

Appendix M

TRANSPORTATION, DISTRIBUTION AND LOGISTICS YOUTH APPRENTICESHIP

AUTO COLLISION PATHWAY PAINTING & REFINISHING (UNIT 5)

Unit 5: Auto Collision Pathway Painting & Refinishing

Competency

1. Sand area to be painted/refinished

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Inspect and identify substrate, substrate condition, type of finish, film thickness and surface condition
- Assist to determine method to remove finish
- Clean surface to be sanded
- Mask areas to be protected
- Power grind or sand the surface to remove the old paint/finish
- Replace the sandpaper when the paint begins to “ball up” on the paper
- Rinse off any residue and clean using proper cleaning solutions
- Remove or protect from dust/lint particles
- After servicing, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Explain how sanding prepares the surface for painting
- Describe different types of abrasives
- Distinguish between grit and numbering systems
- Explain how to select grit abrasive materials for sanding tasks
- Compare power sanding to power grinding to remove paint/finish
- Compare types of sanding and sandpaper
- Compare types of sanding methods
- Describe the proper use of a sanding respirator
- Explain how to inspect the condition, fit, and operation of a sanding respirator

Comments:

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Competency

2. Strip finish or other protective coatings

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Inspect and identify substrate, substrate condition, type of finish, film thickness and surface condition
- Assist to determine method to remove finish
- Clean surface to be stripped
- Mask areas to be protected
- Slightly sand the surface
- Strip finish and paint with a chemical remover or air-powered blasting equipment
- Apply a thick coat of stripper in one direction using a soft bristle brush
- Allow stripper time to soak until paint/finish is softened
- Scrape softened paint/finish with a scraper or scuff grinder
- Rinse off any residue and clean using proper cleaning solutions
- Remove small patches left with a scraper or scuffing disc or wheel
- Remove or protect from dust/lint particles
- After servicing, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Describe the process for evaluating the surface for paint/finish condition
- Compare advantages and disadvantages of finish removal methods
- Explain when stripping is indicated to remove paint/finish
- Compare methods of stripping finish and paint
- Discuss the purpose & process of the paint adhesion check
- Explain the purpose and process for air-powered (blasting)
- Discuss when air-blasting versus chemical stripping is indicated
- Describe appropriate measures to eliminate static electricity and dust from resettling on vehicle

Comments:

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Competency

3. Featheredge adjacent areas for blending

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Start over the chipped area and work outward
- Rough cut down the edges of the broken areas with a course sandpaper with a sanding block or air sander
- Follow with a smoother grit
- Complete the taper of the featheredge with a fine grit paper and water
- Check the edges frequently for rough edges
- After servicing, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Define featheredging and blending as it applies to panel paint/finish
- Discuss why the angle of the sander is so important in this process
- Explain how to sand and scuff adjacent panels
- Demonstrate proper featheredge sanding

Comments:

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Competency

4. Prepare undercoating

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Select the appropriate primer(s) and/or sealer(s) based on the surface condition and size of the job
- Select the proper solvent for weather conditions
- Mix materials thoroughly
- After preparation, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- List the purpose of the undercoat
- Discuss types of undercoats
- Define substrate
- Define topcoat
- Explain the difference between sealers and primers
- Compare primers, sealers, primer-sealers, and primer-surfacers
- Describe types of sealers and primer-sealers
- Explain how to select the right type of undercoating
- Indicate when sealers are to be used as opposed to primers

Comments:

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Competency

5. Apply undercoating

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Remove, with a tack rag, any dust or lint particles from the area to be refinished
- Treat the bare metal substrate with metal conditioner
- Plan the order of priming/sealing
- Apply the first coat of undercoat and allow it to flash dry
- Apply 2 or 3 more medium wet coats for build up; allow flash time between each coat
- Apply stone chip-resistant coating primers if indicated
- Allow undercoat to dry thoroughly
- After servicing, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Explain how to properly apply primer
- Explain how to properly apply sealers and primer-sealers
- List common areas treated with chip-resistant coatings
- Explain how to properly apply chip-resistant coatings
- Compare waterborne and solvent based chip resistant primer application
- Compare chip-resistant coatings to conventional primers
- Demonstrate proper treatment of enclosed interior surfaces, exposed interior surfaces and exposed exterior surfaces
- Explain how to determine what seams and joints are to be sealed
- Identify types of seam sealer
- Demonstrate proper application of thin-bodied, heavy-bodied, solid, and brushable sealer
- List factors that determine dry time of sealers

Comments:

