

Intro to Collision Repair Process Overview

Self-study Narrations



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Intro to Collision Repair Process Overview



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Learning Objectives

Learning objectives for this module include:

- identifying the different types of collision damage.
- explaining the creation and function of a damage report.
- defining repair blueprinting and supplements.
- explaining insurance policy basics.
- describing vehicle teardown and parts ordering.
- explaining exterior lighting, and heating and cooling systems.

Introduction

A vehicle has been involved in a collision. What is next? From the time the vehicle is driven away or towed away from the scene of the accident, what are the steps involved in repairing the vehicle to its original appearance and function?

This course provides an overview of the collision repair process, from when the vehicle is brought into an estimating bay, to when the vehicle is detailed and delivered to the customer.

An overview of the different repair areas of a collision repair facility and common operations performed at each area are also provided.

This course will also be following a collision-damaged vehicle through the repair process, starting with the creation of the damage report. You will watch this vehicle go from station to station, and see the different repair processes used to restore the vehicle.

The Collision

Collisions are a common occurrence on our roads, highways, and parking lots. Collisions can result in damage that varies from a small door dent to severe damage that can affect the entire structure of the vehicle.

Determining how to repair collision damage and carry out the repairs requires skilled professionals with considerable training to ensure the vehicle is as durable and safe as it was before the collision.

Two Types Of Damage

Collision damage may be categorized as drivable or non-drivable damage. Drivable damage, as the name implies, means that the vehicle can still be driven following a

collision. This may require some temporary repairs to make the vehicle roadworthy. This allows the owner to use the vehicle up to the scheduled repair date at the collision repair facility.

Non-drivable damage requires the vehicle to be towed to the collision repair facility, impound / tow lot, or salvage pool to await the damage report. A vehicle is considered non-drivable when any safety systems have been disabled from the collision. For example, if an airbag has deployed, the vehicle should not be driven until the airbag has been replaced and the system is working properly.

A vehicle may be non-drivable if some mechanical items have been damaged. For example, if there is leaking drivetrain fluid or coolant fluid, steering issues, or problems with the suspension, the vehicle generally should not be driven until repairs have been made.

Damage Reports

Before any repairs are started on the vehicle, one of the first steps in the collision repair process is to perform a damage inspection and write a damage report. In the collision industry, estimates are often referred to as damage reports. Other common names for damage reports include damage appraisal and visible damage quote.

The damage report will be used throughout the repair process as a record of the estimated repair costs, and work that will be done to repair the vehicle. It is also used as a record of pre-existing damage that will not be included as part of the collision repair process.

Additionally, the damage report is used to prevent any misunderstandings between the repairer, insurer, and customer. It can be considered an agreement between the three parties on the work that will be done.

Additional Functions Of A Damage Report

Additional functions of a damage report include being a record of information that will be needed later for ordering parts and invoicing the insurer (or customer) for the completed repairs.

Damage reports typically have a place for the vehicle owner to sign, authorizing the repair of the vehicle to begin.

Other functions include being a record of state mandated disclosure information and information regarding customer rights and insurance information.

Damage Report Writing Location

The extent of damage can affect where the damage report is written. For example, if the vehicle is drivable, the estimator can drive to where the customer is located, such as work or home. It may be completed at a drive-in claims center or the collision repair facility in an estimating bay.

If the vehicle is not drivable, the damage report is written at the location it was towed after the accident, such as a salvage pool or storage area at the collision repair facility. Arrangements may need to be made by the estimator/appraiser to access the vehicle for estimating.

Damage Analysis

The first step in assessing damage to the vehicle should be an initial inspection. An initial vehicle inspection gives an overview of the damage, allows visualizing the repair process that will be used, and should include envisioning the direction and force of the impact. This helps determine if any of the damage extends beyond the area of initial impact.

An initial vehicle inspection considers the collision energy transfer and absorption, and includes looking for structural damage indicators. It may include asking the vehicle owner if there have been any changes in the handling or operation of the vehicle, provided it has been driven since the collision.

When doing an initial vehicle inspection, it will be determined whether or not the vehicle can be safely and economically repaired. This requires looking for damage related to the collision, and looking for signs of previous repairs and pre-existing damage.

Supplements

Initial inspections may not always include all the collision-related damage, especially with heavier impacts. Some of the damage may be hidden behind panels and not revealed until adjacent parts are removed.

Some of the damage may require being added to a damage report as new items. These are called supplements. Supplements to a damage report require the approval of the insurance company and the vehicle owner.

Sublet Repair

Not all collision repair facilities are equipped to handle all types of repairs. For example, many facilities may not own a wheel alignment machine, either due to space issues or expense issues. In these instances, the repair is handed over to another repair facility to complete these operations. This portion of the repair is called a sublet repair and is also added to the damage report.

Writing The Damage Report

The person responsible for the damage report may vary. It may be written by an estimator or production manager at a repair facility. It may also be written by a representative from the insurance company. This person is called an auto physical damage appraiser or estimator. There are also independent appraisers/adjusters that can be hired by an insurance company to write damage reports.

When writing the damage report, an auto physical damage appraiser generally starts with basic information such as customer name, address, and contact information, insurance company information and policy information, and vehicle identification.

Repair Or Replace Determinations

Next, the appraiser will follow a systematic approach for looking at the vehicle damage, perhaps starting at the point of impact and working toward the opposite side of the vehicle. Clues to the type and extent of damage are commonly provided by visual indicators, such as inconsistent gaps between panels, however, panel gaps do not always provide an adequate measure of the extent of damage. Three-dimensional measuring may be required. There are a variety of machines available that provide quick three-dimensional measurements without having to mount the vehicle on a frame machine. Verifying the extent of damage with quick measurements will help determine the repair plan and damage report.

Throughout the damage report writing process, the damage appraiser will determine which parts can be repaired and which parts must be replaced. This decision is based on extent of damage to a part. Exterior panels, such as door skins or quarter panels, may require extensive repair. A decision will have to be made as to whether the part should be repaired or replaced based on time to repair and durability of the repair.

This decision is also based on repairability of a part. In some instances, depending on the construction material type, even minor damage may not be repairable due to weakening the strength of the material if repairs are done to it.

Ultimately, this decision is based on vehicle maker recommendations. Some vehicle makers will state that a part should not be repaired due to concerns of future performance in subsequent collisions.

Parts may be completely replaced or partially replaced. This decision is based on the vehicle maker's recommendations. While partial replacement, either at factory seams or sectioning, may save time by reducing the amount of intrusion into the vehicle structure, some parts are not good candidates due to their extremely high strength, their function with regard to occupant safety, or their construction configuration.

During the damage report writing process, the appraiser will also determine the amount of time required for specific repair processes, and cost for various parts and materials required to complete the repair.

Repair Delays from Supplements

In some instances, partial vehicle teardown may be required during the damage analysis to find any hidden damage. The more thorough the inspection, the less likely a supplement will need to be filed. Supplements that are created after work has started can lead to delays in the repair, since additional parts may have to be ordered, and authorization will need to be obtained.

Repair Blueprint

To assist in the repair process, some repair facilities may create a “repair blueprint” to ensure a smooth and continuous repair from start to finish. The blueprint is designed to see the entire repair picture before repairs are started. This allows the vehicle to enter the “repair stream” and continue without stopping.

The blueprint is also designed to identify all parts needed, down to the clips, moldings, and one-time-use fasteners, determine any sublet work, and find any hidden damage.

More information on the blueprinting process can be found in the I CAR live instruction course Blueprinting Process and Damage Discovery (BLU01).

Insurance Policies

Since the majority of collision repairs have some type of insurance company involvement, it is recommended for insurers to go over the customer’s insurance policy with the customer before repairs have begun. Knowledge of some basic insurance company practices and types of policies is helpful when dealing with customers.

Collision insurance covers damage to a policyholder’s vehicle due to a collision and usually includes a deductible. The deductible portion of the policy may have to be explained to the customer. The explanation may include that the deductible is a portion of the claim amount that must be paid by the policy holder, and may be different amounts depending on the type of coverage.

The explanation may also include that the deductible is paid regardless of who is at fault, and may be an area of conflict between the customer, the insurer, and the collision repair facility. It is necessary for the collision repair representative to explain the insured’s responsibilities to avoid conflicts before repairs begin.

Comprehensive insurance covers the policyholder's physical property for non-collision related damage. Some examples include hail, fire, theft, or damage from hitting animals.

Some insurance policies have items that will not be covered in the event of a loss. These excluded items are usually listed in the declarations page of the policy. Most policies have limits to the amount the insurer will be held accountable for.

Completing The Damage Report

Following the damage report writing process, the auto physical damage appraiser should determine if a vehicle can be repaired in a manner that is economical or if the vehicle should be declared a total loss. A total loss is when the cost of repairs exceeds a pre-determined percentage of the vehicle's value.

Vehicles that have been totaled may still have a salvaged vehicle value. Salvaged vehicles may be sold to recyclers, where usable parts are removed and reused; rebuilders, where the vehicle is repaired and placed back in service; or, the owner of the vehicle, who can then arrange for repairs without insurance company involvement.

Most states have an inspection process that must be completed before a salvaged vehicle can be registered.

Vehicles that do not have a salvage value will be classified as junk, and cannot be repaired according to the law. Recyclers may purchase these vehicles and remove any working or undamaged parts. The remaining sheet metal structure will then be recycled.

Ordering Parts

Once the damage report writing process is complete and the customer, insurer, and repairer have agreed to the repairs, the repairs may be started. One of the first steps is to order parts for the repair. When writing the damage report, it should have been determined which types of parts to order, such as new parts from the vehicle maker, aftermarket parts, reconditioned parts, or recycled parts.

Also, it may be noted to the customer that regardless of which type of part is ordered, almost all sheet metal parts have warranties from the repairer and insurer for corrosion and performance.

When ordering parts from the vehicle maker, vehicle identification numbers (VINs) are often required by the part supplier to ensure that the part will match the vehicle being

repaired. If a part is ordered using simply the make and model of the vehicle, it may not match due to mid-year changes in the vehicle design.

Verify Parts

Collision repair facilities generally do not begin repairs until all parts have been received from the suppliers, and verified that they match the vehicle being repaired. Verification steps include making sure it is for the proper side of the vehicle (right or left), and the part has the correct shape and contours as the part being replaced.

Verification steps also include making sure the part does not have any unexpected damage, and any associated clips, moldings, and fasteners have been included with the parts.

Repair facilities that start repairs before a part arrives may be taking a risk since some parts may be out of stock, delaying the delivery time. Also, the wrong part may be delivered, or the delivered part may be in an unacceptable condition, requiring a return. If the customer was driving the vehicle and dropped it off for repairs, the length of time the customer is without a vehicle has now been extended while the repair facility waits for new parts. Additionally, if the vehicle has been disassembled and entered into the repair facility's work stream, it must now be removed and replaced with a different vehicle that can be repaired while waiting for new parts to arrive, creating inefficiencies in the repair process.

Vehicle Teardown

Once the parts have been received and verified, the vehicle can enter the workflow stream of the repair facility. Repairs may begin with the teardown of the vehicle, which may include removal of bolt-on sheet metal in the repair area, any adjacent interior and exterior trim panels, and moldings.

Teardown may also include protecting the interior of the vehicle with floor mats, seat covers, wheel covers, etc., taking pictures of the disassembly to help during the reassembly process, and recording any presets if the repair will require disconnecting the battery.

If a teardown was not done during the initial estimate or blueprinting process, it is possible that supplements may be submitted at this point. Removal of trim panels, carpeting, and sheet metal often provides a better view of the damaged area.

Heating And Cooling Systems

The major parts that make up a cooling system include the radiator, hoses and lines, heater core, water pump, and fan.

The major parts that make up an air conditioning system include the compressor, condenser, cooling fan, blower fan, evaporator, accumulator, etc.

Most of these parts are located up front behind the grille, which means in a front collision, these parts are commonly damaged. When body parts are being repaired, such as the radiator core support, front rails – upper and lower, and aprons, etc., these mechanical parts are often removed during the disassembly process.

Both the heating and air conditioning systems contain hazardous materials, such as coolant, refrigerant, oils, etc., that must be recovered during the disassembly process. Materials such as the R-134a air conditioning refrigerant and the coolant can be recycled and put back into the vehicle once the system is repaired and reassembled.

Any technician that works on an air conditioning system must be certified by passing a training program approved by the Environmental Protection Agency (EPA). Additionally, the refrigerant recovery equipment must also be EPA-certified.

Exterior Lamps

Exterior lamps, such as headlamps, tail lamps, fog lamps, turning signals, high-mount brake lamps, and backup lamps may require removal if the rear or front structure was damaged. Headlamps, in particular, have increased the number of options available, making basic removal procedures a little more complex.

Headlamp features may include auto-leveling, which returns the headlamps to the proper position if the vehicle is loaded unevenly. Also, adaptive front lighting, which is used to turn the headlamps and illuminate the side of the road when driving around corners. And high-beam assist, which turns the high beams off when a vehicle approaches oncoming traffic, or approaches a vehicle from the rear.

These new technologies require technicians to have access to service information to be familiar with removal and installation procedures. Removal of these headlamp systems may require removal of the bumper assembly and fender, and initialization upon reassembly.

Module Summary

Information discussed in this module included:

- the different types of collision damage.
- the creation and function of a damage report.
- repair blueprinting and supplements.

- insurance policy basics.
- vehicle teardown and parts ordering.
- exterior lighting, and heating and cooling systems.

Learning Objectives

Learning objectives for this module include:

- explaining why vehicles are measured and considerations for straightening.
- explaining structural part repairs and replacement.
- explaining exterior panel and non-structural repairs.
- discussing the role of stationary glass and replacement considerations.

Measuring And Straightening

If it has been determined that a vehicle requires structural repair, it will be mounted to a frame machine where the vehicle is restored to proper dimensions.

The three-dimensional measuring system used may be dependent on vehicle maker recommendations. Some vehicle makers may recommend a fixture-type system, which is used for straightening and three-dimensional measuring of the vehicle.

Use Of Heat

During the straightening process, metal may be heated and stress-relieved to bring the vehicle back to the proper shape. However, with the addition of new high-strength steels to many vehicle designs, such as boron-alloyed steel, the use of heat is being allowed less often as heat destroys the strength. Even mild steel may have its strength and integrity altered if excessive heat is used. Some steels may be too strong to straighten without damaging the part, and may require the part to be replaced even if it has moderate damage.

Structural Part Replacement

Structural parts that cannot be straightened will be replaced either at factory seams or at a sectioning location. To complete this type of repair, access to vehicle service information is critical in determining whether or not sectioning is allowed. If sectioning is allowed, the service information will indicate the cutting locations, and joint recommendations.

Some vehicle makers, such as GM, offer free collision repair information. Others have a fee based on the length of time for the subscription.

With recent advancements in structural steel, technicians must know what they are working with before beginning repairs. This can determine which type of welding

equipment to use in addition to the type of cutting tools. Steel that is very strong will require different cutting bits and blades compared to a milder and softer steel.

Exterior Panel Repair

While structural damage is not uncommon in a collision repair facility, a large portion of collision repairs are for exterior panels and bumpers. Types of damage range from hail dents and door dings to crumpled-up quarter panels. There are generally more repair options for exterior body panels compared to structural panels, and the decision to repair or replace the panel is more subjective when compared to structural part repair options.

The different repair options for exterior panels include repairing the part, and partial replacement of the part. For example, this may include sectioning a quarter panel or a door skin. Repair options for exterior panels may also include complete replacement of the part.

The determination of which is done is based on the extent of damage and the durability of the repair. It is also important to consider the customer's expectations when making these decisions. Some vehicle makers may have specific procedures for repair or replacement of damaged exterior body panels.

Exterior Panel Repair Process

If the decision has been made to repair the panel, the process usually consists of removing the majority of the damage by metal straightening techniques, and applying body filler to the damaged area.

Also included is sanding the body filler to the contour of the panel, applying primer-surfacer to the repair area to fill minor surface imperfections before refinishing, and refinishing to match the previous finish.

Paintless Dent Repair (PDR)

Another type of straightening process is called paintless dent repair (PDR) and is used for small, mild dents. The option may be used based on the extent of damage and consists of removing the damage without refinishing.

PDR also consists of using special tools and equipment to remove dents without damaging the finish, and using a specialized technique to work out small dents from the backside of the panel.

Removal And Attachment Methods For Exterior Panels

If the decision has been made to remove the damage, either by partial replacement or complete replacement at factory seams, decisions will also have to be made about how the replacement panel will be installed. Often times, the procedure is provided by the

vehicle maker, however, it may also be left up to the repairer to make the replacement decision.

Exterior steel panels are commonly attached at the factory with spot welds, adhesives, a combination of both, and laser welds. During panel replacement spot welds and plug welds are the most common method used to attach panels that were originally spot welded to the vehicle structure.

Laser welds cannot be replicated in a collision repair facility, so are substituted with a different attachment method.

Similar to the panel replacement recommendations, panel attachment method recommendations are also commonly provided by the vehicle maker.

Following the repair, an inspection should be conducted to verify that the repairs were properly made. This may require checking panel alignment and contours, weld quality, fasteners, body filler, and primer application.

Stationary Glass

Stationary glass plays a vital role in the structural integrity of a vehicle. Stationary glass supports the roof of the vehicle, and helps transfer collision energy up through the roof and away from the passenger compartment.

Stationary glass may also play a role in the restraint system. On some vehicles, the passenger airbag will deflect off the windshield to provide protection to those in the passenger seat.

For these reasons, it is critical that the windshield be installed correctly to ensure future performance. This requires the proper adhesive and primer to ensure factory-recommended adhesion between the glass and the pinchweld. Depending on the repair facility, this procedure may be sublet to local glass installers.

Adhesive Full-Strength Times

After the windshield has been installed, it is important for technicians to note the time that it takes the urethane windshield adhesive to achieve full strength. This time is different for the type of adhesive used, and can be affected by humidity and temperature.

Full-strength times can be a possible area of conflict with scheduling for completion. The correct strength must be reached before returning the vehicle to service. If the proper

strength has not been achieved, the glass can break loose from the flange during a vehicle rollover or airbag deployment.

Module Summary

Information discussed in this module included:

- measuring and straightening.
- structural part repairs and replacement.
- exterior panel and non-structural repairs.
- the role of stationary glass and replacement considerations.

Learning Objectives

Learning objectives for this module include:

- identifying types of restraints and restraint systems.
- explaining the importance of wheel alignments.
- listing types of vehicle electronics and electrical damage.
- identifying hybrid-electric vehicles and listing high voltage considerations.

Restraints

After the vehicle structure has been repaired, mechanical systems must be restored to operating condition. One of the primary systems that must be repaired includes the restraint system. Types of restraint systems include airbags, which include driver and passenger front airbags, knee bolster airbags, and curtain and side airbags. Seat belts may include a seat belt pre-tensioner. Seats may also include an active head restraint, which activates automatically in the event of a rear collision.

Restraint Deployment

The parts of a restraint system that require replacement after a collision differ among vehicle makes and models and model years. With regard to airbag replacement parts, the I-CAR website provides technicians with information and guidelines from the vehicle makers on which parts to replace for most vehicles. These replacement recommendations are also available on the vehicle maker's websites.

In some instances, it may appear that an airbag should have deployed but did not. It is important to note that there is a threshold for deployment, and even if a vehicle seems severely damaged, a deployment is not always guaranteed. Variables for deployment may include the rate of deceleration, seat belt use, and seat occupation.

Seat belts are often replaced if they were in use during the time of the collision. If a seat belt pre-tensioner was deployed, the entire seat belt assembly must be replaced.

Resetting the computers for a restraint system may require a specific scan tool. If this tool is not in-house, the operation may be sublet to a dealership that is properly equipped.

Active Head Restraints

Some vehicles have active head restraints that are designed to move forward in the event of a collision. This reduces the distance between the back of the head and the head restraint, thus reducing the possibility of whiplash.

Some vehicles have head restraints that are self-resetting. Many of these systems reset themselves after the collision, but others must be reset or replaced following a deployment.

Wheel Alignment

Wheel alignments are often necessary after structural repairs have been completed, especially if there has been damage to the front structure or engine cradle, or if one of the steering and suspension parts have been replaced such as tie rods, the steering rack, struts, ball joints, springs, etc. A wheel alignment aligns the wheels to vehicle maker specifications to provide stability and handling and to reduce tire wear.

There are differences in the types of alignments done on a vehicle, including two-wheel, four wheel, and thrust-angle alignments.

A four-wheel alignment involves aligning both the front and rear wheels to the vehicle centerline. A thrust-angle alignment aligns the front wheels in relationship to the position of the rear axle. This keeps the steering wheel straight. Though no longer common, a two-wheel alignment involves measuring and aligning the front wheels only.

Many collision repair facilities are not equipped with wheel alignment machines, and therefore, the operation is often sublet.

Advanced Electronics

Vehicles are being equipped with more advanced safety and convenience systems every year, requiring technicians to be informed about the systems and how they operate. Even if a technician will not be repairing the system, knowing where sensors and computers are located is important to avoid damaging them during the repair process.

Due to the equipment and knowledge necessary to repair advanced electronics, most repairs are sent to the mechanical shop or sublet to a facility that is equipped to repair these types of systems. Dealerships often have the required equipment to repair the advanced electronic systems.

Advanced vehicle systems may include blind spot detection, which is designed to inform the driver when a vehicle is approaching or in the vehicle's blind spot; adaptive cruise control, which is designed to maintain a set distance from the vehicle ahead; electronic stability control, which is designed to return vehicle control in a skid event; hill start assist, which is designed to apply brakes to prevent back roll when starting on a hill from a dead stop; and lane departure warning, which alerts the driver when an unintended lane change is taking place.

Advanced vehicle systems may also include pre-collision systems. When an imminent collision is detected, a pre-collision system may provide brake assist, automatically adjust the seat belt, automatically adjust the seats, close windows or sunroofs, and adjust the damping action of shock absorbers.

Electrical Damage

When an electronic system is damaged, it is likely to turn on a "malfunction indicator lamp (MIL)." These lamps are warning systems designed to illuminate when a computer diagnostic that is performed during startup or operation determines that a system is not responding the way it should. An MIL provides the technician with information regarding which systems are damaged.

Some common collision damage to a vehicle electrical system includes damaged wires and connectors, sensors, fuses, and lamps.

Wires and wire connectors commonly get pinched or cut in a collision. Vehicle maker's guidelines on repair or replacement of the harness should be followed. Sensors can be very delicate and may be subject to damage even if they are located away from the area of direct damage.

Calibration

Most of the advanced electronic systems will require calibration of the system if a sensor or other part is removed from the vehicle. Calibration requires a vehicle-specific scan tool, and may require other system-specific calibration tools to return the system to proper operating condition.

Hybrid-Electric And Electric Vehicles

Hybrid-electric and pure electric vehicles are becoming more common in the United States, which means that more of them are being brought into collision repair facilities.

Hybrid-electric vehicles have an electric motor or motors in addition to an internal combustion engine, and require special considerations. While the body structure generally does not differ between hybrid-electric and some electric vehicles compared to a conventional vehicle, there are some considerations for working with these types of vehicles that repair technicians must be aware of.

Hybrid Vehicle Considerations

All vehicles are equipped with a 12-volt battery that is primarily used to engage the starter and start the engine. It is also a power storage device that is used to provide a constant supply of power to electronic equipment such as computers, lamps, clocks, security systems, etc.

Hybrid-electric vehicles have an additional battery that delivers considerably higher voltage to power an electric motor. The voltage of these batteries ranges from 42–300 plus volts depending on the application. Working with hybrid-electric vehicles requires collision repair technicians to have basic knowledge of the high voltage system. For example, it may be necessary for a collision repair technician to disable and remove the high voltage battery to gain access to damaged panels.

Hybrid-electric vehicle high voltage batteries are equipped with a service disconnect that is used to disable the high voltage system, and isolate the high voltage to the battery.

Module Summary

Information discussed in this module included:

- restraints and restraint systems.
- wheel alignments.
- vehicle electronics, electrical damage, and calibration considerations.
- hybrid-electric vehicles, and high voltage considerations.

Learning Objectives

Learning objectives for this module include:

- explaining the refinishing process.
- listing corrosion protection considerations.
- describing the detailing process.
- explaining the pre-delivery inspection and customer delivery process.

Refinishing

One of the final stages of the collision repair process is to refinish the damaged area of the vehicle. The refinishing department is most often identified by the spraybooth and an adjacent prep deck.

The refinishing department receives the vehicle from the non-structural or structural repair department, and performs the refinishing operations such as masking, scuffing, and sanding, and applying primer and topcoats. The refinish will be the first item the customer inspects when they pick up the vehicle from the collision repair facility.

The refinish requires a proper color match and no finish defects. Proper blending techniques are used by the refinish technician to ensure a seamless appearance between the repaired area and the undamaged area of the vehicle.

Corrosion Protection

Corrosion protection is applied throughout the repair process. For example corrosion-resistant material, such as weld-through primer, will be applied when welded parts are being replaced.

Also, during the refinishing process, primer is applied as a base for the color coat. The primer serves to protect the metal against corrosion, and also provides a stable surface for the color coat, ensuring adequate adhesion.

Once the refinishing process is complete, additional corrosion protection is applied to interior surfaces such as rails or the backside of exterior panels. This is commonly a wax-based coating. Applying this material before refinishing the vehicle would contaminate the vehicle surface, causing a variety of finish defects.

Other Corrosion Protection

Other items that may be applied after the refinish has been applied include chip coating, which is applied on the lead edges of doors, rocker panels, hoods, and bumpers.

Also, undercoating, a thick tar-like material, is applied on wheelhouse surfaces, the floor pan underside, and the trunk floor.

Detailing

One of the final steps in the repair process is detailing. The detailing station is used to wash the vehicle, and buff out or sand any minor paint defects. Additionally, the interior can be cleaned, and any collision-related or repair-related stains or dust are removed. Additional detailing items may include removing any residual buffing compound from panel edges and emblems, and cleaning the inside and outside of glass.

Additional detailing items may also include waxing the new finish, if it is allowed by the paint maker to wax shortly after paint application, and removing any odors that may have resulted from the damage.

Pre-Delivery Inspection

Before the vehicle is delivered to the customer, a technician should examine the vehicle for any signs of the repair. The goal is to have the vehicle look like it did before the collision.

Part of the pre-delivery inspection items may include checking for finish defects, which includes signs of poor detailing and masking; checking for consistent panel gaps, and re-installation of all parts including proper wheel and tire installation.

Also included is checking for, proper operation of exterior and interior lamps, and checking for properly operating mechanical systems, such as air conditioning, heating and cooling, and power steering. It is also important to make sure all fluids related to those systems and other systems are filled to the proper levels, and making sure restraint systems are operating properly.

Checking for any damage or dirt on the interior that is related to the collision or repair process, and resetting any presets that may have been lost if the battery was disconnected for repairs may also be included.

Part of the pre-delivery inspection items may also include checking for any MILs that may be set during a test drive.

Customer Delivery

The final step in the collision repair process is to deliver the vehicle to the customer. When the vehicle is delivered to the customer, a collision repair facility representative will explain the repairs, providing an overview of what was repaired, and what was replaced. The customer is given some time to examine the work.

Other items that may be covered with the customer during delivery include going over any warranties. The customer should drive away from the repair facility with a feeling that their vehicle is in good condition and that potential issues will be covered. Addressing any concerns about the repair may also be covered.

A short period of time after the vehicle has been delivered to the customer, repair facilities may follow-up with the customer to make sure they are satisfied with the repair. Follow-ups may be done a week or so after vehicle delivery.

Module Summary

Information discussed in this module included:

- the refinishing process.
- corrosion protection considerations.
- the detailing process.
- pre-delivery inspection and customer delivery process.