



Burlington County Institute of Technology

Medford Campus

Career and Technical Programs

Career Cluster: *Transportation, Distribution, and Logistics*

Program Name: *Autobody/Collision & Repair Technology/Technician*

Program Title: *Auto Body Technology*

CIP Code: *470603*

Board Approval Date: August, 2023



Program of Study

→ Grade 9

- ◆ Introduction to Auto Collision Repair
- ◆ Introduction to Auto Body Welding

→ Grade 10

- ◆ Introduction to Automotive Refinishing
- ◆ Introduction to Structural Analysis and Damage Repair
- ◆ Advanced Non-structural Analysis and Damage Repair

→ Grade 11

- ◆ Advanced Automotive Refinishing
- ◆ Advanced Structural Analysis and Damage Repair
- ◆ Introduction to Basic Automotive Mechanical Repair

→ Grade 12

- ◆ Custom Painting and Color Matching
- ◆ Custom Auto Body Modifications
- ◆ Advanced Welding and Plastic Repair
- ◆ Auto Collision Repair Business



→ Program Descriptor

- ◆ The Auto Collision Repair program is designed to equip students with the skills needed for a demanding profession in the auto collision repair sector. Through this program, students gain expertise in identifying, removing, replacing, and repairing various components of automobile bodies, including glass and upholstery. The curriculum is designed to challenge and prepare students for the competitive and evolving job opportunities within the automotive industry. To achieve this, the program adheres to the rigorous standards set by the National Institute for Automotive Service Excellence (A.S.E.).
- ◆ Within the program, students work diligently to attain "Student ASE Certifications." These four certifications, which are provided by ASE, are available to high school students enrolled in the collision repair program. Students are presented with the chance to sit for the certification exams twice a year, beginning in their Sophomore year. The four certification exams cover areas such as painting and refinishing, non-structural repair, structural repair, and mechanical repair.

→ Program Outcome

- ◆ Upon completion of the Auto Collision Repair Technology program, students will achieve proficiency in a range of essential skills for the ACRT industry. As a testament to their expertise, students will earn four distinguished ASE certifications in areas including auto body collision, welding, refinishing, damage repair, and plastic repair. These certifications will equip graduates with the necessary qualifications for successful entry-level positions within the field.

→ Work Based Learning Opportunities

- ◆ Simulated Workplace Experience Career Preparation: All students will participate in our live auto collision repair shop. Students will gain experience in body, paint, and detail work.
- ◆ Non-Hazardous Career Preparation: Students will have the opportunity to enroll in our school-to-work program with local business partners in shop cleaning and maintenance, auto paint prepping, auto body helper, and detailing.

→ Industry Valued Credentials



- ◆ ASE Student Certification: Collision Repair and Refinish
- ◆ OSHA 10

Course Descriptions

1. Grade 9

- Introduction to Auto Collision Repair:* This course delves into the realm of Auto Collision Repair, also known as Auto Body Repair, providing foundational knowledge essential for grasping more advanced concepts in subsequent courses. You will be guided through the entire repair process of damaged vehicles, starting from their arrival at the repair facility, progressing through damage assessment, metal manipulation, filling, sanding, masking, painting, detailing, and concluding with the delivery to the customer. By the end of this course, all students will exhibit a 100% proficiency in comprehending both school and shop safety protocols and regulations. Students will master the analysis and restoration of non-structural damaged areas, employing fundamental procedures like part preparation, replacement, and adjustment, along with metal finishing techniques and the removal of glass and hardware for the purpose of aligning body panels.
- Introduction to Auto Body Welding:* When dealing with extensive collision repair tasks, a significant portion of a vehicle's panels often necessitates replacement and welding for proper placement. As you delve into this subject, you'll realize that this process demands a high degree of skill and precision. The overall structural soundness of the vehicle hinges on the quality of your welding and panel installation. This course serves as an introduction to various methods of joining metals and plastics, including



Mechanical, Chemical, and, notably, Welding. Mastery of welding is a crucial skill for any aspiring first-class technician. Throughout the course, students will become acquainted with specific equipment, such as M.I.G. welding, Oxy-Acetylene welding, and Spot welding. They will also gain proficiency in setting up and operating these diverse welding tools, along with learning how to effectively weld high-strength steel using M.I.G. welding equipment.

2. Grade 10

- a. *Introduction to Automotive Refinishing:* This course outlines the essential procedures for readying refinishing equipment and the paint shop area, enabling students to effectively undertake vehicle painting tasks. Within the realm of refinishing operations, numerous factors linked to the workshop and equipment come into play. These encompass the painting environment, the functionality of painting equipment, and the necessary adjustments. Throughout this course, you will acquire the skills to manage these variables and others. Students will become proficient in prepping diverse surfaces for refinishing. Furthermore, they will gain hands-on experience with various types of spray guns used for refinishing a variety of paints. Additionally, the course will introduce students to the mixing of different undercoat types utilized within the auto body trade. A comprehensive understanding of paint application issues, paint defects, their root causes, and corresponding remedies will also be covered. This knowledge will be assessed through written tests and practical applications, overseen by the instructor.
- b. *Introduction to Structural Analysis and Damage Repair:* The concept of Vehicle Construction pertains to the assembly process of passenger cars, trucks, vans, and SUVs at the factory. A typical vehicle comprises over 15,000 components, all orchestrated to function harmoniously and offer a secure and reliable mode of transportation. As you delve into this subject, you'll come to recognize that the modern automobile stands as one of the most remarkable feats of human engineering. This course aims to acquaint students with the "Auto Parts Vocabulary" essential for becoming a proficient Auto Body Repair Technician. Moreover, students will gain insights into identifying areas of structural damage, employing techniques like base frame inspections and repair procedures. They will also learn about uni-body inspection measurements and corresponding repair methodologies. Additionally, the course will introduce students to restoring vehicles to their original conditions as specified by manufacturers, encompassing frame and underbody component repairs.
- c. *Advanced Non-Structural Analysis and Damage Repair:* This course guides students through a progression from foundational metalworking skills to the comprehensive analysis and restoration of



substantial collision damage. Among the crafts essential to a collision repair technician, metalworking skills stand as paramount, yet they often remain overlooked. An untrained individual might expend more effort shaping and molding an excessive layer of body filler than they would correcting the damaged metal itself. To address this concern, this course equips students with the ability to assess and mend non-structural areas of damage. This involves mastering the fundamental stages of preparation, part replacement, and adjustment, as well as refining metal finishing techniques, becoming proficient in M.I.G. welding, and conducting glass and hardware removal to align body panels properly. As the modern automobile incorporates a growing array of composite materials, a section of this course will also encompass the repair and replacement of these materials.

3. Grade 11

- a. *Advanced Automotive Refinishing:* In the contemporary context, accomplished refinishers take particular pride in achieving a flawless topcoat of paint that seamlessly corresponds to both the color and texture of the original or OEM finish. The responsibility of the skilled painter extends to satisfying customers with a paint application that not only presents a visually pleasing appearance but also withstands various weather conditions over time. This course will also provide students with an introduction to modern high-solids, low volatile organic compound (VOC) paints, as well as high-efficiency spray guns. Students will engage in the process of mixing, matching, and applying diverse types of paints utilized in the auto body trade. Furthermore, participants will develop the capability to troubleshoot paint application issues, address paint defects, understand their causes, and implement effective remedies. The assessment of these skills will encompass written tests and practical applications, supervised by the instructor.
- b. *Advanced Structural Analysis and Damage Repair:* In this course, students will develop the expertise to assess structural damage in vehicles. Through comprehensive instruction in base frame inspections and repair methodologies, as well as unibody inspection measurements and repair procedures, participants will acquire the skillset necessary to restore frames and underbody components to their original manufacturer's specifications. Successful completion of this course requires achieving a minimum proficiency level of 70%..
- c. *Introduction to Basic Automotive Mechanical Repair:* Contemporary collision repair technicians frequently encounter the need to address mechanical chassis components as part of extensive auto body repair work. Within this course, students will become acquainted with the mechanical aspects of



vehicles. Encompassing an array of components, the curriculum will cover topics such as front and rear suspension systems, brake systems, cooling systems, basic electrical troubleshooting, as well as belts and hoses. Through this comprehensive instruction, students will gain a foundational understanding of these mechanical elements crucial to successful collision repair.