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Competency

6. Smooth undercoating

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Allow undercoat to dry thoroughly
- Once dry, smooth the undercoating by sanding
- Inspect surface
- Remove imperfections from undercoating
- Apply two-component glazing putty to minor surface imperfections
- Block sand area to which primer-surfacer and/or two-component glazing putty have been applied
- Block sand area until smooth
- After servicing, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Demonstrate dry sanding with & without a block, wet sanding and scuff-sanding
- Demonstrate proper block sanding techniques including application of a guide coat

Comments:

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Competency

7. Prepare painting and drying areas

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Clean paint booth
- Remove all scrap and trash
- Clean floors and walls
- Clean equipment used
- Drain oil and water filters and traps
- Clean air hoses by wiping
- Vacuum booth
- Examine and replace paint booth filter if needed or required
- Examine paint booth seals
- Set temperature as required
- Set lighting to daylight-corrected lighting
- Turn air circulation system on to ensure it is working properly
- Close off painting area
- Allow air circulation system to purge booth of debris
- Monitor manometer readings
- After cleaning, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Explain the purpose of a separate paint area
- List regulations concerning low VOC and refinish technology
- Explain the process for cleaning prior to painting
- Describe the importance of not touching the surface to be painted with your skin
- Describe specific daily, weekly, monthly and yearly maintenance tasks required for booth cleaning
- Explain the purpose of the manometer and the information it provides
- Describe the physical processes that are occurring when a surface is drying
- Define drying versus curing
- Define flash time
- List methods used to accelerate drying times

Comments:

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Competency

8. Prepare paint mixing area

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Clean area of dirt & dust
- Check painting suits
- Straighten and organize personal safety equipment
- Check emergency equipment such as eye washes and first aid equipment
- Stock materials such as sanding blocks & abrasive paper, wiping cloths, tack rags, paint paddles, strainers, mixing buckets, masking materials, squeegees, reducers, activators, & cleaning solvents
- Clean & check mixing equipment if applicable
- After cleaning, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Explain the purpose of the paint mixing room
- Describe typical building, fire, & electrical codes applicable to a paint mixing area
- List common mixing equipment typically found in the mixing area
- Identify body repair and refinishing materials and supplies

Comments:

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Competency

9. Prepare air supply equipment

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Check and replace oil & water filters & traps on air supply system as required
- Drain moisture from the system each morning
- Replace hoses as needed
- Check that air lines slope away from compressor
- After preparation, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Describe the eye & lung precautions necessary when painting
- Explain the purpose of the air supply system
- Describe the typical parts and operation of an air supply system
- List common problems associated with air supply systems
- Explain the rationale for morning moisture draining
- Explain the rationale for air lines that slope away from the compressor

Comments:

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Competency

10. Clean spray guns

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Clean spray equipment as required for type of spray gun
- Set up spray equipment with proper fluid needle, fluid nozzle, and air cap for the material to be sprayed
- Adjust the air pressure
- After cleaning, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- List the typical components & function of a spray gun
- Define a captive gun system
- Explain the importance of proper cleaning of spray equipment
- Discuss common problems associated with defective or dirty spray equipment

Comments:

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Competency

11. Test spray guns

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Verify temperature of spray booth
- Verify or adjust air pressure
- Set the pattern control knob to for the size of the spray pattern
- Set the fluid control knob for volume of paint
- Hold the gun 4-6 inches away from the paper
- Pull the trigger all the way back & release immediately
- Assist to inspect the burst pattern
- Adjust the control knobs accordingly
- Check uniformity of distribution by loosening the air cap
- Pull the trigger until the paint begins to run
- Assist to inspect the run lengths
- Adjust the control knobs accordingly
- Re-test until satisfactory test results are achieved
- After testing, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Summarize atomization and how it relates to spray gun operation
- Explain the purpose of the spray pattern test
- Explain the elements of a good spray pattern
- Discuss the requirement for optimum spraying pressure
- Explain the appearance of a good spray pattern
- Describe common spray pattern problems and how to adjust for them
- Explain the appearance of a good distribution pattern
- Describe common spray distribution problems and how to adjust for them
- Demonstrate the set up, adjustment, and use of spray gun

Comments:

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Competency

2. Assist to determine type, color & formula of paint

Performance Standard Condition

Competence will be demonstrated

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Determine type and color of paint already on vehicle
- Locate paint code information and color chip using the color directory
- Identify paint color formula using the basecoat patch, spectrophotometer and/or computerized color matching system
- After locating information, complete appropriate documentation

