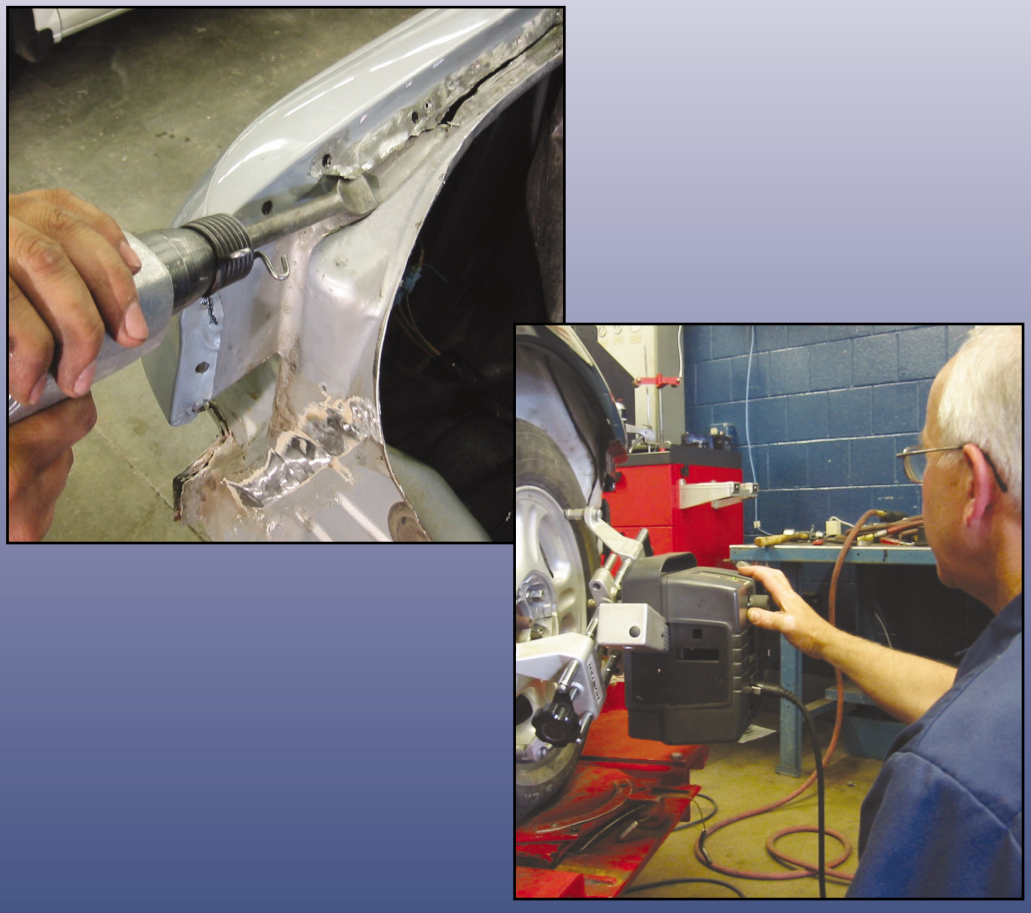
AUTO BODY REPAIR

SURFACE PREPARATION AND REFINISHING



TEACHER'S GUIDE

SHOPWARE®

INTRODUCTION

This Teacher's Guide provides information to help you get the most out of *Surface Preparation and Refinishing.* The contents in this guide will enable you to prepare your students before using the program and present follow-up activities to reinforce the program's key learning points.

A glimmering coat of paint is the finishing touch to an auto body repair job. This video takes viewers through the entire process of preparing, sanding, priming, sealing, topcoating, clearcoating, quality-checking, and final detailing. Use the *Surface Preparation and Refinishing* video and accompanying activities provided in this guide to prepare students for the most effective way to approach auto body repairs, and to familiarize students with terminology used in the auto repair industry.

LEARNING OBJECTIVES

After viewing the program, students will be able to:

- Demonstrate a basic knowledge of surfacing and refinishing operations and safety procedures.
- Identify the correct tools to use given the task to be performed.
- Identify proper equipment and materials in refinishing.
- Identify specialized finishes.
- Describe procedures for sanding and grit selection.
- List procedures for masking.
- Determine proper procedures for spray painting.
- Explain different types of paints and undercoatings and the procedures for application.
- List automotive detailing procedures.

EDUCATIONAL STANDARDS

The primary certifying body for automotive technician training programs is the National Institute for Automotive Service Excellence (ASE). ASE is a non-profit organization established in 1972 by the automotive industry to improve the quality of vehicle repair and service through the voluntary testing and certification of automotive repair technicians. The National Automotive Technicians Education Foundation (NATEF) is a separate non-profit foundation within ASE. The mission of NATEF is to improve the quality of automotive technician training programs nationwide through voluntary certification. The State Departments of Education in all 50 states support ASE/NATEF certification of automotive programs.

National Standards

This program correlates with the Program Certification Standards for Automobile Technician Training Programs from the National Institute for Automotive Service Excellence (ASE) and the National Automotive Technicians Education Foundation (NATEF). The content has been aligned with the following educational standards, which reflect the tasks in the ASE Program Certification Standards for Automobile General Service Technician Programs.

Preparation

- Comply with personal and environmental safety practices associated with clothing; respiratory protection; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Safety Precautions

- Select and use the proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application, paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.).

Surface Preparation

- Inspect, remove, store, and replace exterior trim and molding.
- Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants.
- Inspect and identify substrate, type of finish and surface condition; develop a plan for refinishing using a total product system.
- Remove paint finish.
- Dry or wet sand areas to be refinished.
- Featheredge broken areas to be refinished.
- Apply suitable metal treatment or primer.
- Mask trim and protect other areas that will not be refinished.
- Mix primer, primer-surfacer or primer-sealer.
- Apply primer onto surface of repaired area.
- Apply two-component finishing filler to minor surface imperfections.
- Dry or wet sand area to which primer-surfacer has been applied.
- Dry sand area to which two-component finishing filler has been applied.
- Remove dust from area to be refinished, including cracks or moldings of adjacent areas.
- Clean area to be refinished using a final cleaning solution.
- Remove, with a tack rag, any dust or lint particles from the area to be refinished.
- Apply suitable sealer to the area being refinished when sealing is needed or desirable.
- Scuff sand to remove nibs or imperfections from a sealer.

Spray Gun and Related Equipment Operation

- Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment).
- Check and adjust spray gun operation for HVLP (high volume, low pressure) or LVLP (low volume, low pressure) guns.
- Set up (fluid needle, nozzle, and cap), adjust, and test spray gun using fluid, air, and pattern control valves.

Paint Mixing, Matching, and Applying

- Determine type and color of paint already on vehicle by manufacturer's vehicle information label.
- Shake, stir, reduce, catalyze/activate, and strain paint according to manufacturer's procedures.
- Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.

- Apply selected product on test and let-down panel in accordance with manufacturer's recommendations; check for color match.
- Apply single stage topcoat for refinishing.
- Apply basecoat/clearcoat for panel blending or partial refinishing.
- Apply basecoat/clearcoat for overall refinishing.
- Denib, buff, and polish finishes where necessary.
- Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials, preparation, and refinishing procedures.
- Refinish rigid, semi-rigid and flexible plastic parts.
- Clean, condition and refinish vinyl (e.g. upholstery, dashes, and tops).
- Apply multi-stage (tricoat) coats for panel blending or overall refinishing.
- Identify and mix paint using a formula.
- Identify poor hiding colors; determine necessary action.
- Tint color using formula to achieve a blendable match.
- Identify alternative color formula to achieve a blendable match.

General Operations

- Identify parts using industry terminology.

Language Arts and Communication Standards

According to ASE/NATEF standards, the automobile technician must be proficient in the following Language Arts and Communications related academic skills that are embedded in the occupation. The activities and information presented in this program and accompanying teacher's guide are aligned to the following standards from the National Automotive Technicians Education Foundation from the National Institute for Automotive Service Excellence.

- Request, collect, comprehend, evaluate, and apply oral and written information gathered from customers, associates, and supervisors regarding problem symptoms and potential solutions to problems.
- Identify the purpose for all written and oral communication and then choose the most effective strategies for listening, reading, speaking, and writing to facilitate the communication process.
- Adapt a reading strategy for all written materials, e.g. customer's notes, service manuals, shop manuals, technical bulletins, etc., relevant to problem identification, diagnosis, solution, and repair.
- Use study habits and techniques, i.e. previewing, scanning, skimming, taking notes, etc., when reviewing publications (shop manuals, references, databases, operator's manuals, and text resources) for problem solving, diagnosis, and repair.
- Write clear, concise, complete, and grammatically accurate sentences and paragraphs.
- Write warranty reports and work orders to include information regarding problem resolution and the results of the work performed for the customer or manufacturer.
- Follow all oral/written directions that relate to the task or system under study.
- Comprehend and apply industry definitions and specifications to diagnose and solve problems in all automotive systems and components of the automobile and light truck.

- Comprehend and use problem-solving techniques and decision trees that are contained in service manuals and databases to determine cause-and-effect relationships.
- Use the service manual to identify the manufacturer's specifications for system parameters, operation, and potential malfunctions.
- Supply clarifying information to customers, associates, parts supplier, and supervisors.

Standards for the English Language Arts, *by the International Reading Association and the National Council of Teachers of English, Copyright 1996 by the International Reading Association and the National Council of Teachers of English. Reprinted with permission.*

Technology Standards

The activities in this Teacher's Guide were created in compliance with the following *National Education Technology Standards* from the National Education Technology Standards Project. The content has been aligned with the following educational standards and benchmarks.

- Use a variety of media and formats to communicate information and ideas effectively to multiple audiences.
- Use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.
- Use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.
- Use technology tools to enhance learning, increase productivity, and promote creativity.
- Use technology to locate, evaluate, and collect information from a variety of sources.

The National Education Technology Standards reprinted with permission from the International Society for Technology Education.

PROGRAM OVERVIEW

The finish on any autobody repair is the final touch and is a beautiful thing when done correctly. However, when it is applied incorrectly, it can mean a lot of extra work! So what do you need to know to ensure that the finish turns out perfectly?

This program will use a vehicle with a panel repair to demonstrate the entire process of preparing, sanding, priming, sealing, topcoating, clearcoating, quality-checking, and final detailing. It will also demonstrate a total refinish. After viewing this video and completing some of the learning activities included in this guide, students will be better prepared to properly complete surface preparation and refinishing, and incorporate industry terminology in order to communicate effectively with coworkers, parts suppliers, and insurance adjusters.

MAIN TOPICS

Topic 1: Preliminary Preparation & Refinishing Process

This section of the program describes the preliminary preparation required for finishing an autobody repair. Students will learn the importance of cleaning before painting, what to look for and how to evaluate what must be done to a surface before refinishing, how to evaluate the existing finish, and color matching.

Topic 2: Surface Preparation
This section of the program describes procedures for preparing a surface for refinishing. Students will learn how to properly remove cracked or blistered paint, how to use chemical stripper, proper blasting, sanding, and grinding techniques, how to apply primer-surfacer, and how to properly "mask" a vehicle for painting.

Topic 3: Applying the Finish
This section describes the procedures for applying a final finish to an auto body repair. Students will learn the four main considerations when applying the final finish, safety procedures for spraying finishes, how to test and adjust spray guns, and how to correctly apply sealer, color, and clear coats.

Topic 4: Detailing
This section of the program discusses the imperfections to look for after a new finish is applied, how to correct those imperfections, and what procedures should be followed to thoroughly clean and prepare the vehicle for delivery back to its owner.

FAST FACTS

- When preparing a vehicle for refinishing, it is important to apply a wax remover and degreaser. Paint will not adhere to a surface with wax, silicones, or grease.
- One thing to check before refinishing is how much paint buildup exists on the vehicle. Typically, the factory finish plus one additional refinish will be slightly under 12 mils, or 12 thousandths of an inch. Paint build-up should be limited to 12 mils. If it becomes thicker than 12 mils, the paint has a tendency to crack.
- Before refinishing, you need to find out what kind of finish the car has and match the color and the type of paint. The vehicle's identification plate contains the manufacturer's paint codes as well as the type of finish. The ID plate is located in different places for different makes and models of vehicles.
- Paint colors vary slightly from batch to batch even with precise measuring and mixing. Over time, a vehicle's finish can fade. Therefore, it is important to create a test panel to check the color match before refinishing the vehicle.
- Paint needs to be thinned to decrease its viscosity or thickness. If paint is too thick or viscous, it won't flow or atomize properly. If it's too thin, it won't cover and will tend to create drips.
- Blasting with abrasives will quickly remove loose paint and reveal any underlying rust. Abrasives that can be used include sand, plastic beads, soda, even walnut shells. Blasting with sand may damage thinner steel panels, aluminum, or plastic. Using soda, walnut shells, or plastic media instead of sand makes blasting safe for all surfaces.
- Sandpaper comes in various grits and in dry or wet varieties. The smaller the number, the coarser the grit. Generally, you should select the finest grit paper that will do the job. If you use coarser paper, it may work faster, but you will have to sand out deeper scratches. Scratches that are not sanded out will show up in the final finish.
- Primer-surfacer, or "surfacer," fills in scratches left by sanding and grinding and other little imperfections in the body filler. It also provides a good base for the adhesion of the finish coats that follow.

- Every area that is to be painted must be sanded or scuffed to improve adhesion of the new finish. Usually this is accomplished by wet sanding using a very fine 600-grit waterproof paper either by hand or with a power sander.
- Featheredging means gradually tapering one finish into the other. With successful featheredging, if you run your hand over the area where the two surfaces meet, it will feel perfectly smooth with no indication where one surface ends and the other begins.
- When you're planning a spot repair, especially with a multistage finish, any trim that can be removed should be. Multiple finish coats around trim pieces build up a considerable edge which is more likely to crack or chip later. If the piece cannot be easily removed, then mask it.
- There are several types of masking: masking paper and masking tape, plastic sheeting and masking tape, specially shaped masking covers and liquid masking material. Be sure wherever you mask to cover the part completely, but don't overlap onto areas that are supposed to be finished. You can remove paint from surfaces that were not supposed to be finished, but you cannot successfully add paint to areas that were unintentionally masked off.
- There are four major considerations when applying the final finish: a clean environment, temperature and humidity, light, and ventilation. A properly maintained paint booth provides control over all of these variables.
- Paint spray guns combine the paint with compressed air. When you pull the trigger the paint is atomized as it comes out of the nozzle, meaning the paint is formed into a cloud of tiny, uniform droplets. When applied to a vehicle, these droplets flow together to form a continuous film on the surface.
- Before the color coat, a sealer must be applied to the repair area and slightly beyond. The purpose of the sealer is to improve the adhesion of the new finish and to keep the finish from soaking into the porous surfacer causing color or texture variations.
- When finishing plastic parts, like a bumper cover, you must add a flexing agent to the color and clear coats. If you don't, when the plastic flexes, the finish might crack.

VOCABULARY TERMS

atomization: The breaking down of a liquid into small particles, like a mist, by the use of pressure.
cratering: Erosion of the original finish.
digital mil gauge: Digital device used to check finish thickness before, during, and after refinishing. The device instantly shows a reading when it is placed next to a metal panel.
dry-guide coat: A fine, dark-colored dust used to determine if a surface is smooth and level.
featheredge: The technique of gradually tapering one finish into the other.
masking: to cover up, as in prior to painting.
pencil mil gauge: Device used to check finish thickness before, during, and after refinishing. To use, the magnetic end is placed against the metal body. As it is slowly pulled away, a reading is registered.
primer-surfacer: Also called "surfacer." A substance that fills in scratches left by sanding and grinding and other little imperfections in the body filler, and provides a good base for the adhesion of finish coats.
self-etching primer: A substance that promotes paint adhesion and provides corrosion protection.
viscosity: The thickness of a substance.

PRE-PROGRAM DISCUSSION QUESTIONS

1. What do you think are the steps you would have to take to prepare a surface for refinishing? Why would each of these steps be important?
2. What kinds of factors do you think could cause a paint job to turn out blemished, imperfect, or incorrect? What do you think you can do to avoid or adjust for these factors?
3. What tools and substances do you think are used by auto body repair technicians when preparing a surface for refinishing and actually performing the refinishing?
4. What do you think are some important considerations for the environment/area you are in when you apply a finish to a car? Why do you think these are important?
5. What do you think would be some of the biggest challenges you would face when refinishing a surface? Why?

POST-PROGRAM DISCUSSION QUESTIONS

1. What is the first step for preparing any vehicle for refinishing? Why is this step so important?
2. Where can you learn about the formula for the type of finish and paint code you are going to use? What does the formula tell you? If paint doesn't match, where can you get suggestions on how to alter a paint color to more closely match a vehicle?
3. Name three methods for removing cracked, loose, or blistering paint and the substances or tools these methods may require. Which of these methods is best for large amounts or multiple layers of paint? What is the drawback to this method?
4. What is masking? Why is it important? Describe five different types of materials used for masking. Where should you get these materials? Why?
5. Describe the process for final detailing of a car. What elements should you look for? How can imperfections be fixed? What steps should you take before returning the vehicle to its owner?

GROUP ACTIVITIES

OOPS! Poor Paint Jobs!

If you aren't careful, there are many things that can cause flaws in your final finish and require you to redo the job! Review the video and think about the many different considerations, elements, and materials that could cause a paint job to go wrong. Using paint and several common items such as glue, dust, candle wax, paint that is too thick, grease, or other items, create a display of at least five "poor paint jobs." (For example, you can mix paint with dust or dirt, and show the result when it dries.) For each poor paint job, describe the material or mistake that caused the poor paint job, and the steps that should be taken to ensure this type of result does not happen when applying a finish.

The Perfect Paint Booth

There are four major considerations when applying a final finish: A clean environment, temperature and humidity, light, and ventilation. A good paint booth can help control these factors and provide the right environment for a good paint job. As a group, design your perfect Paint Booth. Discuss how it would control the four major considerations. Also, describe other features you would like your paint booth to have. What would make your paint booth different from or better than the ones that exist today?

You'd Better Shop Around

A happy customer is always the best customer. As a group, create an "Auto Body Paint Shop" guide for customers that describes some of the things they should look for in an autobody shop so that they can get the best refinishing job. Include tips on how to select the right shops, what types/brands/qualities of paints are used and how each type of paint is different, how much time it takes to repaint a car, and how to save money.

INDIVIDUAL STUDENT PROJECTS

Refinish Me Safely!

Prepare a brochure, booklet, or poster that illustrates at least five important safety precautions that you should take when refinishing a surface. Include a description and an illustration of the dangers that each safety precaution help to prevent, and describe the consequences that could result from not taking these precautions.

Under the Gun

When refinishing a surface, your spray gun is one of the most important tools you will use. What are some tips and tricks for using these spray guns? What different types of paint guns are on the market? What features do they offer? Create a poster that illustrates these guns and tips and tricks for using them.

Auto Refinisher Job Ad

You are the proud owner of a very prestigious auto body shop. However, your best auto body refinisher has just retired, and you need to find a replacement! Prepare a job advertisement to put in the newspaper or on the Internet that describes the skills, knowledge, experience, and abilities you would want your replacement auto body refinisher to have.

INTERNET ACTIVITIES

Teach Me! Web Scavenger Hunt

It's your turn to play the role of teacher! Your job is to teach the class all about surface preparation and refinishing using only information you find on the Internet. Prepare a lesson plan that uses a series of Web sites that you could use to teach the topic. Your lesson plan should include at least three unique lessons about surface preparation and refinishing. For each lesson, list the Web site, what information it contains, and how you would use that information to teach the class about surface preparation and refinishing. When you are finished, present at least one of your lessons to the class.

Painting 101
Visit http://www.autobody101.com/ to learn about "Auto Body and Paint Information, Tips, and Techniques." Using this website, choose at least three new tips and tricks, and create a poster or booklet describing each of these tips and tricks. For each tip or trick, be sure to describe the following:

- What the tip or trick is and what part of the surface preparation and refinishing process it applies to
- The tools needed for the tip or trick
- What types of new benefits the tip or trick offers
- How the tip or trick is different or new

Autobody Refinisher Career Profile
Using the Internet, research the career of an autobody refinisher. How in demand is this career right now? Is it growing? What would you need to get started in this career? What skills does it require? Where can someone go to get those skills?

Prepare a report that details the autobody refinisher career. Be sure to include statistics or research that talks about the career of autobody refinisher, how it is growing, what the current salary is, and how much of a demand exists for this career nationwide.

ASSESSMENT QUESTIONS

Q: What are the stages in the refinishing process?
(a) Cleaning, checking, applying the finish, final detailing.
(b) Preliminary preparation, cleaning, surface preparation, painting, final detailing
(c) Preliminary preparation, surface preparation, applying the final finish, and final detailing.
(d) None of the above
A: (c)
Feedback: There are four stages to the refinishing process: Preliminary preparation, which includes things like evaluating the existing finish and color matching; surface preparation, which includes getting the vehicle ready to paint; applying the final finish; and final detailing. Failure to thoroughly follow any of the steps leading up to and including the final detailing, can lead to a time-consuming and money-wasting disaster!

Q: During preliminary preparation, what is the next step after washing?
(a) Evaluate the existing finish.
(b) Apply a wax remover.
(c) Apply a wax remover and a degreaser.
(d) Prepare a plan for refinishing.
A: (c)
Feedback: After washing a vehicle, apply a wax remover and degreaser. Spray the degreaser on all surfaces to be refinished, and wipe it off. Paint will not adhere to a surface with wax, silicones or grease.

Q: Paint tends to cover existing blemishes. *(True or False)*
A: False
Feedback: Painting magnifies existing blemishes. Blemishes that are not corrected prior to painting may require you to redo the job later. In repaired areas, check to make sure the surface is completely smooth and blemish free. Check for waviness, pinholes, sanding scratches, or any other imperfections.

Q: What measurement should paint build-up be limited to and why?
A: Paint build-up should be limited to 12 mils. If it becomes thicker than this, the paint has a tendency to crack.
Feedback: Typically, the factory finish plus one additional refinish will be slightly under 12 mils, or 12 thousandths of an inch.

Q: What is the erosion of the original finish called?
(a) Cracking
(b) Cratering
(c) Blistering
(d) None of the above
A: (b)
Feedback: The erosion of the original finish is called cratering.

Q: Where can you find the manufacturer's paint codes and the type of finish used on a vehicle?
(a) In the owner's manual
(b) Under the hood
(c) On the door
(d) On the vehicle's identification plate
A: (d)
Feedback: The vehicle's identification plate contains the manufacturer's paint codes as well as the type of finish. The ID plate is located in different places for different makes and models of vehicles. If you are unsure where to find the ID plate, consult a "crash book."

Q: Paint needs to be thinned to decrease its _____.
A: viscosity (thickness)
Feedback: If paint is too thick or viscous, it won't flow or atomize properly. If it's too thin, it won't cover and will tend to create drips.

Q: _____ is best used to take off large amounts or multiple layers of paint.
(a) Blasting
(b) Chemical stripper
(c) Sanding
(d) None of the above
A: (b)
Feedback: Chemical stripper is best used to take off large amounts or multiple layers of paint. However, it can get trapped under trim and ooze out later to ruin the final finish. Therefore, use a chemical stripper only when other means are not feasible.

Q: What do self-etching primers do?
A: Self-etching primers promote paint adhesion and provide corrosion protection in one application.
Feedback: Any bare metal must be treated with a self-etching primer. Simply spray on the primer and let it dry.

Q: What does primer-surfacer primer do?
A: Primer-surfacer, or "surfacer," fills in scratches left by sanding and grinding and other little imperfections in the body filler.
Feedback: Primer-surfacer, or "surfacer," also provides a good base for the adhesion of the finish coats that follow.

Q: What does atomization mean?
A: Atomization means using compression to form paint into a cloud of tiny, uniform droplets.
Feedback: Atomization is very important to the success of a paint job. It means that the paint is formed into a cloud of tiny, uniform droplets. When applied to a vehicle, these droplets flow together to form a continuous film on the surface.

Q: Before the color coat, a sealer must be applied to the repair area and slightly beyond. *(True or False)*
A: True
Feedback: The purpose of the sealer is to improve the adhesion of the new finish and to keep the finish from soaking into the porous surfacer, causing color or texture variations.

Q: When performing overall refinishing, begin painting with the_____.
(a) roof
(b) doors
(c) hood
(d) none of the above
A: (a)
Feedback: Overall refinishing works in a similar manner to panel repair, but the entire surface of the car must be prepared before it can be painted. Begin painting with the roof. Hold the gun perpendicular to the surface and maintain even, overlapping strokes. Always move to a new area of the car from a wet edge.

