

Automotive Body Repair and Paint Work Level- III

Based On October, 2023, Curriculum Version- II



**Module Title: Performing Upholstery, Ceiling and
Interior Side Panel Repairs**

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Table of Contents

Acknowledgment	3
Acronym	4
Introduction to the Module	5
Unit one:-Overview of Upholstery, Ceiling and Interior Side Panel	6
1.1.Construction of upholstery, ceiling and Interior Side Panel	6
1.2.Replacing and repairing material	12
1.2.1.Cleaning materials.....	12
1.2.2.Removal and replacement/refitting of trim components	14
1.2.3.Adhesives, solvents, resins and cleaning materials.....	18
1.2.4.Fabric (cloth and leather fabrics)	19
1.2.5. Interior materials (Nylon, Vinyl, Wood grain imitation, Faux leather)	20
1.3.OHS requirements	21
Self-Check:-1.1	24
Unit Two: -Removing & Replacing seats, interior trim components and fittings	25
2.1. using work method	25
2.1.1.visual, mechanical and physical examination.....	25
2.1.2.Removal and replacement/refitting of components	26
2.1.3.Electrical disconnection and reconnection	27
2.1.4.Clamping, crimping, gluing and sewing	27
2.2. Removing & replacing seats, interior trims and fittings	28
2.2.1. Seat covering.....	28
2.2.2. Quarter trim panel	34
2.2.3. Door trim panel	35
2.2.4. Front seat backs.....	36
2.2.5. Head liner and carpet.....	39
2.3. Selecting adhesives material	40
2.4. Clean up work area and maintaining equipment	42
Operation Sheet-2.1.....	48
Operation Sheet-2.2.....	49
Operation Sheet-2.3.....	50
LAP Test -2.....	52
Reference	53

Page 2 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II
			October, 2023

Acknowledgment

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Page 3 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
--------------	--	---	------------------------------

Acronym

PVC	Polyvinyl chloride
MEK	Methyl ethyl ketone
PPE	Personal Protective Equipment
OHS	Occupational health safety

Page 4 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II
			October, 2023

Introduction to the Module

In automotive body work measurement and quantity estimation of body work project helps to know the quantity of work; to estimate the quantity of material required; to determine the cost of the work; to estimate the expected project completion time and to know the amount of material supplied for body work. This module covers the knowledge and skills required to remove and replace seats, internal fittings and vehicle interior trim (headliners, carpet, and trim panel) components.

This module covers the units:

- Overview of Upholstery, Ceiling and Interior Side Panel
- Removing seats, interior trim components and fittings
- Replacing seats interior trim components and fittings
- Cleaning up work area and maintain equipment

Learning Objective of the Module

- Understand Overview of Upholstery, Ceiling and Interior Side Panel
- Remove seats, interior trim components and fittings
- Replace seats interior trim components and fittings
- Perform clean-up work area and maintain equipment

Module Instruction

For effective use this module trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” given at the end of each unit and
5. Read the identified reference book for Examples and exercise

Page 5 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
--------------	--	--	------------------------------

Unit one:-Overview of Upholstery, Ceiling and Interior Side Panel

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Construction of upholstery, ceiling and Interior Side Panel
- Replacing and repairing material
- OHS requirements

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Understand Construction of upholstery, ceiling and Interior Side Panel
- Perform Replacing and repairing material
- Observe OHS requirements and personal protective needs

1.1.Construction of upholstery, ceiling and Interior Side Panel

Introduction

Purpose of Upholstery

Is the work of providing furniture, especially seats, with padding, springs, webbing, and fabric or leather covers. The word "upholstery" comes from the Middle English words up and Holden, meaning to hold up. The term is applied to domestic furniture and also to applications in automobiles.

The term car upholstery is typically in reference to the seats in your car, truck, or SUV. In all actuality, car upholstery is the entire interior of your vehicle including the roof, center console, and anywhere else that has fabric.

Upholstery is the process of covering furniture, such as seats and cushions, with fabric or leather. It serves to enhance the appearance, durability, and comfort of the furniture, allowing for personalization and customization.

Page 6 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
--------------	--	--	------------------------------

These soft coverings often provide cushioning for sitting (in the case of seat cushions on a chair or sofa) for added comfort, saving us from having to stretch out and rest on an exposed wood couch at the end of a long day.

Importance of upholstery

- Improving cost-effectiveness
- Working with contours
- Easily customized
- Attractive
- Durable
- Strength and weight
- Flame resistance
- Abrasion resistance



Figure 1. Upholstery

Upholstery is the materials—which include fabric, padding, webbing, and springs—that make up the soft coverings of chairs, sofas, and other furniture. The process began in the Middle Ages and grew in popularity during the 17th, 18th, and 19th centuries.

The following are the upholstery applications

- Auto floor mats
- Automotive carpeting
- Automotive seating
- Seat covers
- Seat belts
- Air bags
- Steering wheel covers
- Automotive headliners
- Auto trim/supported PVC
- Auto trim/ leather
- Auto trim/ other automotive upholstery
-

Page 7 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
--------------	--	---	------------------------------

Purpose of Ceiling

Ceiling, the overhead surface or surfaces covering a room, and the underside of a floor or a roof. Ceilings are often used to hide floor and roof construction.

Functional requirements of ceiling

- They should be easy to construct, maintain and clean.
- So designed that adequate means of access is provided to the void space for the maintenance of the suspension system, Concealed Services and light fittings.
- Provide any required thermal/sound insulation.

Ceiling materials include fiberglass, metal, mineral fiber, polyvinyl chloride (PVC) and thermoplastic. You can integrate lighting panels into your suspended ceiling or choose from a vast selection of fashion lighting.

Properties of a good ceiling

A ceiling must be safe, durable, long-lasting and made with high quality products. A must withstand any pressure and not easily get disfigured or broken by any force to make sure it is safe for the people that stays or works beneath the ceiling of a certain room.

Purpose of Interior Side Panel

The primary materials used for car interiors include nylon, leather, vinyl, polyester, and fabric. The more elegant and high quality the interior material is, the more it adds to the value of your car. The interior panels may be composed of a single piece of molded plastic, or several pieces of plastic. As other areas of automotive manufacturing have evolved, interior panels have from being made from pieces of metal, to thin pieces of cardboard, to molded plastics, fiberglass and wood.



Figure 2. Side Panel

Page 8 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II
			October, 2023

Construction of upholstery

Methods of seat **construction**: The traditional method of seat making involves cutting and sewing of panels of the seat cover laminate (face fabric/foam/scrim)

Seat fabrics:

Over 90% of all fabric coverings are in polyester because only this fibre combines the requirements of high performance with reasonable cost. Polyester is more resistant to the particular wavelengths of UV light which penetrate the glass windows of a car. Automotive seat fabric is almost invariably a tri-laminate polyester is used on 90% of all car seats. Wool, wool blends, leather and man-made leather are also used. Tri-laminate can be as:

- Polyester fabric
- Polyurethane foam
- Nylon/polyester scrim backing

The materials which are used for seat making is as follows

- Alternatives for seat cover laminate foam
- Alternatives for seat squab and cushion foam
- Sewing threads
- Kaptex
- Natural leather
- Man-made leather and suede
- Flocked fabrics

Water vapor permeability (breath ability) of some car seat materials

Construction of ceiling

The roof assembly may comprise a roof panel made from a first material, and an attachment flange made from a second material that is different than the first material. The attachment flange extends along at least a portion of an outer periphery of the roof panel and attaches to a structural member of the vehicle.

Page 9 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
--------------	--	---	------------------------------

A headliner often is a composite material that is adhered to the inside roof of automobiles or yachts. It typically consists of a face fabric with nonwoven or foam backing.