4. Grade 12

- a. **Custom Painting and Color Matching:** This course offers students a comprehensive education in both fundamental and advanced techniques for refinishing automobiles, whether they are damaged or undamaged. Students will delve into a range of essential skills, encompassing color theory, precise color matching, tinting methods, the application of multi-stage finishes, the process of let down panels, and foundational approaches to custom paintwork. Through hands-on instruction and theoretical principles, students will develop a robust skill set in automotive refinishing. Students will learn the fundamental and advanced level techniques for refinishing both damaged and undamaged automobiles. These skills will include color theory, color matching, tinting, multi-stage finishes, let down panels and basic methods of custom paint work.
- b. **Custom Auto Body Modifications:** This course provides students with a comprehensive exploration of both fundamental and advanced techniques for repairing automobiles, whether they have sustained damage or remain undamaged. Students will engage in an in-depth study of essential skills, encompassing custom sheet metal fabrication, advanced repairs involving fiberglass and plastics, as well as an introduction to body modifications and suspension systems. Through hands-on learning and theoretical understanding, students will acquire a versatile skill set in automotive repair.
- c. ***Advanced Welding and Plastic Repair:*** In this advanced welding and plastic repair course, students will be provided with a unique opportunity to refine their skills. The curriculum delves into both fundamental and advanced techniques required for repairing modern high-tech automobiles. Throughout the course, students will gain hands-on experience working with a variety of materials including aluminum, sheet molded compounds, plastics, and high-strength steels. This comprehensive training equips students to address the complexities of automotive repair in today's technologically advanced vehicles.
- d. ***Auto Collision Repair Business:*** This course offers students an in-depth understanding of the essentials required to effectively manage an auto collision repair facility. Encompassing a range of critical skills, students will delve into advanced damage estimating, customer interactions, fostering employer-employee relations, navigating insurance company interactions, and various other pertinent



topics. The course places a specific emphasis on the business aspects of the repair industry, equipping students with the knowledge needed for successful facility management.



Curriculum Maps

Course: Safety

Unit: OSHA 10

Length: 1 Week

Standards

- 9.3.12.AG-FD.1 Develop and implement procedures to ensure safety, sanitation and quality in food product and processing facilities.
- 9.3.12.AC-CST.5 Apply practices and procedures required to maintain jobsite safety.
- 9.3.12.AR.2 Analyze the importance of health, safety and environmental management systems, policies and procedures common in arts, audio/video technology and communications activities and facilities.
- 9.3.12.ED.4 Evaluate and manage risks to safety, health and the environment in education and training settings.
- 9.3.HT-RFB.2 Demonstrate safety and sanitation procedures in food and beverage service facilities.
- 9.3.HU-ED.5 Evaluate safety and sanitation procedures associated with the early childhood education environment to assure compliance and prevent potential hazards.
- 9.3.LW.4 Conduct law, public safety, corrections and security work tasks in accordance with employee and employer rights, obligations and responsibilities, including occupational safety and health requirements.
- 9.3.LW-ENF.8 Explain the appropriate techniques for managing crisis situations in order to maintain public safety.
- 9.3.MN.3 Comply with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 9.3.MN-HSE.3 Demonstrates a safety inspection process to assure a healthy and safe manufacturing environment.
- 9.3.MN-HSE.5 Evaluate continuous improvement protocols and techniques in health, safety and/or environmental practices.
- 9.3.12.TD.5 Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.



- 9.3.12.TD-HSE.1 Describe the health, safety and environmental rules and regulations in transportation, distribution and logistics workplaces.
- 9.3.12.TD-OPS.3 Comply with policies, laws and regulations in order to maintain safety, security and health and mitigate the economic and environmental risk of transportation operations.

Essential Question(s)

- Why is it important to practice safety?
- What do safe practices look like in my industry?
- How can I keep myself and others safe?

Content

- Walking working surfaces
- Emergency action plans
- Fire protection
- Electrocution hazards
- Personal protective equipment
- Hazard communication
- Materials handling, storage, use and disposal.

Skills

- Explain why OSHA is important to workers.
- Explain workers rights under OSHA
- Discuss employer responsibilities under OSHA.
- Discuss the use of OSHA standards.
- Explain how OSHA inspections are conducted.
- Utilize helpful worker safety and health resources.
- Identify hazards in the workplace associated with walking and working surfaces.



- Identify best practices for eliminating or controlling hazards associated with walking and working surfaces in the workplace.
- Recognize employer requirements to protect workers from walking and working surface hazards.
- Recognize benefits of an Emergency Action Plan.
- Identify elements of the Fire Protection Plan.
- Identify conditions under which evacuation actions may be necessary in an emergency situation.
- Identify conditions under which shelter-in-place may be necessary in an emergency situation.
- Identify characteristics of an effective emergency escape route.
- Recognize the five types of fire extinguishers, including the types of fires they can extinguish.
- Review requirements for proper maintenance of portable fire extinguishers.
- Identify major electrical hazards.
- Describe types of electrical hazards.
- Describe electrical protection methods.
- Recognize employer requirements to protect workers from electrical hazards.
- Recall employer responsibilities toward affected employees regarding PPE.
- Identify when face and head protection should be used.
- Recall which types of hand and foot protection should be used in a specific situation.
- Recognize the differences between respirator types.
- Identify the differences between full-body protection levels.
- Identify the employer's responsibilities under the HCS, including training requirements.
- Identify components of a Hazard Communication program.
- Describe requirements of the different types of Hazard Communication labels.
- Locate pertinent information about chemicals on labels, including other forms of hazard communication, to ensure "right to understanding" provisions of GHS requirements.
- Identify types of material handling equipment.
- Describe hazards associated with material handling activities (e.g., storage, use, and disposal).
- Identify methods to prevent hazards associated with material handling equipment.
- Recognize employer requirements to protect workers from material handling hazards
- Identify the main causes of machinery accidents.



- Recognize basic machinery parts that expose workers to hazards.
- Recognize workplace situations involving machinery that requires guarding.
- Identify the requirements for safeguards.
- Identify types of machine guards including types of devices used to safeguard machines.
- Identify strategies to control chemical hazards.
- Identify strategies to control biological hazards.
- Identify strategies to control physical hazards.
- Identify strategies to control ergonomic hazards.
- Identify OSHA requirements pertaining to bloodborne pathogens.
- List the potential routes of exposure from bloodborne pathogens.
- Identify the risks associated with Human Immunodeficiency Virus (HIV), Hepatitis B, and Hepatitis C Virus.
- Identify methods of preventing transmission of bloodborne pathogens & managing occupational exposures.
- Restate methods of the safe disposal of sharps.
- Recount steps which should be taken in the event of an exposure to a potential bloodborne pathogen.
- Recognize risk factors associated with work-related musculoskeletal disorders (MSD)s.
- Identify good posture.
- Describe safe lifting techniques.
- Identify ergonomic control methods for eliminating/reducing work-related MSDs.
- Identify the number one cause of death for U.S. teens.
- List eight risk factors for young drivers.
- Identify the biggest risk factor for young drivers.
- Define distracted driving.
- Provide examples and/or causes of distracted driving.
- Identify the biggest risk factor for distracted driving
- Discuss the risk of having other young passengers in the car.
- List some actions employers should take to keep employees safe while driving.
- List some actions employees can take to safely drive on the job.
- Define the term violence.
- Recall who is at risk for encountering workplace violence.



- Describe workplace violence prevention strategies.
- Identify how to StartSafe and StaySafe to prevent or lessen workplace violence.
- Recognize the costs of workplace accidents.
- Recognize the benefits of implementing an effective safety and health program.
- Describe the elements of an effective safety and health program.
- Identify three methods to prevent workplace hazards.

Assessments

- OSHA 10 Assessment and Certificate

Course: CTE

Unit: Career Awareness

Length: Woven Throughout

Standards

- 9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession.
- 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
- 9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
- 9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
- 9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.
- 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.



- 9.2.12.CAP.7: Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.
- 9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.
- 9.2.12.CAP.9: Locate information on working papers, what is required to obtain them, and who must sign them.
- 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans)
- 9.2.12.CAP.11: Demonstrate an understanding of Free Application for Federal Student Aid (FAFSA) requirements to apply for postsecondary education
- 9.2.12.CAP.12: Explain how compulsory government programs (e.g., Social Security, Medicare) provide insurance against some loss of income and benefits to eligible recipients.
- 9.2.12.CAP.13: Analyze how the economic, social, and political conditions of a time period can affect the labor market.
- 9.2.12.CAP.14: Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income
- 9.2.12.CAP.15: Demonstrate how exemptions, deductions, and deferred income (e.g., retirement or medical) can reduce taxable income.
- 9.2.12.CAP.16: Explain why taxes are withheld from income and the relationship of federal, state, and local taxes (e.g., property, income, excise, and sales) and how the money collected is used by local, county, state, and federal governments. •
- 9.2.12.CAP.17: Analyze the impact of the collective bargaining process on benefits, income, and fair labor practice. •
- 9.2.12.CAP.18: Differentiate between taxable and nontaxable income from various forms of employment (e.g., cash business, tips, tax filing and withholding). •
- 9.2.12.CAP.19: Explain the purpose of payroll deductions and why fees for various benefits (e.g., medical benefits) are taken out of pay, including the cost of employee benefits to employers and self-employment income.
- 9.2.12.CAP.20: Analyze a Federal and State Income Tax Return



- 9.2.12.CAP.21: Explain low-cost and low-risk ways to start a business.
- 9.2.12.CAP.22: Compare risk and reward potential and use the comparison to decide whether starting a business is feasible.
- 9.2.12.CAP.23: Identify different ways to obtain capital for starting a business

Essential Question(s)

- How does one prepare for a career?
- How does one improve marketability?
- Why is career planning important?
- What are the risks in starting a business?

Content

- There are strategies to improve one's professional value and marketability.
- Career planning requires purposeful planning based on research, self-knowledge, and informed choices.
- An individual's income and benefit needs and financial plan can change over time.
- Securing an income involve an understanding of the costs and time in preparing for a career field, interview and negotiation skills, job searches, resume development, prior experience, and vesting and retirement plans
- Understanding income involves an analysis of payroll taxes, deductions and earned benefits.
- There are ways to assess a business's feasibility and risk and to align it with an individual's financial goals

Skills

- Act as a responsible and contributing community member and employee.
- Attend to financial well-being.
- Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management.
- Plan education and career paths aligned to personal goals.



- Use technology to enhance productivity, increase collaboration and communicate effectively.
- Work productively in teams while using cultural/global competence.

Assessments

- Career Research Project
 - Resume/Cover Letter
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Course: Introduction to Auto Collision Repair

Length: Semester

Standards

- 9.3.12.TD.1 Describe the nature and scope of the Transportation, Distribution & Logistics Career Cluster and the role of transportation, distribution and logistics in society and the economy.
- 9.3.12.TD.2 Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems
- 9.3.12.TD.3 Describe the key operational activities required of successful transportation, distribution and logistics facilities.
- 9.3.12.TD.4 Identify governmental policies and procedures for transportation, distribution and logistics facilities.
- 9.3.12.TD.5 Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.
- 9.3.12.TD.6 Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution & Logistics Career Pathways.



- NATEF Standards
 - This unit addresses the following items on the NATEF Collision Repair Task List:
 - Painting and Refinishing, Task A1, Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations.
 - Painting and Refinishing, Task A2, Identify safety and personal health hazards according to OSHA guidelines and the “Right to Know Law.”
 - Non-Structural Analysis and Damage Repair (Body Components), Task E1, Identify weldable and non-weldable substrates used in vehicle construction.
 - Painting and Refinishing, Task B24, Identify metal parts to be refinished; determine the materials needed, preparation, and refinishing procedures.
 - Damage Analysis, Estimating and Customer Service, Task C1, Identify type of vehicle construction (space frame, unibody, body-over-frame).
 - Structural Analysis and Damage Repair, Task A3, Analyze, straighten and align mash (collapse) damage.
 - Structural Analysis and Damage Repair, Task A7, Analyze, straighten, and align diamond frame damage.
 - Structural Analysis and Damage Repair, Task A16, Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair.
 - Structural Analysis and Damage Repair, Task A17, Analyze and identify crush/collapse zones.
 - Painting and Refinishing, Task B14, Dry sand area to which finishing filler has been applied.
 - Damage Analysis, Estimating and Customer Service, Task A13, Identify suspension, electrical, and mechanical component physical damage.
 - Damage Analysis, Estimating and Customer Service, Task C1, Identify type of vehicle construction (space frame, unibody, body-over-frame).
 - Damage Analysis, Estimating and Customer Service, Task C2, Recognize the different damage characteristics of space frame, unibody, and body-over-frame vehicles.
 - Damage Analysis, Estimating.

Essential Question(s)



- How do vehicle classifications and safety ratings influence collision repair strategies?
- What are the different types of body shops and their roles in the industry?
- What steps are involved in effectively ordering parts and performing body and mechanical repairs in collision-damaged vehicles?

Content

- Vehicle and Repair Process
 - Vehicle classifications.
 - Vehicle production.
 - Vehicle safety rating.
 - Vehicle design factors.
 - Material types.
 - Vehicle parts.
 - Collision factors.
 - Damage.
- Collision Repair Basics:
 - Body shop types.
 - Collision repair industry jobs.
 - Educational opportunities.
 - Collision repair shop hazards.
 - Personal protective gear.
 - Safe work practices.
 - Hazardous waste.
 - Environmental regulations.
- Repair Procedures:
 - Ordering parts.
 - Body repairs.
 - Mechanical repairs.



- Refinishing.
- Reassembly.
- Detailing.

Skills

- Vehicle and Repair Process:
 - Understand different vehicle classifications and their significance in the collision repair industry.
 - Comprehend the various factors that influence vehicle production and design.
 - Explain the importance of vehicle safety ratings and their impact on repair decisions.
 - Identify the different types of materials used in vehicle manufacturing.
 - Recognize the key components and parts of a vehicle.
 - Analyze collision factors and their implications for repair processes.
 - Evaluate the extent of damage in various collision scenarios.
- Collision Repair Basics:
 - Differentiate between different types of body shops and their roles within the industry.
 - Explore various job opportunities available in the collision repair sector.
 - Investigate educational pathways and training options in collision repair.
 - Identify potential hazards in collision repair shops and implement personal protective measures.
 - Understand the importance of following safe work practices and adhering to environmental regulations.
 - Demonstrate knowledge of handling hazardous waste appropriately.
- Repair Procedures:
 - Apply effective methods for ordering necessary parts for repairs.
 - Demonstrate proficiency in performing body repairs on damaged vehicles.
 - Gain skills in addressing mechanical repair tasks in collision-damaged vehicles.
 - Execute refinishing techniques to restore a vehicle's appearance.
 - Successfully reassemble and detail a repaired vehicle, ensuring its readiness for return.



Assessments

- Given a scenario of a collision, students must identify the relevant collision factors and explain how they would impact the repair approach.
- Students will be presented with a list of common hazards in a collision repair shop and must describe appropriate personal protective gear for each hazard.
- Provide students with a list of damaged vehicle components, and have them create an order for the required replacement parts.
- Students will perform a hands-on MIG welding task on a practice metal piece and be evaluated based on the quality of their weld.
- Students will be presented with descriptions of different collision scenarios and must determine which type of metal repair is most suitable for each situation.
- Several quizzes weekly written and proficiency
- Written and proficiency Test
- Written and proficiency rubrics
- Observation and verbal quizzes
- Workbook and note taking

Course: Introduction to Body Welding

Length: Semester

Standards



- 9.3.12.TD.6 Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution & Logistics Career Pathways.
- NATEF Standards
 - This unit describes the purpose and use of general-purpose tools and equipment, as well as service information. Correlations to the NATEF Task List are not applicable.
 - Structural Analysis and Damage Repair, Task A3, Analyze, straighten and align mash (collapse) damage.
 - Structural Analysis and Damage Repair, Task A7, Analyze, straighten, and align diamond frame damage.
 - Structural Analysis and Damage Repair, Task A16, Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair.
 - Structural Analysis and Damage Repair, Task A17, Analyze and identify crush/collapse zones.
 - Painting and Refinishing, Task B14, Dry sand area to which finishing filler has been applied.
 - Damage Analysis, Estimating and Customer Service, Task A13, Identify suspension, electrical, and mechanical component physical damage.
 - Damage Analysis, Estimating and Customer Service, Task C1, Identify type of vehicle construction (space frame, unibody, body-over-frame).
 - Damage Analysis, Estimating and Customer Service, Task C2, Recognize the different damage characteristics of space frame, unibody, and body-over-frame vehicles.
 - Damage Analysis, Estimating.

Essential Question(s)

- Use of Tools:
 - How do collision repair technicians effectively utilize tools, equipment, and service information to ensure efficient and accurate repair processes?
- Welding Techniques:
 - What are the main welding methods used in collision repair, and how do they differ?
- Metal Properties and Repair Factors:
 - How do material properties and collision factors impact repair decisions?



Content

- Use of Tools
 - Tool storage.
 - General purpose hand tools.
 - Power tools.
 - Shop equipment.
 - Service information
- Welding Techniques:
 - Welding safety.
 - Welding fundamentals.
 - MIG welding.
 - Flux-cored arc welding.
 - Tungsten inert gas welding.
 - Resistance welding.
 - Oxy Acetylene torch.
 - Heating steel parts.
 - Brazing.
 - Cutting steel parts.
- Metal Properties and Repair Factors
 - Metal Properties.
 - Collision factors.
 - Damage.

Skills

- Use of Tools:
 - Demonstrate proper handling and use of a variety of tools commonly used in autobody repair.
 - Identify the appropriate tools required for specific repair tasks.
 - Apply safety protocols when using tools to prevent accidents and injuries.



- Tool Storage:
 - Understand the importance of organized tool storage for efficient workflow.
 - Develop a system for safely storing and retrieving tools, reducing the risk of damage or loss.
- General Purpose Hand Tools:
 - Familiarize oneself with a range of general purpose hand tools used in autobody repair.
 - Demonstrate the correct application of hand tools for tasks such as cutting, drilling, and shaping.
- Power Tools:
 - Differentiate between various power tools used in autobody repair and their specific functions.
 - Safely operate power tools, considering potential hazards and employing appropriate safety measures.
- Shop Equipment:
 - Identify common types of shop equipment utilized in autobody repair.
 - Gain proficiency in the operation and maintenance of shop equipment to ensure accuracy and safety.
- Service Information:
 - Interpret and effectively use service manuals, repair guides, and technical documentation.
 - Locate relevant information within service manuals to aid in diagnosing and repairing vehicle issues.
- Welding Techniques:
 - Implement proper safety precautions when engaging in welding activities.
 - Understand the fundamental principles of welding and its significance in collision repair.
 - Develop proficiency in MIG welding techniques for repairing damaged metal parts.
 - Acquire competence in flux-cored arc welding and its applications in collision repair.
 - Master the process of Tungsten Inert Gas (TIG) welding for precise repairs.
 - Learn the essentials of resistance welding and its role in joining metal components.
 - Demonstrate proficiency in using an oxyacetylene torch for cutting and heating steel parts.
 - Apply brazing techniques to join metal components effectively.
- Metal Properties and Repair Factors:
 - Explore the properties of different metals and how they influence repair decisions.
 - Analyze collision factors to determine the extent of damage and required repairs.

Assessments



- Practical Tool Demonstration: Students demonstrate the proper use of select tools for specific repair tasks.
- Tool Inspection Activity: Students assess a set of tools for damage and organize them correctly in a designated storage area.
- Hand Tool Application: Students perform a hands-on task using various general purpose hand tools, such as cutting, filing, or measuring.
- Power Tool Safety Quiz: Quiz that assesses students' knowledge of safety measures specific to operating power tools.
- Power Tool Demonstration: Students demonstrate the proper use of a power tool, emphasizing safety precautions.
- Weld Quality Assessment: Students weld samples and are assessed on the quality of their welds, considering factors like strength and appearance.
- Damage Assessment Exercise: Provide images of damaged vehicles and ask students to analyze the type of damage and its impact on repair decisions.

Course: Introduction to Automotive Refinishing

Length: Semester

Standards

- 9.3.12.TD.2 Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems.
- 9.3.12.TD.3 Describe the key operational activities required of successful transportation, distribution and logistics facilities.
- NATEF Standards:
 - Painting and Refinishing, Task C1, Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment).



- Painting and Refinishing, Task C4, Demonstrate an understanding of the operation of pressure spray equipment.
- Painting and Refinishing, Task E7, Identify overspray; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task B4, Strip paint to bare substrate (paint removal).
- Painting and Refinishing, Task B7, Apply suitable metal treatment or primer in accordance with total product systems.
- Painting and Refinishing, Task B9, Mix primer, primer-surfacer or primer-sealer.
- Painting and Refinishing, Task D1, Identify color code by manufacturer's vehicle information label.
- Painting and Refinishing, Task D2, Shake, stir, reduce, catalyze/activate, and strain refinish materials.
- Painting and Refinishing, Task D12, Identify and mix paint using a formula.
- Painting and Refinishing, Task D15, Identify alternative color formula to achieve a blendable match.

Essential Question(s)

- What are the core refinishing equipment pieces and their specific roles in achieving a high-quality finish?
- How does familiarity with additional refinishing equipment expand the capabilities of autobody repair technicians?
- What are the distinct types of paint used in refinishing, and how do their properties influence application and durability?
- How do different components in paint formulations contribute to the overall quality and performance of a finish?
- Why are topcoats and undercoats crucial in the refinishing process, and how do they contribute to the final appearance and protection of a vehicle?
- What are the various techniques used to apply topcoats and undercoats, and how does each method impact the final outcome?
- What factors should be considered when choosing between chemical paint removal and other methods of surface preparation?
- How does paint reduction affect the viscosity of paint, and why is it essential for achieving desired application results?



Content

- Tools:
 - Hand tools.
 - Power tools.
- Refinishing Equipment:
 - Refinishing equipment.
 - Additional refinishing equipment.
- Paint Types and Components:
 - Types of paint.
 - Paint components.
- Paint Application:
 - Topcoats.
 - Undercoats.
- Paint Preparation and Techniques:
 - Abrasives.
 - Chemical paint removal.
 - Paint mixing.
 - Paint reduction.

Skills

- Hand Tools:
 - Identify a variety of hand tools used in auto body repair and understand their specific functions.
 - Demonstrate proper usage and handling techniques of different hand tools.
- Power Tools:
 - Differentiate between various power tools commonly employed in auto body repair.
 - Safely operate power tools, adhering to established safety guidelines.
- Refinishing Equipment:



- Recognize essential refinishing equipment utilized in auto body repair processes.
- Comprehend the functions and applications of different refinishing equipment.
- Paint Types and Components:
 - Distinguish between different types of paint used in refinishing vehicles.
 - Explain the role and significance of various components in paint formulations.
- Paint Application:
 - Understand the purpose and characteristics of topcoats in vehicle refinishing.
 - Grasp the importance of undercoats and their role in achieving a high-quality finish.
- Paint Preparation and Techniques:
 - Explore the variety of abrasives used in paint preparation and surface refinement.
 - Describe the process and techniques of chemical paint removal for effective surface preparation.
 - Learn the process of paint mixing and understand the importance of accurate proportions.
 - Understand the concept of paint reduction and its role in achieving desired viscosity.

Assessments

- Equipment Application: Students explain how a specific piece of refinishing equipment is used in a refinishing process.
- Paint Components Quiz: Students match paint components with their respective roles in a paint formulation.
- Application Methods: Students describe various techniques for applying topcoats and undercoats.
- Paint Mixing Practical: Students mix paint in accurate proportions and explain the importance of proper mixing.
- Paint Reduction Effectiveness: Students discuss the significance of paint reduction in achieving the desired viscosity for a particular application.



Repair

Standards

- 9.3.12.TD.2 Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems.
- 9.3.12.TD.3 Describe the key operational activities required of successful transportation, distribution and logistics facilities.
- NATEF Standards:
 - Structural Analysis and Damage Repair, Task A2, Attach vehicle to anchoring devices
 - Structural Analysis and Damage Repair, Task A1, Measure and diagnose structural damage using a tram gauge.
 - Structural Analysis and Damage Repair, Task A14, Measure and diagnose structural damage using a three-dimensional measuring system (mechanical, electronic, laser), etc.
 - Structural Analysis and Damage Repair, Task A15, Measure and diagnose structural damage using a dedicated (fixture) measuring system.
 - Structural Analysis and Damage Repair, Task B3, Measure and diagnose unibody damage and using tram gauge.
 - Structural Analysis and Damage Repair, Task B4, Determine and inspect the locations of all suspension, steering, and powertrain component attaching points on the vehicle.
 - Structural Analysis and Damage Repair, Task B5, Measure and diagnose unibody vehicles using a dedicated (fixture) measuring system.
 - Structural Analysis and Damage Repair, Task B6, Diagnose and measure unibody vehicles using a three-dimensional measuring system (mechanical, electronic, and laser, etc.).
 - Damage Analysis, Estimating, and Customer Service, Task A9, Identify structural damage using measuring tools and equipment.

Essential Question(s)



- How do different frame machine types impact the efficiency and accuracy of auto body repairs?
- What are the key features of various frame machine options, and how do they cater to different repair scenarios?
- How does the choice of frame machine type affect the versatility and adaptability of an auto body repair shop?
- Why are precise measurements crucial in auto body repair, especially after a collision?
- What distinguishes one-dimensional, two-dimensional, and three-dimensional measurements in the context of assessing vehicle structural integrity?
- How can accurate measurements aid in identifying hidden structural deviations caused by collisions?
- What safety precautions and guidelines should be followed when using pulling equipment for auto body repairs?
- How does proper calibration of pulling equipment contribute to the success of repair operations?
- What are the fundamental steps to ensure safe and effective use of pulling equipment when addressing different types of collision damage?
- Why is creating accurate damage diagrams essential in the auto body repair process?
- How do comprehensive damage diagrams assist repair technicians and insurance assessors in understanding the extent of collision damage?
- What role do damage diagrams play in streamlining communication between repair professionals, insurers, and vehicle owners during the repair estimation process?

Content

- Frame Machine Types:
 - Pulling Equipment
 - Pulls
- Measurement Types:
 - Linear Measurements
 - One-Dimensional Measurement
 - Two-Dimensional Measurements
 - Three-Dimensional Measurements



- Additional:
 - Damage Diagram

Skills

- Frame Machine Types:
 - Understand the various types of frame machines used in auto body repair and their specific functions.
 - Identify the essential components and features of different frame machine types utilized in collision repair shops.
 - Compare and contrast frame machine options, considering factors such as structural repair capabilities, versatility, and ease of use.
- Measurement Types:
 - Define and grasp the significance of linear measurements in auto body repair for ensuring precise alignment and accurate repairs.
 - Differentiate between one-dimensional, two-dimensional, and three-dimensional measurements in the context of assessing and restoring vehicle body integrity.
 - Apply knowledge of measurement types to identify and rectify deviations in a vehicle's structure caused by collisions.
- Pulling Equipment:
 - Proficiently set up, operate, and maintain pulling equipment for auto body repairs, adhering to industry best practices.
 - Understand the importance of proper equipment calibration and its impact on achieving accurate repairs and vehicle safety.
 - Employ safe and effective techniques when using pulling equipment to address various types of collision-induced damage.
- Damage Diagram:
 - Develop the skill to create comprehensive and precise damage diagrams to assess, communicate, and document auto body damage effectively.



- Apply knowledge of damage diagrams to enhance the accuracy of repair estimates and facilitate smoother communication with insurance providers.
- Utilize damage diagrams as visual aids to guide repair processes, ensuring alignment with industry standards and safety regulations.
- These objectives are tailored specifically to auto body repair and aim to equip students with the necessary knowledge and skills for success in the field.

Assessments

- Students will use measuring tools to document structural deviations and propose repair recommendations based on industry tolerances.
- Teams of students will collaborate to devise and execute a repair plan using pulling equipment, addressing different types of damage.
- Students will choose a photograph of vehicle damage and create detailed damage diagrams, evaluated for accuracy and clarity.
- Quizzes, tests, practicals

Course: Advanced non-structural Analysis and Damage Repair

Length: Semester

Standards

- 9.3.12.TD.2 Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems.



- 9.3.12.TD.5 Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.
- 9.3.12.TD.6 Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution & Logistics Career Pathways.
- NATEF Standards:
 - Non-Structural Analysis and Damage Repair (Body Components), Task A1, Review damage report and analyze damage to determine appropriate methods of overall repair; develop and document a repair plan.
 - Non-Structural Analysis and Damage Repair (Body Components), Task A2, Inspect, remove, label, store, and reinstall exterior trim and moldings.
 - Non-Structural Analysis and Damage Repair (Body Components), Task A3, Inspect, remove, label, store, and reinstall interior trim and components.
 - Non-Structural Analysis and Damage Repair (Body Components), Task A4, Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair.
 - Non-Structural Analysis and Damage Repair (Body Components), Task A5, Inspect, remove, label, store, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair.
 - Non-Structural Analysis and Damage Repair (Body Components), Task A6, Protect panels, glass, interior parts, and other vehicles adjacent to the repair area.
 - Non-Structural Analysis and Damage Repair (Body Components), Task B1, Determine the extent of direct and indirect/hidden damage and direction of impact; develop and document a repair plan.
 - Non-Structural Analysis and Damage Repair (Body Components), Task B2, Inspect, remove, and replace bolted, bonded, and welded steel panel or panel assemblies.
 - Non-Structural Analysis and Damage Repair (Body Components), Task B3, Determine the extent of damage to aluminum body panels; repair or replace.
 - Non-Structural Analysis and Damage Repair (Body Components), Task B10, Straighten contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pulling attachments.



- Non-Structural Analysis and Damage Repair (Body Components), Task C2, Locate and repair surface irregularities on a damaged body panel.
- Non-Structural Analysis and Damage Repair (Body Components), Task C3, Demonstrate hammer and dolly techniques.
- Non-Structural Analysis and Damage Repair (Body Components), Task A4, Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair.
- Non-Structural Analysis and Damage Repair (Body Components), Task A5, Inspect, remove, label, store, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair.
- Non-Structural Analysis and Damage Repair (Body Components), Task A10, Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.
- Non-Structural Analysis and Damage Repair (Body Components), Task B4, Inspect, remove, replace, and align hood, hood hinges, and hood latch.
- Non-Structural Analysis and Damage Repair (Body Components), Task B5, Inspect, remove, replace, and align deck lid, lid hinges, and lid latch.
- Non-Structural Analysis and Damage Repair (Body Components), Task B6, Inspect, remove, replace, and align doors, latches, hinges, and related hardware.
- Non-Structural Analysis and Damage Repair (Body Components), Task B7, Inspect, remove, replace, and align tailgates, hatches, lift gates and sliding doors.
- Non-Structural Analysis and Damage Repair (Body Components), Task B8, Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware.
- Non-Structural Analysis and Damage Repair (Body Components), Task B9, Inspect, remove, replace, and align fenders and related panels.
- Non-Structural Analysis and Damage Repair (Body Components), Task B13, Replace door skins.
- Damage Analysis, Estimating and Customer Service, Task C4, Identify steel types; determine repairability.
- Structural Analysis and Damage Repair, Task A1, Identify weldable and non-weldable substrates used in vehicle construction.



- Structural Analysis and Damage Repair, Task A12, Determine the joint type (butt weld with packing, lap, etc.) for weld being made.
- Non-Structural Analysis and Damage Repair (Body Components), Task B11, Weld damaged or torn steel body panels; repair broken welds.
- Non-Structural Analysis and Damage Repair (Body Components), Task B12, Restore corrosion protection.
- Non-Structural Analysis and Damage Repair (Body Components), Task B15, Perform panel bonding and weld bonding.
- Non-Structural Analysis and Damage Repair (Body Components), Task D3, Inspect, repair or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs.
- Non-Structural Analysis and Damage Repair (Body Components), Task F1, Identify the types of plastics; determine repairability.
- Non-Structural Analysis and Damage Repair (Body Components), Task F2, Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures.
- Non-Structural Analysis and Damage Repair (Body Components), Task F3, Repair rigid,
 - semi-rigid, or flexible plastic panels.
- Non-Structural Analysis and Damage Repair (Body Components), Task F4, Remove or repair damaged areas from rigid exterior composite panels.
- Non-Structural Analysis and Damage Repair (Body Components), Task F5, Replace bonded rigid exterior composite body panels;
- Damage Analysis, Estimating and Customer Service, Task C6, Identify plastic/composite components; determine repairability.
- Structural Analysis and Damage Repair, Task A1, Remove and reinstall or replace fixed glass (heated and non-heated) using recommended materials and techniques.
- Structural Analysis and Damage Repair, Task A2, Remove and reinstall or replace modular glass using recommended materials.
- Structural Analysis and Damage Repair, Task A3, Check for water leaks, dust leaks, and wind noise.
- Non-Structural Analysis and Damage Repair (Body Components), Task D1,



- Inspect, adjust, repair, or replace window regulators, run channels, glass, power mechanisms, and related controls.
- Damage Analysis, Estimating and Customer Service, Task C7, Identify vehicle glass components and repair/replacement procedures.

Essential Question(s)

- How do you locate reliable sources for obtaining replacement parts in the auto body repair industry?
- What are the key steps involved in replacing bolted parts during auto body repair processes?
- How does the replacement of specific bolted parts contribute to the overall repair of a vehicle?
- What are the essential steps for safely and effectively replacing welded and bonded non-structural panels?
- How do you determine which specific nonstructural panels require replacement in a given autobody repair scenario?
- How does the selection and replacement of non-structural panels impact the overall structural integrity of a vehicle?
- How are plastics classified in the autobody repair context, and why is this classification important?
- What tools and materials are essential for successful plastic repair in the autobody industry?
- What are the step-by-step procedures involved in repairing damaged plastic components?
- How does the approach to repairing specific types of plastic damage vary, and what considerations are involved?
- What are the distinct types of glass commonly found in vehicles, and how do their properties differ?
- How do you differentiate between movable and fixed glass in auto body repair, and what are their individual challenges and solutions?
- What tools are necessary for safely removing and installing glass components during repair and replacement tasks?
- What factors should be considered to ensure effective and safe glass repair and replacement services?

Content

- Part Replacement:



- Part sources.
- Bolted part replacement steps.
- Replacing specific bolted parts.
- Non-Structural Panel Replacement:
 - Welded and bonded non-structural panel replacement steps.
 - Replacing specific nonstructural panels.
- Plastic Repair:
 - Classifying plastics.
 - Tools and materials.
 - Plastic repair steps.
 - Repairing specific types of plastic damage.
- Glass Repair and Replacement:
 - Types of glass.
 - Movable and fixed glass.
 - Glass removal and installation tools.
 - Glass service.

Skills

- Part Replacement:
 - Identify diverse sources for obtaining replacement parts used in auto body repair.
 - Understand the systematic steps involved in replacing bolted parts within the auto body repair process.
 - Execute bolted part replacement tasks with precision and attention to detail.
 - Apply appropriate procedures to replace specific bolted parts, considering vehicle make and model.
- Non-Structural Panel Replacement:
 - Familiarize oneself with the steps for replacing welded and bonded non-structural panels in auto body repair.
 - Skillfully perform the replacement of specific nonstructural panels, adhering to industry standards.



- Differentiate between various non-structural panels and their individual replacement requirements.
- Plastic Repair:
 - Categorize different types of plastics commonly encountered in auto body repair.
 - Recognize and proficiently utilize the essential tools and materials necessary for plastic repair.
 - Implement step-by-step plastic repair techniques to effectively restore damaged plastic components.
 - Apply targeted plastic repair strategies to address specific types of plastic damage.
- Glass Repair and Replacement:
 - Differentiate between different types of glass used in vehicles, considering their properties and applications.
 - Distinguish between movable and fixed glass and comprehend their respective repair and replacement procedures.
 - Acquire proficiency in using glass removal and installation tools for safe and accurate glass-related tasks.
 - Demonstrate competency in providing glass repair and replacement services, ensuring quality and safety.

Assessments

- Practical Demonstration: Students perform a hands-on task of replacing a bolted part, following the correct steps and techniques.
 - Plastic Classification Quiz: Students categorize various plastic samples based on their properties and characteristics.
 - Hands-On Task: Students complete a plastic repair task, demonstrating their proficiency in using the required tools and materials.
 - Practical Test: Students demonstrate their ability to safely remove and install movable and fixed glass using appropriate tools.
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Course: Advanced Automotive Refinishing

Length: Semester

Standards

- 9.3.12.TD.2 Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems.
- 9.3.12.TD.3 Describe the key operational activities required of successful transportation, distribution and logistics facilities.
- NATEF:
 - Painting and Refinishing, Task C2, Select spray gun setup (fluid needle, nozzle, and cap for product being applied).
 - Painting and Refinishing, Task C3, Test and adjust spray gun using fluid, air and pattern control valves.
 - Painting and Refinishing, Task D3, Apply finish using appropriate spray techniques (gun arc, angle, distance, travel speed, and spray pattern overlap) for the finish being applied.
 - Painting and Refinishing, Task D4, Apply selected product on test and let-down panel; check for color match.
 - Painting and Refinishing, Task D6, Apply basecoat/clearcoat for panel blending and panel refinishing.
 - Painting and Refinishing, Task E5, Identify clouding (mottling and streaking in metallic finishes); determine the cause(s) and correct the condition.
 - Non-Structural Analysis and Damage Repair (Body Components), Task A7, Soap and water wash entire vehicle; complete pre-repair inspection checklist.
 - Non-Structural Analysis and Damage Repair (Body Components), Task A8, Prepare damaged area using water-based and solvent-based cleaners.
 - Non-Structural Analysis and Damage Repair (Body Components), Task C1, Remove paint from the damaged area of a body panel.
 - Non-Structural Analysis and Damage Repair (Body Components), Task D2, Inspect, adjust, repair, remove, reinstall or replace weather-stripping.
 - Painting and Refinishing, Task B1, Inspect, remove, store, and replace exterior trim and components necessary for proper surface preparation.



- Painting and Refinishing, Task B2, Soap and water wash the entire vehicle; use appropriate cleaner to remove contaminants.
- Painting and Refinishing, Task B3, Inspect and identify type of finish, surface condition, and film thickness; develop and document a plan for refinishing using a total product system.
- Painting and Refinishing, Task B4, Strip paint to bare substrate (paint removal).
- Painting and Refinishing, Task B5, Dry or wet sand areas to be refinished.
- Painting and Refinishing, Task B6, Featheredge areas to be refinished.
- Painting and Refinishing, Task B8, Mask and protect other areas that will not be refinished.
- Painting and Refinishing, Task B12, Apply two-component finishing filler to minor surface imperfections.
- Painting and Refinishing, Task B13, Block sand area to which primer-surfacer has been applied.
- Painting and Refinishing, Task B15, Remove dust from the area to be refinished, including cracks or moldings of adjacent areas.
- Painting and Refinishing, Task B16, Clean area to be refinished using a final cleaning solution.
- Painting and Refinishing, Task B17, Remove, with a tack rag, any dust or lint particles from the area to be refinished.
- Painting and Refinishing, Task B19, Scuff sand to remove nibs or imperfections from a sealer.
- Painting and Refinishing, Task B20, Apply stone chip resistant coating.
- Painting and Refinishing, Task B21, Restore caulking and seam sealers to repaired areas.
- Painting and Refinishing, Task B22, Prepare adjacent panels for blending.
- Painting and Refinishing, Task D6, Apply basecoat/clearcoat for panel blending and panel refinishing.
- Painting and Refinishing, Task E7, Identify overspray; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E15, Identify poor adhesion; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E16, Identify paint cracking (shrinking, splitting, crows feet or line-checking, micro-checking, etc.); determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E17, Identify corrosion; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E20, Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.



- Painting and Refinishing, Task E23, Identify chalking (oxidation); determine the cause(s) and correct the condition.
- Damage Analysis, Estimating and Customer Service, Task C5, Identify aluminum/magnesium components; determine repairability.
- Painting and Refinishing, Task E6, Identify orange peel; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E9, Identify sags and runs in paint surface; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E12, Identify color difference (off-shade); determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E14, Identify low gloss condition; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E18, Identify dirt or dust in the paint surface; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E21, Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition.
- Painting and Refinishing, Task E22, Identify dieback conditions (dulling of the paint film showing haziness); determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E26, Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition.
- Painting and Refinishing, Task F1, Apply decals, transfers, tapes, woodgrains, pinstripes (paint and taped, etc.).
- Painting and Refinishing, Task F2, Sand, buff and polish fresh or existing finish to remove defects as required.
- Painting and Refinishing, Task F3, Clean interior, exterior, and glass.
- Painting and Refinishing, Task F4, Clean body openings (door jambs and edges, etc.).
- Painting and Refinishing, Task F5, Remove overspray.
- Painting and Refinishing, Task F6, Perform vehicle clean-up; complete quality control using a check



Essential Question(s)

- What are the foundational painting techniques essential for auto body repair, and how do they contribute to the overall repair process?
- How does adhering to safety protocols and wearing proper personal protective equipment (PPE) enhance your effectiveness when practicing basic painting skills in auto body repair?
- What are the key principles of effective spray gun handling, and how do they impact the quality of paint application on auto body surfaces?
- How do you determine the appropriate spray gun technique based on the unique requirements of a specific auto body repair job?
- What factors should you consider when applying spray gun techniques to ensure even coverage and minimize overspray on auto body panels?
- How does the understanding of environmental conditions, such as temperature and humidity, influence your choice and execution of spray gun techniques?
- What are the essential steps for proper cleaning and maintenance of spray guns to ensure their optimal performance and longevity in auto body repair?
- Why is proper surface preparation crucial in auto body repair, and how does it contribute to the longevity and quality of the paint finish?
- How do you tailor surface preparation techniques to address different types of auto body damage, such as scratches, dents, and corrosion?
- What is the purpose of color sanding in auto body repair, and how does it contribute to achieving a smooth and flawless finish?
- How do buffing techniques enhance the appearance of painted auto body surfaces and restore gloss?
- What are some common paint surface defects specific to auto body finishes, and how can they be effectively identified and rectified?
- How does paintless dent repair offer a non-invasive solution for removing minor dents from auto body panels, and what are its benefits?
- Why is precision crucial when applying pinstripe tape, adhesive-attached plastic molding, and riveted-on molding clips to auto body surfaces, and how does it impact the overall aesthetics and functionality?



- What considerations should be taken into account when applying decals to auto body surfaces to ensure accurate alignment and bubble-free application?
- What are the essential steps for ensuring a thorough clean-up after completing auto body painting tasks, and why is maintaining a clean workspace important?
- How do you identify and address post-painting defects or imperfections specific to auto body finishes to achieve a polished and professional outcome?

Content

- Basic Painting Skills:
 - Basic painting skills.
- Spray Gun Techniques:
 - Spray gun handling.
 - Match the technique to the job.
 - Spraying body panels.
 - Other painting considerations.
 - Spray gun cleaning.
- Surface Preparation:
 - Basic surface preparation procedures.
 - Surface preparation for specific types of damage.
- Finishing and Refinement:
 - Color sanding.
 - Buffing.
 - Removing paint surface defects.
- Special Techniques:
 - Paintless dent repair.
 - Installing pinstripe tape.
 - Adhesive-attached plastic molding.
 - Riveted-on molding clips.
 - Decals.



- Final Steps:
 - Clean up.

Skills

- Basic Painting Skills:
 - Develop a foundational understanding of basic painting techniques specific to auto body repair.
 - Apply safety protocols and personal protective equipment (PPE) when practicing basic painting skills.
- Spray Gun Techniques:
 - Demonstrate proficient and safe handling of a spray gun to achieve consistent and accurate paint application on auto body surfaces.
 - Identify suitable techniques based on the specific auto body repair job and environmental conditions.
 - Apply effective spray gun techniques to achieve uniform coverage and minimize overspray on auto body panels.
 - Analyze variables such as temperature, humidity, and paint viscosity when selecting and applying spray gun techniques.
 - Perform thorough cleaning and maintenance of spray guns to ensure optimal performance and longevity.
- Surface Preparation:
 - Execute essential surface preparation procedures for auto body repair to ensure proper paint adhesion and longevity.
 - Adapt surface preparation techniques based on the type of auto body damage, such as scratches, dents, or corrosion.
- Finishing and Refinement:
 - Skillfully perform color sanding techniques on auto body surfaces to achieve a smooth finish.
 - Apply buffing methods to restore gloss and enhance the appearance of painted auto body surfaces.
 - Identify and address common paint surface defects specific to auto body finishes, aiming for a flawless result.
- Special Techniques:



- Demonstrate proficiency in paintless dent repair methods to effectively remove minor dents from auto body panels.
- Precisely apply pinstripe tape, adhesive-attached plastic molding, and riveted-on molding clips for both aesthetic and functional purposes in auto body repairs.
- Skillfully apply decals on auto body surfaces, ensuring accurate alignment and bubble-free application.
- Final Steps:
 - Execute proper clean-up procedures after completing auto body painting tasks, maintaining a tidy and organized workspace.
 - Identify and rectify any post-painting defects or imperfections specific to auto body finishes to achieve a high-quality outcome.