ADDITIONAL RESOURCES

WEB SITES

AutoBody101.com
http://www.autobody101.com

Auto Body Curriculum Guide
www.sasked.gov.sk.ca/docs/paa/autobody/index.html

Auto Body Online
www.autobodyonline.com

Auto Body PI
www.autopi.com/frame.htm

Auto Body Pro
www.autobodypro.com

Auto Body Tool Mart Repair and Restoration Tutorials
www.autobodytoolmart.com/restorations.html

Automotive Body Repair News
www.abrn.com/abrn (see: www.abrn.com/abrn/article/articleDetail.jsp?id=39995)

Automotive Learning Online
www.innerauto.com

Auto Glossary
www.autoglossary.com

Automotive Plastics Council
http://www.plastics-car.com/s_plasticscar

Automotive Services Association
www.asashop.org

Automotive Youth Educational Systems (AYES)
www.ayes.org/index.asp

Collision Repair Industry Insight
http://www.collision-insight.com/

Do-It Yourself Network—Automotive Repair
www.diynet.com/diy/ab_auto_body_work/0,2020,DIY_13675,00.html

How Stuff Works—Auto Stuff Page
http://auto.howstuffworks.com

I-car
www.i-car.com

National Automotive Service Task Force
www.nastf.org

National Automotive Technicians Education Foundation—Program Standards
www.natef.org/program_standards/collision/index.cfm

OEM Listing: Auto Body Online
www.autobodyonline.com/industry/OEM/index.cfm

Society of Collision Repair Specialists
www.scrs.com/codeofethics.htm

Tektips - Auto Body Pro Website
www.autobodypro.com/tektips.htm

BOOKS

Chilton Book Company. *Chilton's Auto Repair Manual, 1998-2002.* Chilton Book Co., 2003. ISBN: 0801993628

Duffy, James E. *I-CAR Professional Automotive Collision Repair*. Delmar Thomson Learning, 2001. ISBN: 0766813991

Duffy, James E. *Auto Body Repair Technology, 4th Edition*. Thomson/Delmar Learning, 2003. ISBN: 0766862747

OTHER PRODUCTS

Auto Body Shop Safety, Software, Cambridge Educational
Safety procedures relevant to the auto body shop are outlined, along with lessons on First Aid, Fire Safety and Prevention, Wire Feed MIG Welding, and Proper Use of Auto Body Tools. 3.5" IBM version, Mac version also available. A Shopware Production.
Order #: 20941, www.cambridgeeducational.com, 1-800-468-4227

Multimedia Auto Shop Safety, Software, Cambridge Educational
This multimedia CD-ROM uses video, animation and still photos to examine the topics of general shop safety, fire safety and prevention, first aid, and safe tool use for mechanics. The segment dealing with overall shop safety emphasizes the link between cleanliness and organization, as well as personal safety considerations of glasses, earplugs, shoes, and clothes. The first aid portion suggests that a certified first aid class be taken, but it offers an excellent survey of first aid practices, including what NOT to do. Correct fire extinguisher usage is illustrated by memorable graphics. The auto workshop is portrayed as a work site of numerous potential hazards, while at the same time the viewer is taught how to cope with the challenges of volatile auto products, damaged electrical cords, and welding cylinders and their contents. The mechanic's tools are shown to be a statement of their owner's professionalism. It seeks to foster that professionalism by describing the safe care and use of hand and power tools, wrenches, auto body tools, and measuring devices. Part of the series *Shop Safety.* A Shopware Production.
Order #: 20463, www.cambridgeeducational.com, 1-800-468-4227

Automotive Technicians, VHS/DVD, Cambridge Educational
Sponsored by the National Automotive Technicians Education Foundation (NATEF), this program explores automobile repair and collision repair. NATEF works closely with Automotive Service Excellent (ASE), the nation's only industry-wide certification program for automotive technicians. Technicians with a sound education have a choice of career avenues. Aside from fixing cars and trucks, they can become service managers, service engineers, automotive writers, or even auto technology teachers.
Order #: 24924, www.cambridgeeducational.com, 1-800-468-4227

Understanding Cars, VHS/DVD, Films for the Humanities and Sciences
First they revolutionized travel. Then they reshaped American culture. This program, narrated by Jane Curtin, traces the history of automobile technology and design through the 20th century. Stops along the way include visits to the Sandia National Laboratories, the GM Design Center, the Detroit Car Show, and the Petersen and Blackhawk Automotive Museums. The mechanics of four-stroke and two-stroke internal combustion engines, energy-efficient vehicles that run on electricity and fuel cells, automated highways and smart cars, and a number of automotive curiosities are featured.
Order #: 29881, www.films.com, 1-800-257-5126

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