Commonly used methods of roof-to-wall connections include:

- Using Clips. Clips are used if the connection needs to be re-sealable. ...
- Using Clamps. Clamps are used in cases where an installer needs to attach two materials together while maintaining a leak-free air gap. ...
- Overlap Connections. ...
- Tension Connections. ...
- Key Takeaway.

Construction of interior side panels

Basically, the interior of a car is composed of an instrument panel, a console, and a door. And the design structure and decorative elements determine the driver's watch, ease of operation, livability, and openness. It is interesting to note that these various interior features reflect the car's

The primary materials used for car interiors include nylon, leather, vinyl, polyester, and fabric. The more elegant and high quality the interior material is, the more it adds to the value of your car.

Top Tips in Choosing the Best Car Interior

1. Have it suit your taste. Your car, your taste, your decision. ...
2. Match it with your car exterior. ...
3. Consider your main driving schedule. ...
4. Consider the climate of where you live. ...
5. Gauge your cleanliness level.

The **door** is composed of two main panels; outer and inner panel, constructed to act as a frame for the door. The outer panel flanges over the inner panel around the edges to form a single unit.

Page 10 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

The **window channel** may be welded or bolted to inner door panel to provide support & direction to the window glass.

The **inner panel** has holes or apertures drilled, punched or formed for attachment of door trims.

The thickness of the door is due to the depth of the inner panel which accommodate door catch, window mechanism, etc. -

The inner panel forms the lock pillar and the hinge pillar sections of the door.

Page 11 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

1.2.Replacing and repairing material

1.2.1.Cleaning materials

Steps in interior materials cleaning (Preliminary steps)

- 1.Read the service order for instruction
- 2.Opens doors & evaluate the condition of the interior
- 3.Remove floor mats (front & back) & give to the person cleaning the trunk or clean /shampoo immediately & place near the rear of the vehicle to dry
- 4.Push front seat all the way back
- 5.Use plastics bags to contains loose items
- 6.Remove front & back, clean & dry. Before replacing clean the area
- 7.Flip down sun visors
- 8.With the air blower, blow out entire interior
- 9.Vacuum entire interior carpets, seats panels etc
- 10.Apply appropriate spot remover (front & back) to all heavy spots on carpets

Cleaning steps

- 1.Starting on drivers' side, clean headliners, front half
- 2.Clean sun visors, visors, mirror, & rear-view mirror
- 3.Clean trim around doors & front windows
- 4.Clean dash board
- 5.Clean panels & steering columns & glove box
- 6.Apply shampoo & friction shampoo carpets
- 7.Using extractors, extract all shampoo & dirty residue

Page 12 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

A.Fabric seat

- 1.Scrub spots /stains on fabric seats
- 2.Apply shampoo & friction shampoo seats
- 3.Using extractor, extract all shampoo & dirty residue
- 4.Using scrubby clean /scrub centre console

B.Vinyl/leather seat

- 1.Scrubb vinyl/leather upholstery with scrubby or rotary shampoo & wipe dry
- 2.Using scrubby clean /scrubby centre console
- 3.Clean/shampoo front seat belts
- 4.Push the front seat all the way forward
- 5.Scrubby spots /stains on front door panels
- 6.Clean /shampoo door panels using a scrubby. nylon scrubby
- 7.Spray doorjamb & door edges with all-purpose cleaner & wipe dry

C.Vinyl/leather seats panels

- 1.Scrub vinyl/leather upholstery with scrubby or rotary shampoo & wipe dry
- 2.Using scrubby clean /scrubby centre console
- 3.Clean/shampoo batch of front seat following procedure for either fabric or vinyl
- 4.Scrubby spots /stains on rear carpets
- 5.Apply shampoo/friction shampoo carpets
- 6.Using extractor, extract all shampoo & dirty residue
- 7.Scrub spots /stains rear door panels
- 8.Spray doorjamb & door edges with all-purpose cleaners & wipe dry

Page 13 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II
			October, 2023

1.2.2. Removal and replacement/refitting of trim components

Trim is anything the manufacturer applies to the car to enhance its style and appearance. Decorative and functional strips around the vehicle are an integral part of vehicle design. Common exterior trim items include radiator grills, window frames, light rings, door handles, emblems and antennas. The demands of the designers must be realized in the same way as the functional requirements, e.g. in case of window frames, the necessities of window guide, cover and/or water management. But there are also different trim products which fulfil additional functions, e.g. door sill tread plates, boot finishers, division bars for side windows and side trims for A-C post. In these cases, there may be specific requirements which have to be considered in the material selection apart of the visual appearance (e.g. strength, wear resistance, etc.).

Automotive Interior Trim components

- Hardboard.
- Natural Fiber Composites.
- Wood Composites.
- Fiberglass & Glass Mat Composites.
- Injection Molding.
- Carpet: Tufted & Non-woven

Automotive Exterior Trim Components

- Lighting system
- Car security/central locking system
- Window glass
- Wind shield

Page 14 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Procedures for removing interior trim components

Procedure for removing carpets

Step 1. some vehicles have, as original equipment, a one-piece carpet covering front and rear of the vehicle floor. to simplify handling, positioning and installation, we often supply two separate units, one for the front, the other for the rear and they will neatly overlap in any exposed area.

Step 2. Remove screws from sill place (metal molding under each side of door). most cars will require a phillips screwdriver to unscrew. usually, four or five screws must be removed.

Step 3. Remove accelerator pedal, if necessary.

Step 4. Take new carpet from box. roll open and lay flat to remove any wrinkles that may have formed while the carpet was in the box. allowing an hour or two is advised.

Step 5. Remove old carpet. note: on some later cars an additional insulation floor padding is used. do not remove this padding.

Step 6. Place your new carpet over the old to determine if it is almost an exact match in size and shape.

Step 7. Sweep or vacuum floor thoroughly before installing carpet.

Step 8. Put carpet in car, making sure that you have positioned the carpet properly. the heel protector pad should always be on the left-hand driver's side.

Procedure for installing carpets

Step 1. lay carpet flat. fold in half by pulling front edge back over to meet rear edge.

Step 2. center folded carpet over the transmission hump just in front of the front seat.

Step 3. slowly unfold the carpet toward the front firewall.

Step 4. when you reach a shift lever cut a small "x" shaped slit just large enough for the shift lever rod to fit through.

Step 5. lift the carpet up and slide it down over the lever through the "x" slit.

Step 6. repeat steps 3, 4 and 5 if a second shift lever exist.

Step 7. after the full installation of your carpet is complete, return to the shift levers and cut the holes larger. be careful not to cut the hole larger than the boot that will cover the area.

Page 15 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Step 8. use the same “x” slit system if your vehicle requires a cutout for the floor dimmer switch.

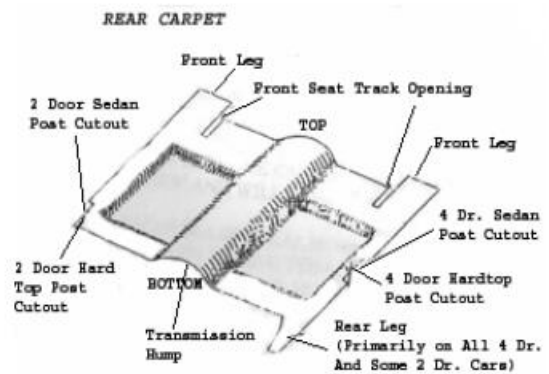
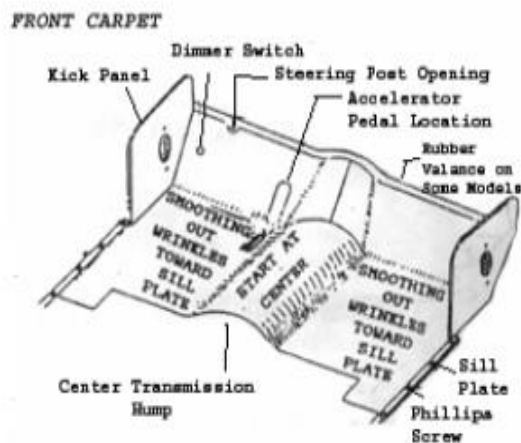
Step 9. center the carpet over the transmission hump and starting from the center of the hump, work out towards each side smoothing out wrinkles and pulling the carpet tight.