Learning Objectives

- Describe color theory and how it relates to refinishing
- Define terms relating to color
- Explain the purpose of repair finish systems
- Identify and distinguish between finish systems
- Compare types of paint
- Compare lacquer and enamel paints
- Describe contents of paints
- Compare various paint materials
- Explain how to find and read a vehicle's paint code
- Describe the resources to use to determine the mixing formula
- Describe the purpose and function of the spectrophotometer
- Explain the use of a computerized color matching system
- Describe how spray methods can affect color
- Locate vehicle body plates and the type of paint on the vehicle

Comments:

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Competency

13. Assist to mix and strain paint or primer

Performance Standard Condition

Competence will be demonstrated

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Obtain a can, pail or container with straight sides
- Place the correct graduated mixing stick, cup or scale for the type of material to be mixed in the container
- Pour the amount of paint or primer into the container
- Stop pouring at the precise marking corresponding to the amount and column on the mixing stick, cup or scale
- Pour the hardener to the precise marking corresponding to the correct amount & column on the mixing stick, cup or scale
- Pour the final ingredient, such as solvent, until it aligns with the correct amount & column on the mixing stick, cup or scale
- Mix thoroughly
- Check viscosity
- Pour mixed material through the paint strainer prior to filling the sprayer cup
- After mixing, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Explain how to mix paint by percentage or by part
- Calculate amounts based on percentages and parts for mixing
- Explain the purpose and use of the graduated mixing stick
- Describe how to use the mixing stick for pouring required amounts
- Compare the use of mixing sticks with cups and computerized mixing scales
- Define viscosity
- Describe how to make paint thickness measurements
- Describe how to use a viscosity cup
- Compare types of viscosity cups
- Describe how to adjust the color mixture to the correct viscosity
- Explain the function of the formula base, tint and reducer
- Explain the purpose of additives such as retarders, accelerators, and catalysts/hardeners as additives in paint curing
- Identify the correct foundation for topcoat

- Explain when adhesion promoter is used
- Explain how to apply hand-rubbing and machine-rubbing compounds and adhesion promoter
- Compare factory-packaged topcoats and intermixes

Comments:

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Competency

14. Assist to apply paint on test panel or let-down panel

Performance Standard Condition

Competence will be demonstrated

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Obtain a test panel or let-down panel
- Apply primer(s) that match the primer(s) on the vehicle
- Apply basecoat to full hiding; allow proper flash time between coats
- Apply clearcoat to half the panel OR split panel into equal sections for a let-down panel
- Apply increasing coats of midcoat color in each section of the let-down panel
- Allow to dry completely
- Assist to check color match
- After testing, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Explain the purpose of the test or let-down panel
- Explain when to use a test panel or a let-down panel
- Describe appropriate painting techniques for painting basecoats, single-stage top coats, multi-stage coats, blending, spot painting, etc.

Comments:

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Competency

15. Assist to check color match; tint as necessary

Performance Standard Condition

Competence will be demonstrated

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

Performance will be successful when learners:

- Obtain equipment & materials needed
- Review safety & service procedures
- Test paint mixture on a test panel or let-down panel
- Compare panel to vehicle
- Assist to evaluate color match
- Run through possible reasons for a mismatch; tint only as a last resort
- Verify the paint code was correct, proper paint was mixed, test panel was made correctly, and that the panel was compared in the proper light, on a clean vehicle using the correct views
- Check manufacturer variance formulas
- If there is no variance formula, tint to a blendable match
- Verify formula
- Plot color on color plotting chart
- Use only half the can of paint
- Using one tinting base within the color formula at a time
- Check color after every adjustment
- Keep records of tinting process in case more needs to be mixed
- After tinting, cleanup work area, return tools to proper location, complete appropriate documentation

Learning Objectives

- Describe safety practices related to personal protection, equipment & materials for this process
- Discuss the differences between matching solid colors, metallic finishes, & multi-stage finishes
- List possible reasons for a color mismatch
- Define tinting
- Explain how to use a kill chart to tint
- Explain how to tint solid & metallic colors
- Describe the difference between tinting and blending
- Identify the following common paint/finish imperfections and how to correct them:
 - excessive or lack of texture (orange peel)
 - overspray
 - sags and runs
 - sandscratch swelling
 - color mismatch

- delamination (poor adhesion, peeling)
- cracking (crows feet or line-checking, micro-checking, etc.)
- water spotting, damage caused by bird droppings, tree sap and other natural causes
- damage caused by airborne contaminants, (acids, soot, rail dust, chemicals and other industrial-related causes)
- damage caused by buffing/polishing painted surfaces and improper topcoat blend

Comments: