construction relating to strength and collision protection
- Characteristics and purpose of structural and non-structural panels
- The importance of positional correctness to retain vehicle safety and performance
- The role played by direction and weight of damage force as well as the impact at the point of collision
- How position, shape and strength of individual body assemblies affect the paths taken by collision forces
- Methods of correcting forces including vectors of force Principles of body jig measuring systems including bracket and computerized measuring systems
- Principles of pulling systems including fixed post, swinging arm and vector systems

The individual shall be able to:

- Mount vehicles on anchoring equipment
- Interpret manufacturers' specifications relating to vehicles
- Diagnose the extent of vehicle damage and rectify the damage with reference to vehicle manufacturers' recommendations
- Determine the direction of damaging forces or impacts
- Determine the extent of damaging forces or impacts
- Determine structural damage using appropriate diagnostic equipment
- Identify the correct and appropriate methods for the correction of vehicle body damage
- Reinstall correct vehicle body alignment
- 'Rough out' damaged sections or panels prior to removal for replacement
- Straighten and align damaged structural components and reinstall their dimensional accuracy
- Diagnose frame damage using any of:
  - Toe in gauge
  - Self-alignment gauge
  - Tram gauge
  - Vehicle manuals etc.
- Repair and align full frame and suspension damage.

Section	Relative importance (%)
<b>3 Replace necessary welding on parts/panels</b>	<b>34</b>

The individual needs to know and understand:

- The importance of following manufacturers' recommended repair methods and warranty procedures
- Suitable methods of identifying fixing types weld positions and weld types
- Methods of safely and cleanly removing fastenings to free damaged panels for replacement
- Use, setting and maintenance of pneumatic tools used for panel removal and replacement
- Principles of operation and adjustment of welding systems used for panel replacement including MAGS, Resistance spot and MIG brazing
- Processes and procedures for preparing replacement panel work and panel fixing positions
- The importance of realigning structural parts and assemblies to reinstate vehicle integrity and driving characteristics
- Principles of reinstating suitable corrosion protection to replaced parts
- The importance of working within agreed time schedules.

The individual shall be able to:

- Repair or replace structural parts correctly including composites (GRP, carbon)
- Remove structural panels with minimal disturbance to surrounding panels and prepare surfaces appropriately to receive new parts
- Prepare replacement parts to ensure correct fit up and alignment Remove welded panels (rails, rear quarter panels, pillars, structural body panels etc.)
- Replace major welded panels or panel assemblies at manufacturers' seam positions
- Carry out structural part replacement using sectioning methods and procedures
- Use correct welding procedures when replacing structural parts, taking into consideration materials being joined, the identity of parts and unforeseen hazards such as brake, fuel and electrical lines
- Replace structural panels using any of the following jointing methods:
  - MIG welding
  - MIG brazing
  - Riveting and bonding
  - Carry out welding procedures necessary to complete the repair (MAGS)
  - Resistance spot,
  - MIG Brazing
- Dress weld seams using sanding/grinding operations

Section	Relative importance (%)
<b>4 Remove, re-install or replace, and align exterior and/or interior parts and panels</b>	<b>10</b>

The individual needs to know and understand:

- The principles underpinning the use of any of the above fastening systems
- The types, availability and varieties of the above systems
- The range of tools used to carry out remove and replace operations and their safe/correct uses
- The range of methods for removing and replacing individual panels and parts methods used to align replaced parts and panels to reinstate manufacturers original settings

The individual shall be able to:

- Remove and re-install or attach parts and/or body panels (hoods, fenders, doors etc.) using any of the following methods:
  - Screwed
  - Riveted
  - Bolted
  - Clipped
  - Bonded
- Tag removed items for replacement
- Re-align replaced parts to manufacturers' given tolerances where available for panel alignment and/or torque settings
- Remove, replace and adjust exterior/interior trims and/or other part necessary to complete repairs.

<b>5 Operate and/or manipulate any tools or equipment necessary to perform autobody repairs</b>	<b>14</b>
---	-----------

The individual needs to know and understand:

- The range, selection and assembly of hydraulic pull/push equipment
- The characteristics of common metals such as low carbon steel, high strength steels (HSS), ultra-high strength steels (UHSS)
- The direct effects of correct positioning, direction of push/pull etc.
- The principles behind the operation and maintenance of hydraulic push/pull equipment
- The range of set ups, ram ends and their purposes



Section	Relative importance (%)
<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Select, assemble and correctly operate hydraulic push/pulling equipment such as bench mounted, rack or Porto-Power etc.</li> <li>• Manipulate body hammers, spoons, pick and pry bars, body files and any other tools used in the straightening process</li> <li>• Safely and efficiently operate the range of pneumatic tools used in the repair process (e.g. air hammer, disc grinder, file board, shears, adhesive/sealer and rivet guns to include self-piercing riveters etc.)</li> <li>• Safely and efficiently operate electric tools (e.g. welders, pulling tools, power tools)</li> <li>• Use a push set up to execute a pull direction</li> <li>• Prepare the push base to prevent induced damage</li> </ul>	
<b>6    Cosmetic repair of plastic non-structural components</b>	<b>12</b>
<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The safety recommendations placed around correct repairs of non-structural cosmetic panels, e.g. bumpers, headlights, plastic outer trims</li> <li>• The operation of the range of plastic panels and bumpers which may include parking sensors and ADAS systems</li> <li>• Manufacturers' removal, replacement, repair, and testing procedures</li> <li>• Health and safety procedures around safe repairs directly from the OEM guidance</li> </ul>	
<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Remove, replace, repair plastic non-structural components</li> <li>• Use OEM repair methods for both manufacturers and product suppliers</li> <li>• Perform repairs needed to complete safe repairs to components</li> <li>• Manually test sensors or systems to a "road safe" standard before handing vehicles back to customers.</li> </ul>	
<b>Total</b>	<b>100</b>



## References for industry consultation

WorldSkills is committed to ensuring that the WorldSkills Occupational Standards fully reflect the dynamism of internationally recognized best practice in industry and business. To do this WorldSkills approaches a number of organizations across the world that can offer feedback on the draft Description of the Associated Role and WorldSkills Occupational Standards on a two-yearly cycle.

In parallel to this, WSI consults three international occupational classifications and databases:

- ISCO-08: (<http://www.ilo.org/public/english/bureau/stat/isco/isco08/>) ILO 7232
- ESCO: (<https://ec.europa.eu/esco/portal/home>)
- O\*NET OnLine ([www.onetonline.org/](http://www.onetonline.org/))

This WSOS appears to relate closely to *Automotive Body and Related Repairers*:  
<https://www.onetonline.org/link/summary/49-3021.00>.

These links can also be used to explore adjacent occupations.

The following table indicates which organizations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Occupational Standards in place for WorldSkills Shanghai 2021.

Organization	Contact name
MIT Automobile Service Company Limited. China (China)	Yuan Shilong, Departmental Director
The National Institute for Automotive Service Excellence (United States of America)	Teresa Bolton, Director, Collision Repair Test Development