Step 10. on some carpets you will find slight excess of material on both sides at the sill plates. this is purposely included to provide for possible variations of individual installations. if excess exists on your car, merely trim it off with scissors.

Step 11. slip end of carpet under sill plate at either side.

Step 12. replace accelerator pedal, and smooth out carpet so that it lies flat. replace sill plate and screws.

Step 13. slit to edge of carpet under valance, if your vehicle has one.



Procedures for reinstalling Exterior trim components

Reinstalling Windshield

STEP 1: Removing the old cracked windshield

Your car glass technician will first remove the molding strip that holds the glass in place, then break through the urethane glue with a special knife before removing the glass. Since this method necessitates some force, don't be surprised if the glass shatters! It's quite normal, and the professionals know how to clean the glass safely.

STEP 2: Preparing the car for the installation.

The next step is to prepare the car for windshield installation. When we say preparation of the car, it includes various steps such as removing your windshield wipers, rear-view mirror, and any other external attachments and storing them safely until the installation is completed.

Aside from that, the technician will apply protective tape to the windows. After that, towels are placed on top of the dashboard and over the hood.

STEP 3: Prepare the window for installation by cleaning it.

Windshield Experts use special tools to cut down the old adhesive as close as possible to the frame. After that, he cleans the frame to keep the new glass from becoming contaminated.

STEP 4: Installation of the new windshield.

Once the cleaning is done, it's time to install the new windshield. The technician "dry sets" the windscreen with a new layer of urethane glue after the frame is primed and ready. The technician will apply new glue around the windshield with a piece of equipment that looks like a caulking gun, ensuring that it stays in place.

STEP 5: The final touches

After the glass has been installed and cleaned properly, the technician will now reinstall your wipers, mirrors, and other external items that were removed during the process.

Page 17 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

1.2.3. Adhesives, solvents, resins and cleaning materials

Adhesives in automotive components:-Adhesive chemistries include epoxies, polyurethanes, methacrylates, rubber-based anti-flutters, PVC, butyls, bitumens, thermoplastics, and in-component manufacturing silicones. One type of automotive adhesive is a structural adhesive, which is mostly used for engineering applications and is widely applied on load-bearing joints. One type of structural adhesive is methacrylate. This is the most extensively used adhesive on automobiles.

Different Types of Auto Body Adhesives

- Urethane Adhesive. Urethanes are a type of rubber-based adhesive that provide excellent bonding strength and flexibility between metal and plastic surfaces. ...
- Polyurethane Adhesive. ...
- Epoxy Adhesive. ...
- Acrylic Adhesive.

Adhesive material

Adhesive, any substance that is capable of holding materials together in a functional manner by surface attachment that resists separation. “Adhesive” as a general term includes cement, mucilage, glue, and paste—terms that are often used interchangeably for any organic material that forms an adhesive bond.

A. Adhesive resin

The primary functions of the resin are to transfer stress between the reinforcing fibers, act as a glue to hold the fibers together, and protect the fibers from mechanical and environmental damage. Resins used in reinforced polymer composites are either thermoplastic or thermoset

Some of them are:

- Resin is soluble in various liquids but insoluble in water.
- They become soft on heating.
- When ignited, they burn with a smoky flame.

Page 18 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

B.Epoxy resin

Epoxy resin is the most commonly used synthetic resin. This stuff is made through polymerization and polycondensation responses. They are utilized as a thermoset polymer that is generally used for glues.

Adhesive solvent

An example of a harmful solvent that is often used in adhesives is methyl ethyl ketone (MEK). Any adhesive containing more than 5% MEK would qualify as a solvent-based adhesive.

Example of a solvent based adhesive

Notable examples are solvents used to bond tubing in medical applications, polychloroprene-based contact cements, solvent cements for plastic plumbing fixtures, and nitrocellulose solutions used as consumer glues (model airplane builders often prefer these to instant adhesives).

1.2.4.Fabric (cloth and leather fabrics)

Leather seats are much more resistant to the build-up of unpleasant odors. This is down to the fact that the material is spill-resistant, easy to clean, and much more difficult to stain. Leather just doesn't absorb all the little nasty particles that a cloth seat does.

More than 90% of all car seat fabric in the world is polyester, because only polyester has the required standard of high abrasion, resistance combined with UV and light resistance.

Over 90% of all fabric coverings are in polyester because only this fibre combines the requirements of high performance with reasonable cost. Polyester is more resistant to the particular wavelengths of UV light which penetrate the glass windows of a car. Automotive seat fabric is almost invariably a tri-laminate polyester is used on 90% of all car seats. Wool, wool blends, leather and man-made

Fabric car upholstery is generally of two kinds: nylon or polyester. Nylon usually appears as fabric and is one of the most common materials manufacturers use for car seat upholstery.

It is a very durable fabric, but also very porous. Use a vacuum to pick up loose dirt and dust from your car

Page 19 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Different Automotive Leathers

- Pigmented leather. Pigmented leather is also referred to as protected or coated leather.
- Semi-aniline leather. Semi-aniline automotive leathers are both practical and beautiful.
- Aniline leather. ...
- Suede leather and faux suede. ...
- Spray way Auto Leather Cleaner & Conditioner



Figure 3. leather Seat

1.2.5. Interior materials (Nylon, Vinyl, Wood grain imitation, Faux leather)

The inside of your vehicle is essential to you, but everyday use can cause wear to the upholstery. When you require car upholstery repair in Colorado Springs, you need to know who you can trust. At Phil Long Collision Center, we have the upholstery repair expertise you are looking for. Whether you are looking at nylon upholstery repair or your luxury vehicle requires leather upholstery replacement in Colorado Springs, we can help.

Types of Car Upholstery & Repair

There are five distinct types of automotive upholstery, and each one has different care and cleaning needs. Some of these options cost less, but also wear out faster.

1. **Nylon Repair-** Nylon is found in many vehicles. This type of automotive upholstery is simple to clean and replace. It is one of the most cost-effective upholstery options to use in a vehicle

Nylon Car Upholstery Repair

The nylon car upholstery replacement cost in Colorado Springs varies based on size and car type.

2. **Polyester Repair-** Polyester is rarely used by itself but often is combined with other materials to reduce fading and promote longevity.

Polyester Car Upholstery Repair

Replacing polyester upholstery can often cost more than nylon in Colorado Springs.

It's best to get an exact quote from our trained staff.

Page 20 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

3. **Vinyl Repair**-Vinyl upholstery is constructed from two synthetic materials. These fibers create a strong polyester feel. Not only is this material simple to clean, but it also isn't difficult to replace.

Vinyl Car Upholstery Repair

To replace vinyl in Colorado Springs, you will likely pay more than the standard nylon, but not nearly as much as fixing leather

4. **Faux Leather Repair**

This synthetic leather offers many of the same benefits as the real thing, but for far less money.

Faux Leather Car Upholstery Repair

To replace faux leather, you will spend more than the other variations, but not quite as much as repairing genuine leather upholstery.

5. **Leather Repair**

Leather upholstery increases the value of a vehicle but is often the most expensive to replace.

Car Leather Upholstery

Completely reupholstering a vehicle with leather can cost , depending on your vehicle's year, make, and model.

1.3.OHS requirements

This includes providing clear instructions on how to perform tasks safely, outlining proper use of equipment and machinery, and promoting good ergonomic practices.

Personal Protective Equipment (PPE)

PPE used by technician for each of the workshop tasks and operations being conducted as required by the personal protective equipment

Protecting yourself from injury is by wearing of personal protective equipment (PPE) and clothing. These are:

- Wearing eye glasses(goggles)
- Wearing ear protection

Page 21 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

- Wearing cap head band or hairnet.
- Wearing proper clothing, shoes, and gloves.

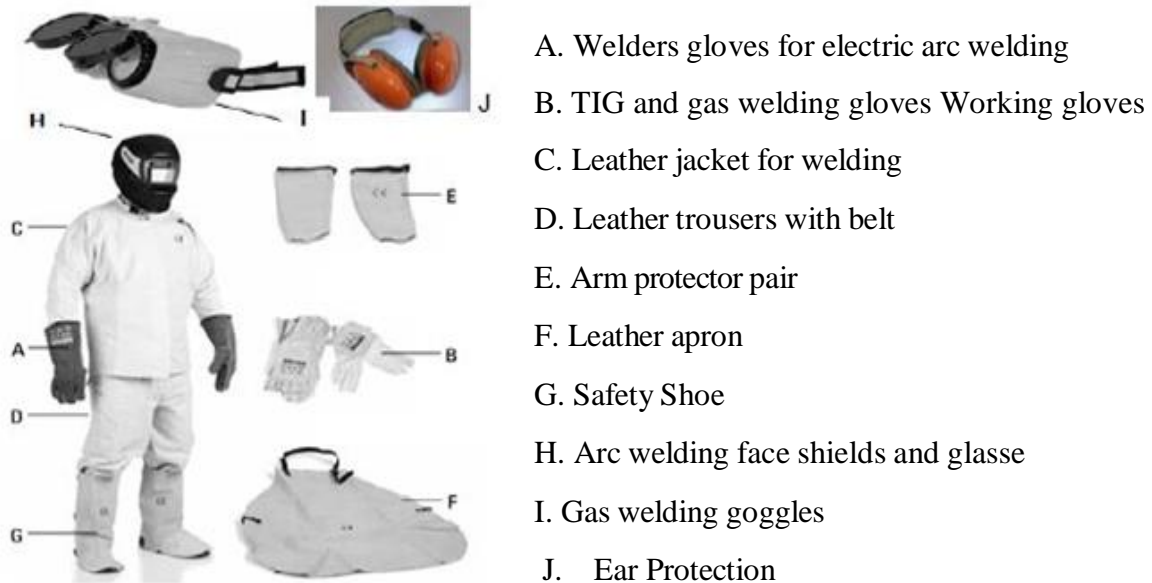


Figure 4. Personal Protective Equipment

Safe use of tools and equipment

Material handling is the movement, protection, storage and control of materials and products throughout manufacturing, warehousing, distribution, consumption and disposal

Each shelf should have an anti-roll lip.

Avoid storing chemicals on the floor (even temporarily) or extending into traffic aisles. Liquids should be stored in unbreakable or double-contained packaging, or the storage cabinet should have the capacity to hold the contents if the container breaks.

Safe handling of material

The National Safety Council suggests employers relay the following information to employees to help reduce workplace incidents when handling and moving materials:

Avoid lifting materials from the floor or while seated.

Make use of available handling aids. Refrain from using sudden or jerky movements

Page 22 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Workplace safety policies and procedures

- Safety glasses, cover goggles, or face shields are required when in any shop area, whether working or not!!
- Shoes must be worn in any shop area. No one wearing sandals will be allowed to enter any shop area. The minimum footwear must cover the entire foot.
- Do not operate any item of equipment unless you are familiar with its operation and have been authorized to operate it. If you have any questions regarding the use of equipment, ask the area supervisor.
- No work may be performed using power tools unless at least two people are in the shop area and can see each other.
- Avoid excessive use of compressed air to blow dirt or chips from machinery to avoid scattering chips. Never use compressed air guns to clean clothing, hair, or aim at another person.
- In case of injury, no matter how slight, report it to the shop supervisor.
- Do not attempt to remove foreign objects from the eye or body. Report to the Health Center for medical treatment. If chemicals get in the eye(s), wash eye(s) for 15 minutes in an open flow of water before proceeding for medical treatment. In severe cases, notify the Department of Public Safety at 387-5555.
- Machines must be shut off when cleaning, repairing, or oiling.
- Do not wear ties, loose clothing, jewelry, gloves, etc. around moving or rotating machinery. Long hair must be tied back or covered to keep it away from moving machinery. Hand protection in the form of suitable gloves should be used for handling hot objects, glass, or sharp-edged items.
- Wear appropriate clothing for the job (i.e., do not wear short sleeve shirts or short pants when welding).
- Do not work in the shop if tired, or in a hurry.
- Never indulge in horseplay in the shop areas.

Page 23 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Self-Check:-1.1

Instruction:-

Part 1. Write the correct answer from the given alternatives

1. _____ is protecting our selves and others from injury or any other accidents

A. Accident B. Work C. Procedure D. Pafety

2. What is the reason to learn safety?

A. For protecting of accident B. For doing work to the right ways

C. For minimizing of injury D. For easily accomplish of tasks E. All

Part II .Give Short Answer

1. What is the purpose of upholstery?

2. List the exterior and interior trim components

3. What is quarter trim panels?

4. Write Components of car interior side panels

Page 24 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Unit Two: -Removing & Replacing seats, interior trim components and fittings

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- using work method
- Removing & replacing seats, interior trims and fittings
- Selecting adhesives material
- Cleaning up work area and maintaining equipment

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Demonstrate work method use
- Perform Remove & replace seats, interior trims and fittings
- Apply Select adhesives material
- Clean up work area and maintaining equipment

2.1. using work method

2.1.1.visual, mechanical and physical examination

Visual instructional materials include

- graphics,
- photographs,
- Concept maps,
- PowerPoint presentations,
- Films,
- Computer and television images, etc.

Physical examination is the process of evaluating objective anatomic findings through the use of observation, palpation, percussion, and auscultation.

Page 25 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

2.1.2. Removal and replacement/refitting of components

Identify component materials involved in the construction of the vehicle in the areas that will be worked on during repair, prior to working on the vehicle

1. use the appropriate Personal Protective Equipment (PPE) when removing and replacing body panels
2. protect the vehicle, its contents and systems effectively when removing and replacing body panels
3. inspect, prepare and use all the tools and equipment required following manufacturers' instructions
4. remove, replace and/or refit all necessary body panels and components following the manufacturer's methods/instructions, recognised researched repair methods, your workplace procedures, the vehicle work specification as well as health, safety and legal requirements
5. seek assistance from the relevant person(s) promptly where there is the potential for your work to disturb other vehicle systems
6. store all removed components safely in the correct location and in accordance with relevant legislation
7. use replacement body panels and components which conform to the vehicle specifications for dimensions, materials and functional capability
8. use and apply sealants and anti corrosion materials conforming to the manufacturer's specification
9. ensure panels are removed and replaced minimising damage to mating surfaces (any damage caused should be correctly reinstated)
10. ensure panels are replaced without incurring damage to the vehicle system
11. ensure all refitted body panels and components are aligned correctly with adjacent panels and fittings
12. complete all activities within the agreed timescale report any anticipated delays in completion to the relevant person(s) promptly

Page 26 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

2.1.3. Electrical disconnection and reconnection

Disconnection and reconnection work is:

- Disconnecting and reconnecting electrical wiring at the equipment itself, and only to the extent necessary to permit the non-electrical work to be performed on the equipment
- Replacing equipment on a “like for like” basis.
- Doing testing to be able to safely isolate the equipment being disconnected or reconnected
- Doing testing to be able to safely use the equipment
- Replacing ‘blown’ fuses and resetting ‘tripped’ circuit breakers
- Equipment operating at voltages up to 1000V alternating current three phase and 1500V direct current.

2.1.4. Clamping, crimping, gluing and sewing

When **clamping or holding** the affected panels during body repair work, clamping can cause scratches on the panels. They must be treated to avoid rusting. The **crimping technique** is one of the most reliable and most versatile connection methods. Extreme quality demands for a variety of different connections require that you use a wide variety of specialized crimping tools which are designed for specific contacts. Weidmüller offers the right crimping tool for a wide variety of contacts. Regardless if you are using turned contacts, cable-lug connectors, insulated connectors or coaxial connectors.

Glue is an adhesive, but not all adhesives are glues. Glues are derived from natural sources (plant and animal byproducts), while adhesives are synthetic. But in everyday usage, the words are practically synonymous. Manufacturers use them interchangeably, and so do we.

Page 27 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

2.2. Removing & replacing seats, interior trims and fittings

2.2.1. Seat covering

Procedure for removing & fitting seats

Step 1. Disconnect the battery.

Step 2. Remove both seats.



Step 3. Label and remove the seat sliders.



Step 4. On a bench top, flip the seat over for access to the bottom and back. Remove the 4 screws from the tipping/latch mechanism.



Page 28 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Step 5. Remove the recliner handle using a #2 Phillips screw driver.



Step 6. The seat back material may be held at the bottom of the frame using clips, glue or both. Remove the clips if present, and then peel the material up and away from the seat frame.



Step 7. Once the seat back is peeled away, you can see how the front of the seat cover is pulled through the seat cushions (in-between the back and bottom) and also glued to the frame. Peel the front flap away from the frame so that it can be pulled back through the seat



Page 29 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II
			October, 2023

Step 8. On the sides of the seat, you will find cards inserted in the material that hook around the seat frame and help hold the seat cover on. Unhook these cards by pulling down and then away from the seat.



Step 9. At this point, the seat cover should be free of the frame at the bottom of the seat. Flip the seat over (right side up) and pull the cover up over the headrest.



Step 10. On the back of the seat, find the headrest retaining tab. Depress the tab and pull the headrest out of the seat. Remove the seat cover from the seat.



Step 11. Once again, turn the seat upside down. Carefully remove the small clips securing the bottom seat cover to the seat frame.



Step 12. Remove the bottom seat cover from the frame and cushion



Step 13. Remove both seat back and bottom cushions from the frame



Step 14. Remove the seat diaphragms. Remove the old seat back straps if you will be installing new ones. Otherwise leave in place.



Step 15. Clean the seat frame. Concentrate on the areas that have glue on them or that will show through the new seat covers as lumps. You do not need to completely remove all the old glue. Just knock off anything loose that will prevent the new seat cover and glue from adhering properly

Step 16. Repair any bent or broken parts on the seat frame.

Procedure for fitting seats

Step 1. Once the seat frame is clean, install the new diaphragm and back straps. As an alternative to new back straps, a piece of canvas can be pulled around the seat back and glued in place on the frame. The canvas will act as the straps supporting the cushion.



Step 2. Use a tape measure and felt-tipped pen to find and mark the centerline of each cushion on both sides (top and bottom, front and back). This will help center the cushions on the frames and the covers on the cushions during assembly. Flip each seat covers inside out and mark the centerline of each seat cover in the pleated area only. You will use these lines to locate the covers on the cushions. Make sure to test your pen on a small inconspicuous area to make sure

Page 32 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

it won't show through. Finally, mark the seat frame, straps (or canvas) and diaphragm centerline.



Step 3. Test fit either of the bottom cushions to the frame and diaphragm to get a good feel for how it fits. The bottom cushions are the same and can be installed on either seat. Apply glue to bottom of cushion, the diaphragm and the seat frame.

Allow the glue to tack up and install the cushion. Make sure the centerlines are aligned and the cushion is all the way against the seat back. Once the base is glued down, test fit and glue the upper part of the seat bottom.



Step 4. Test fit a bottom cover to the foam.

You will only apply glue to the rectangular flat area on the foam and seat cover, now here else. Align the rectangle on the cover so that it fits nicely in the rectangle on the cushion. Do not fold the sides of the cover around the cushion.

Page 33 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II
			October, 2023

2.2.2. Quarter trim panel

It is the side panel of the vehicle that usually wraps around the wheel arches, between the door and trunk lid, between the door and hood, etc.

Panel Removal and Preparation:

1. Straighten any damage to vehicle prior to removing panels.
2. Remove large portions of the panel, making sure not to cut into the flanges.
3. Remove the outer welded flanges using a spot weld cutter tool.
4. Straighten any damage to the flanges with a hammer and dolly.
5. Grind all adhesive, paint, galvanized coatings, and e-coats from both surfaces to be bonded using 36-grit abrasive discs
6. Blow off both surfaces with clean, dry air.
7. If sectioning is required, bevel to a knife edge on the new panel that will be cosmetically finished.

Panel Installation:

1. Remove the cap of the adhesive cartridge by prying the uppermost slot with a flat screwdriver. The cap may be retained for future storage.
2. Properly place the cartridge into the gun. Prior to attaching the mixer, dispense a small amount of adhesive to ensure both sides flow evenly.
3. Attach mixer, and dispense two inches for proper mix.
4. Apply a 3/8- to 1/2-inch bead of adhesive to all areas to be bonded then spread or brush the adhesive evenly, making sure to cover all surfaces of the bare metal
5. Align the new panel in place, and apply even pressure. After the panel has been positioned, do not pull away from the vehicle. If repositioning is required, slide the panels against one another to ensure no air is trapped in the bond line
6. Clamp tightly in place every 4 - 6 inches. Note: Panel 60 adhesive incorporates glass bead technology to ensure proper panel gap and to prevent over-clamping.
7. Install screws or rivets in hard-to-clamp areas.

Page 34 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

8. Tool the adhesive squeeze-out into areas that require a seam sealer.
9. Clamp a minimum of 4 hours at 23°C / 74°F. Longer clamp times may be necessary if lower temperatures are experienced. Clamp times may be accelerated by use of a heat gun or lamp for 10-15 minutes at 180° F.
10. Remove any adhesive from the section area. Apply fiber-filled body filler, then sand, and finish with conventional body filler.
11. Allow proper dry time.
12. Finish, sand and paint per paint manufacturer's recommendation.
13. For future use of the adhesive, remove cartridge from the gun and either leave on the mixer tip or replace the original cap.

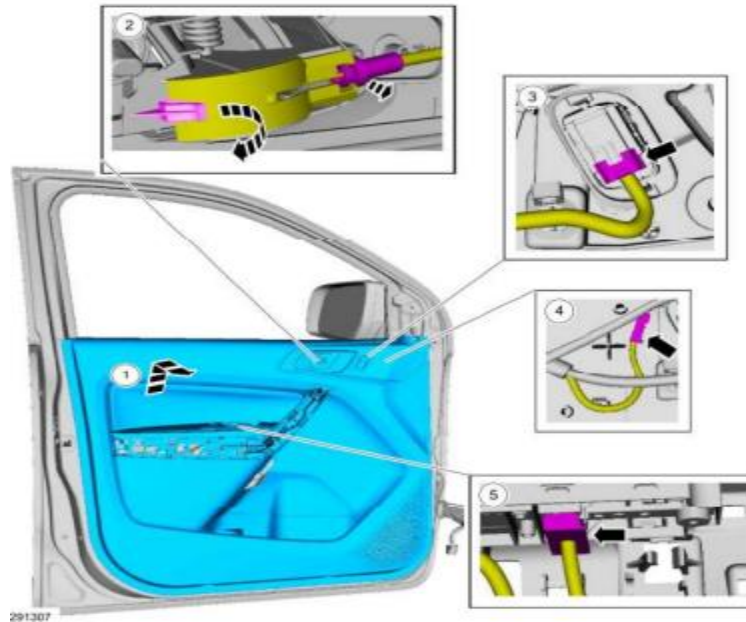
2.2.3. Door trim panel

Remove the front door trim panel

1. Left upward & out ward on the front door trim panel
2. Release the tab & position the interior front door handle cable aside
3. Disconnect the front door lock control switch electrical connector
4. If equipped
Disconnect the front ambient light electrical connector

Page 35 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

5. Disconnect the front door



Installation of front door trim panel

1. To install reverse the removal procedure
2. If the door is equipped with one touch up /down

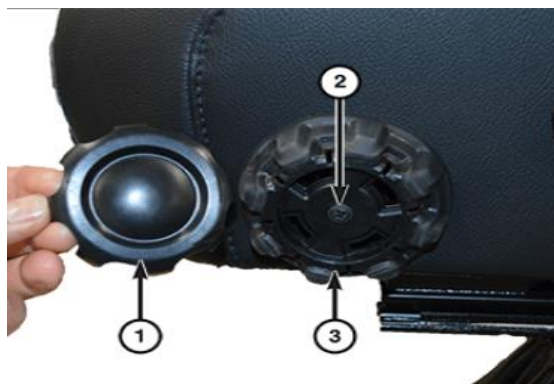
2.2.4. Front seat backs

1. Remove the front seat side shields (Refer to 23 - Body/Seats/SIDE SHIELDS, Seat Cushion, Front/Removal and Installation).
2. If working on a 2-Door model, remove the seat back panel (Refer to 23 - Body/Seats, Front/PANEL, Seat Back, Front/Removal and Installation).
3. If working on a 2-Door model, remove the easy entry cable (Refer to 23 - Body/Seats/CABLE, Release/Removal and Installation). NOTE: The easy entry cable cannot be re-used and must be replaced with a NEW cable and adjusted properly.
4. Unhook the cover (2) on both sides of the seat back and remove the push fastener (1).

Page 36 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II
			October, 2023



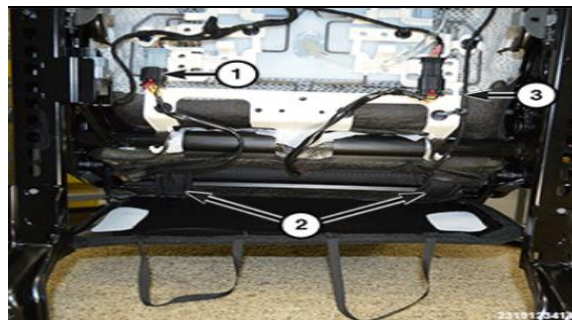
5. Using a small flat bladed tool, remove the cover (1), then remove the screw (2) and the lumbar knob (3).



6. Under the seat, open the Velcro straps (2).

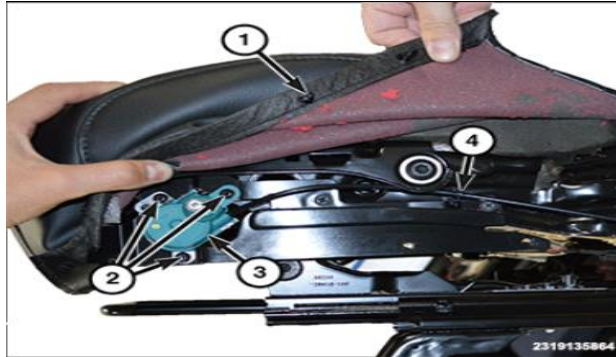
7. Disconnect the seat heater harness connector (1) and unclip the wire harness from the seat frame, if equipped.

8. Unclip the seat air bag wire harness (3) from the seat frame.



9. Using a trim stick, release the push fasteners (1) on the side of the cushion trim.

10. Remove the screws (2) and loosen the lumbar controls (3), then unclip the cable (4) from the seat frame.



11. If working on a 2-Door model, disconnect the easy entry cable (Refer to 23 - Body/Seats/CABLE, Release/Removal and Installation).

12. Remove the bolts (1) on both sides of the seat back (2), and remove the seat back.



Procedures for fitting front seat back

1. Position the seat back and install the two front seats back bolts on each side of the seat. Tighten the front seat back bolts to the proper (Torque Specifications).
2. If working on a 2–Door model, install and adjust the easy entry cable (Refer to 23 - Body/Seats/CABLE, Release/ Removal and Installation).
3. Route the lumbar cable and fasten the lumbar controls.
4. Fasten the seat cushion trim to the frame and hook the sides near the seat back pivot.
5. From under the seat, route the seat back heater harness and connect the wire harness connector, if equipped.
6. From under the seat, route the seat air bag wire harness and clip it to the seat frame.
7. Fasten the Velcro strips.
8. Install the lumbar knob.
9. If working on a 2–Door model, install a NEW easy entry cable (Refer to 23 - Body/Seats/CABLE, Release/Removal and Installation). NOTE: The easy entry cable cannot be re-used and must be replaced with a NEW cable and adjusted properly.
10. If working on a 2–Door model, install the seat back panel (Refer to 23 - Body/Seats, Front/PANEL, Seat Back, Front/Removal and Installation).
11. Install the front seat side shields (Refer to 23 - Body/Seats/SIDE SHIELDS, Seat Cushion, Front/Removal and Installation)

2.2.5. Head liner and carpet

Headliner Adhesive securely bonds heavyweight automotive fabrics to metal surfaces. This adhesive creates a secure hold for bonding headlines, carpet, foam and other materials. Aerosol spray makes application quick and easy.

Carpets -A thick heavy fabric of wool ,cotton or synthetic ,fibers for covering a floor .(Almost all automotive carpets is nylon)

Page 39 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II
			October, 2023

Best Material for a Headliner

- **Fabric:** Traditional headliner fabric is often made of foam-backed cloth. ...
- **Vinyl:** Vinyl headliners are known for their durability and water resistance. ...
- **Suede:** Suede or microsuede headliners bring a luxurious feel to the interior.

2.3. Selecting adhesives material

Automotive adhesives and sealants are binding substance used by automotive original equipment manufacturers (OEMs) to bond different substrate of metal, eliminating the need for welding and mechanical bolts, welds and rivets. Adhesive ranges from thermoplastic and reactive hot melts to pressure sensitive and dispersion adhesives.

Uses of Adhesives in Manufacturing

- Door and window assembly. Adhesives are used in door and window manufacturing.
- Uses of adhesives in the transportation industry. ...
- HVAC manufacturing. ...
- Construction material assembly. ...
- Prefabricated houses. ...
- Packaging. ...
- Agricultural machinery and equipment.
- Security tapes

Adhesive selection

Identifying a suitable adhesive is a complex task due to the range of available adhesives and the specific application requirements. Such requirements can include specific structural and environmental performance, such as load transmission, media exposure, leak tightness, electrical conductivity, heat conductivity, and damping. This necessitates a holistic consideration of the entire process – from the design and surface pre-treatment to integration into the relevant production process.

Selection criteria

When an adhesive is selected for a specific application, it is important to ensure that the chosen adhesive fulfils all the engineering and service requirements (good adhesion to the applied materials), static and dynamic strength (with defined levels of strength retention after

Page 40 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

environmental exposure), impact peel strength (especially at low temperatures), creep (ability to carry load at temperature), etc. Equally important, however, is to consider whether the processing characteristics of the adhesive are compatible with the planned assembly process.

Type of adhesives

Adhesives are generally classified by either the way they are used (specifically by the way they are setting) or by their chemical type. There are only three ways of setting (although combinations of these may occur):

Setting through drying (i.e., the solvent or water evaporates). Since most of the drying must take place through the material, this adhesive type is not suitable for bonding aluminum to aluminum or other metals. However, it could be used for example for bonding porous materials to aluminum. –

Setting through cooling. Some of the drying adhesives can be heat activated. They are applied to one or both surfaces and dried. When joining, the adhesive is activated (melted) on one of the parts and quickly joined with the other. This type of adhesive (not to be confused with hot melts which are applied hot) enables rapid assembly, but is only suitable if one of the materials is readily deformable.

Setting through curing (chemical reaction): The two most common types of forced cure adhesive are one and two component systems. One component system adhesive are supplied in a ready to use form, which cures when exposed some external energy (heat, radiation or moisture). Two component system adhesives utilize the mixing of two different materials which creates a chemical reaction that causes the polymerization (curing or setting) of the materials.

Pressure Sensitive Adhesives Pressure sensitive adhesives form bonds easily when Adhesives pressure is applied. Pressure sensitive adhesives are used on self-sealing envelopes and double-sided tape. The joint is made with very little pressure.

Retaining Adhesives Retaining adhesives are used to prevent the twisting or sliding of non-threaded parts. Retaining adhesives are very similar to locking adhesives except they are used on non-threaded parts.

Page 41 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Sealing Adhesives Sealing adhesives are used to prevent the passage of air, water, oil, etc. between two surfaces. The caulking around windows is an example of a sealing adhesive.

Structural Adhesives Structural adhesives are capable of withstanding a significant load. The term ‘significant load’ has never been defined, but the implication is that the adhesive must be able to withstand a great deal of stress. In fact, it could be said that in the absence of unnaturally high forces, the substrates could be considered to be permanently joined.

Ultraviolet adhesives Any adhesives which cure when exposed to UV light.

Raw materials of adhesive

Animal by-products such as bones, cartilage, and skins are natural sources of raw materials used in adhesive manufacturing. These materials are cooked to extract collagen, the main constituent in animal-based glue. Plant extracts such as soybeans, corn flour, and potato starch can also make vegetable-based glues.

Mechanical Properties of Adhesives

- Abrasion Resistant.
- Creep and Fatigue Resistant.
- Dimensionally Stable.
- Flexibilized and toughened.
- Hardness.
- High Elongation.
- Low Shrinkage.
- Low Stress

2.4. Clean up work area and maintaining equipment

A cleaner and more organized facility is proven to be a far more safe and effective work environment. With floors clear of debris and products ordered efficiently, it also creates a professional atmosphere for staff, suppliers and customers.

As part of our series on effective warehouse processes, this post outlines the importance of keeping a tidy storage space, and a few helpful ways to keep on top of the cleaning duties.

Page 42 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Benefits of a clean and tidy warehouse

1. Create a safe and happy place to work

Any area where materials handling equipment is operating, it's vital to reduce the number of hazards. Rubbish, spills and products left in aisles or walkways become an obstacle that can cause a trip or fall, or obstruct the line of vision of those operating a forklift. Keeping the warehouse clean and tidy will reduce these occupational safety risks, and help keep your staff safe and happy.

2. Promote professionalism

A messy warehouse gives the impression of sloppiness, which is not a quality of a professional organization. A clean storage space, promotes a diligent and effective work environment that encourages staff members to maintain a high level of professionalism. It also gives a good impression to any suppliers or clients who walk through the warehouse.

3. Improve business processes

Getting more done in less time is the ultimate aim of all businesses. One way to increase productivity is with a clean and organized warehouse.

Keeping warehouse aisles and walkways clear will mean there is more room to move in the warehouse, reducing the time it takes for forklifts and manual pickers to navigate the space. Organizing your products will also make it much faster to locate and pick products from the pallet spaces.

Additionally, allocating a clear space for packing products (and keeping it tidy) creates an orderly space where packing can be done correctly, and consistently.

How to make light work of the warehouse clean up

When it comes to getting stuck into the cleaning, there are a few ways to reduce the time and impact this has on you and your staff. Leaving everything for the annual end of year clean-up is simply not going to be effective in the long run.

However, with a little encouragement, you can incorporate cleaning duties into the regular day-to-day processes for you and your team and have a neat and tidy warehouse all year round.

Here's how:

Page 43 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

1. Create a cleaning roster

The sheer size of some warehouses makes the task of cleaning quite onerous. Instead of tackling one massive cleaning job, it can help to focus one aspect at a time, and regularly rotate through a set range of tasks to help stay on top of the overall space. Make a list of all the cleaning tasks (or use our list – [click here](#)), and allocate a couple of achievable tasks to each week or month.

2. Check and tidy up pallet spaces

Ensuring pallets are packed correctly will make it easier to pick products later. And sorting small parts within your shelving will make it easier to find items for an order or any given job. This will also help to identify any slow moving stock or out-of-date stock.

3. Make the clean up part of the process

Cleaning up excess packing materials, as well as metal or wood shavings from the warehouse floor shouldn't be left for the next clean up. This should be a clean as you go task. For jobs that are known to create a mess, build the clean up into the regular process. A job then isn't considered finish unless the final clean up task is complete.

4. Clear waste bins regularly

This may sound like a no-brainer, yet an overflowing bin isn't an uncommon sight. Not only can items thrown onto the trash heap easily fall onto the floor and become a tripping hazard, it can clutter up the space making it feel disorganised. Rubbish bins should be emptied regularly – before they start to overflow.

5. Assign responsibilities

There are some tasks that can't wait until they are scheduled on a roster. Things like emptying bins when full, sweeping the floor, picking up rubbish, cleaning up spills, as well as keeping an eye on the pallet racking and reporting any hazards should be tended to immediately. Giving each staff member, or team, the responsibility of looking after a specific area of the warehouse will help manage the daily cleaning needs.

Page 44 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

6. Make it easy

Keeping cleaning equipment and supplies readily accessible encourages staff to get on top of the cleaning duties as required. Larger warehouses may require several sets of brooms and mops, etc. to prevent staff from having to walk a few hundred metres to find something to clean up a spill. And having several bin locations will help ensure all rubbish ends up in the right place. It means there are no excuses, and no wasted time tracking down everything needed to clean up after a job or any other incidences in the warehouse.

7. Make it clear

Communicating the cleaning duties is just as important as doing them. Holding a staff meeting and following up with an email and posters with instructions can help promote a cleaner space. Regular reminders will help stay on top of your cleaning plan, and it's also important to lead by example.

8. Review and repeat

As with any plan, it's important to regularly review your checklist of cleaning responsibilities to find if there are any improvements to be made. Don't forget the office too – sorting out the paperwork will help ensure clearer communication and better outcomes out in the warehouse.

Maintenance of tools and equipment

1. Clean tools and equipment and work more efficiently. At the end of each working day clean the tools and equipment used and check them for any damage. If you note any damage, tag the tool as faulty.

2. Electrical current can travel over oily or greasy surfaces. Keep electrical power tools free from dust and dirt and make sure they are free of oil and grease.

3. All workshop equipment should have a maintenance schedule. Always complete the tasks described on the schedule at the required time. This will help to keep the equipment in safe working order.

4. Store commonly used tools in an easy-to-reach location.

5. If a tool, or piece of equipment, is too difficult to be returned, it could be left on a workbench or on the floor where it will become a safety hazard

Page 45 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

6. Keep your work area cleanly. This will help you work more efficiently and safely
7. Have a waste bin close to your work area and place any waste in it as soon as possible.
8. **Dispose** of liquid and solid waste, such as oils, coolant and worn components, in the correct manner. Do not pour solvents or other chemicals into the sewage system. This is both environmentally damaging and illegal.
9. **Always** use chemical gloves when using any cleaning material because excessive exposure to cleaning materials can damage skin.
10. **Some** solvents are flammable. Never use cleaning materials near an open flame or cigarette.
11. **The** fumes from cleaning chemicals can be toxic, so wear appropriate respirator and eye protection wherever you are using these products.

Here are some care and maintenance practices for **tools** and **equipment**.

Proper storage

Proper storage entails shielding tools from harsh weather conditions, damage and theft. It is particularly crucial for metallic tools to be kept away from moisture to avoid rusting.

Having a cabinet where these tools and equipment are stored will be vital to ensuring a secure storage area. Also, greasing, lubricating or oiling metallic tools and equipment is essential to prevent rust from forming while keeping the tools in the best condition for future tasks

Using tools and equipment for their right task

Using a tool for the task it is intended helps to keep it in its best shape. This reduces unnecessary damage and protects the user. It is also important to check whether the tools are in the right condition before using them.

Cleaning after use

Storing dirty tools without cleaning them can cause them to deteriorate. Routine cleaning reduces the chances of rust and can reduce the rate of wear and tear.

Page 46 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Inspect tools regularly

Regular inspection of tools is beneficial since it provides an opportunity to see if tools may need repair or replacing. Inspections can help to prevent a situation where a last minute trip to the store to purchase a new tool or spare parts delays a project.

Read and follow manuals

The manuals that come with equipment, especially power tools, have important and useful guidelines. They instruct and advise on the best way to keep equipment in optimal condition.

Page 47 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Operation Sheet-2.1

Operation title: Remove & install front door trim panel

Purpose: To remove the damaged door panels & install by the new one

Instruction: Perform Removeing & installing by applying the steps which is listed below

Tools and requirement: Socket set (3'8"), Phillips screwdriver set, standard screwdriver set, safety goggles, star-shaped socket set, inside door handle clip remoVer, Allen wrench

Precaution: When Removeing & installing front door trim panel, always follow the manufacturer's specified and specialist tools

Procedures in doing the task:

Removal

Step 1: Left upward & out ward on the front door trim panel

Step 2: Release the tab & position the interior front door handle cable aside

Step 3: Disconnect the front door lock control switch electrical connector

Step 4: If equipped

Disconnect the front ambient light electrical connector

Step 5: Disconnect the front door

Installation

Step 1: To install reverse the removal procedure

Step 2: If the door is equipped with one touch up /down

Quality Criteria: Use the specified tools & use service manual

Page 48 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
---------------	--	---	------------------------------

Operation Sheet-2.2

Operation title: Panel Removal

Purpose: To remove the damaged quarter trim panels

Instruction: Perform Removeing & installing by applying the steps which is listed below

Tools and requirement: Socket set (3'8"), Phillips screwdriver set, standard screwdriver set, safety goggles, star-shaped socket set, inside door handle clip remoVer, Allen wrench pry bars, Angle ruler, Tape measure, Miter saw,Nail gun,Spackle,Caulk gun,CA Glue,Trim (baseboards)

Precaution: When Removing quarter trim panels, always follow the manufacturer's specified and specialist tools

Procedures in doing the task:

Step 1: Straighten any damage to vehicle prior to removing panels.

Step 2. Remove large portions of the panel, making sure not to cut into the flanges.

Step 3. Remove the outer welded flanges using a spot weld cutter tool.

Step 4. Straighten any damage to the flanges with a hammer and dolly.

Step 5. Grind all adhesive, paint, galvanized coatings, and e-coats from both surfaces to be bonded using 36-grit abrasive discs

Step 6. Blow off both surfaces with clean, dry air.

Step 7. If sectioning is required, bevel to a knife edge on the new panel that will be cosmetically finished.

Quality Criteria: Use the specified tools & use service manual

Page 49 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
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Operation Sheet-2.3

Operation title: Install quarter trim panel

Purpose: To install quarter trim panels by the new one

Instruction: Perform Removeing & installing by applying the steps which is listed below

Tools and requirement: Socket set (3'8"), Phillips screwdriver set, standard screwdriver set, safety goggles, star-shaped socket set, inside door handle clip remoVer, Allen wrench ,pry bars, Angle ruler, Tape measure, Miter saw,Nail gun,Spackle,Caulk gun,CA Glue,Trim (baseboards)

Precaution: When installing quarter trim panel always, follow the manufacturer's specified and specialist tools.

Procedures in doing the task:

Step 1:Remove the cap of the adhesive cartridge by prying the uppermost slot with a flat screwdriver. The cap may be retained for future storage.

Step 2. Properly place the cartridge into the gun. Prior to attaching the mixer, dispense a small amount of adhesive to ensure both sides flow evenly.

Step 3. Attach mixer, and dispense two inches for proper mix.

Step 4. Apply a 3/8- to 1/2-inch bead of adhesive to all areas to be bonded then spread or brush the adhesive evenly, making sure to cover all surfaces of the bare metal

Step 5. Align the new panel in place, and apply even pressure. After the panel has been positioned, do not pull away from the vehicle. If repositioning is required, slide the panels against one another to ensure no air is trapped in the bond line

Page 50 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
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Step 6. Clamp tightly in place every 4 - 6 inches. Note: Panel 60 adhesive incorporates glass bead technology to ensure proper panel gap and to prevent over-clamping.

Step 7. Install screws or rivets in hard-to-clamp areas.

Step 8. Tool the adhesive squeeze-out into areas that require a seam sealer.

Step 9. Clamp a minimum of 4 hours at 23°C / 74°F. Longer clamp times may be necessary if lower temperatures are experienced. Clamp times may be accelerated by use of a heat gun or lamp for 10-15 minutes at 180° F.

Step 10. Remove any adhesive from the section area. Apply fiber-filled body filler, then sand, and finish with conventional body filler.

Step 11. Allow proper dry time.

Step 12. Finish, sand and paint per paint manufacturer's recommendation.

Step 13. For future use of the adhesive, remove cartridge from the gun and either leave on the mixer tip or replace the original cap.

Quality Criteria: Use the specified tools & use service manual

Page 51 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
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LAP Test -2	Practical Demonstration
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Instruction I: Given necessary templates, tools and materials you are required to perform the following tasks within 1 hour.

Task-1: Remove front door trim panels by applying correct technical steps

Task-2: Replace front door trim panels by applying correct technical steps

Task-3: Remove & install front door trim panels by using correct tools

Task-4: Repair damage front door trim panels

Task-5: Check the front door panels after installation

Page 52 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II October, 2023
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Page 53 of 54	Ministry of Labor and Skills Author/Copyright	Performing Upholstery, Ceiling and Interior Side Panel Repairs	Version -II
			October, 2023

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