Assessments

- Practical Demonstration: Students apply basic painting techniques on practice panels, demonstrating proper brush strokes and coating consistency.
 - Safety Quiz: Students complete a safety quiz covering essential protocols and personal protective equipment (PPE) for basic painting tasks.
 - Skill Assessment: Students use a spray gun to apply paint to a panel, showcasing proficiency in even coverage and proper spray gun handling.
 - Color Sanding Practical: Students perform color sanding on an auto body surface, aiming to achieve a smooth and uniform texture.
 - Buffing Assessment: Students use buffing techniques on a panel and present the before-and-after results, explaining their approach.
 - Molding Installation Task: Students accurately install pinstripe tape, adhesive-attached plastic molding, and riveted-on molding clips on provided panels.
 - Workspace Cleanliness Check: Students complete a practical task where they clean and organize a workspace after an auto body painting activity.
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Course: Advanced Structural Analysis and Damage Repair

Length: Semester

Standards

- 9.3.12.TD.2 Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems.
- 9.3.12.TD.3 Describe the key operational activities required of successful transportation, distribution and logistics facilities.
- 9.3.12.TD.5 Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.
- NATEF Standards:
 - Structural Analysis and Damage Repair, Task A3, Analyze, straighten and align mash (collapse) damage.
 - Structural Analysis and Damage Repair, Task A5, Analyze, straighten and align sideway damage.
 - Structural Analysis and Damage Repair, Task A6, Analyze, straighten and align twist damage.
 - Structural Analysis and Damage Repair, Task B1, Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and chassis alignment problems.
 - Structural Analysis and Damage Repair, Task B7, Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair.
 - Structural Analysis and Damage Repair, Task B8, Attach anchoring devices to vehicle; remove or reposition components as necessary.
 - Structural Analysis and Damage Repair, Task B9, Straighten and align cowl assembly.
 - Structural Analysis and Damage Repair, Task B10, Straighten and align roof rails/headers and roof panels.
 - Structural Analysis and Damage Repair, Task B11, Straighten and align hinge and lock pillars.



- Structural Analysis and Damage Repair, Task B12, Straighten and align vehicle openings, floor plans, and rocker panels.
- Structural Analysis and Damage Repair, Task B14, Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/powertrain mounting points, etc.).
- Structural Analysis and Damage Repair, Task B16, Identify proper cold stress relief methods.
- Structural Analysis and Damage Repair, Task B17, Repair damage using power tools and hand tools to restore proper contours and dimensions.
- Structural Analysis and Damage Repair, Task B22, Restore mounting and anchoring locations.
- Structural Analysis and Damage Repair, Task A3, Analyze, straighten and align mash (collapse) damage.
- Structural Analysis and Damage Repair, Task A4, Analyze, straighten and align sag damage.
- Structural Analysis and Damage Repair, Task A5, Analyze, straighten and align sideways damage.
- Structural Analysis and Damage Repair, Task A6, Analyze, straighten and align twist damage.
- Structural Analysis and Damage Repair, Task A7, Analyze, straighten and align diamond frame damage.
- Structural Analysis and Damage Repair, Task A12, Identify or repair heat limitations and monitoring procedures for structural components.
- Structural Analysis and Damage Repair, Task A16, Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair.
- Non-Structural Analysis and Damage Repair (Body Components), Task B13, Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points).
- Non-Structural Analysis and Damage Repair (Body Components), Task B16, Identify proper cold stress relief methods.
- Structural Analysis and Damage Repair, Task A8, Remove and replace damaged structural components.
- Structural Analysis and Damage Repair, Task A9, Restore corrosion protection to repaired or replaced frame areas.
- Structural Analysis and Damage Repair, Task A13, Demonstrate an understanding of structural foam applications.



- Structural Analysis and Damage Repair, Task A17, Analyze and identify crush/collapse zones.
- Structural Analysis and Damage Repair, Task B7, Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair.
- Structural Analysis and Damage Repair, Task B12, Straighten and align vehicle openings, floor pans, and rocker panels.
- Structural Analysis and Damage Repair, Task B13, Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points).
- Structural Analysis and Damage Repair, Task B14, Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/powertrain mounting points, etc.).
- Structural Analysis and Damage Repair, Task B15, Identify substrate and repair or replacement recommendations.
- Structural Analysis and Damage Repair, Task B18, Remove and replace damaged sections of steel body structures.
- Structural Analysis and Damage Repair, Task B19, Restore corrosion protection to repaired or replaced structural areas.
- Structural Analysis and Damage Repair, Task B20, Determine the extent of damage to aluminum structural components; repair, weld, or replace.
- Structural Analysis and Damage Repair, Task B21, Analyze and identify crush/collapse zones.
- Non-Structural Analysis and Damage Repair (Body Components), Task A9, Remove corrosion protection, under coatings, sealers, and other protective coatings as necessary to perform repairs.
- Non-Structural Analysis and Damage Repair (Body Components), Task B14, Restore sound deadeners and foam materials.
- Non-Structural Analysis and Damage Repair (Body Components), Task E14, Perform the following welds: continuous, plug, butt weld with and without backing, fillet, etc.

Essential Question(s)

- What are the key principles behind unibody straightening, and how does it differ from frame straightening in auto body repair?



- How do basic unibody straightening operations contribute to restoring a vehicle's structural integrity?
- What are the essential steps and techniques involved in basic frame straightening operations?
- How can you identify specific types of frame damage, and what considerations should be taken into account when repairing them?
- What is the step-by-step process for effectively replacing structural panels in auto body repair?
- How do you identify reliable sources for replacement parts and materials, and why is this crucial in maintaining repair quality?
- What are the challenges and techniques involved in replacing full frame components, and how does this contribute to overall structural integrity?
- These essential questions encourage students to think critically and deeply about the concepts, procedures, and considerations related to unibody and frame straightening, as well as structural panel replacement in the context of auto body repair.

Content

- Unibody and Frame Straightening:
 - Basic unibody straightening operations.
 - Basic frame straightening operations.
 - Repairing specific types of frame damage.
- Structural Panel Replacement:
 - Structural panel replacement procedures.
 - Replacement part sources.
 - Replacing full frame components

Skills

- Unibody and Frame Straightening:
 - Understand the fundamental principles and techniques involved in basic unibody straightening operations.



- Gain proficiency in executing basic frame straightening operations using appropriate tools and equipment.
- Identify and apply specific techniques for repairing various types of frame damage, considering different vehicle structures.
- Structural Panel Replacement:
 - Demonstrate the correct sequence and procedures for structural panel replacement in auto body repair.
 - Identify reliable sources for replacement parts and materials, considering quality, compatibility, and availability.
 - Develop the skills necessary to replace full frame components, ensuring proper alignment and structural integrity.

Assessments

- Practical Demonstration: Students perform a hands-on task demonstrating basic unibody straightening techniques on a practice panel.
- Frame Straightening Exercise: Students use frame straightening equipment to correct a simple frame misalignment, showcasing proper techniques.
- Simulation Exercise: Students participate in a simulated structural panel replacement task, ensuring proper sequence and techniques.
- Frame Component Replacement: Students demonstrate their skills in replacing full frame components on a provided vehicle structure.

Course: Introduction to Basic Automotive Mechanical Repair

Length: Semester

Standards



- 9.3.12.TD.2 Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems.
- 9.3.12.TD.3 Describe the key operational activities required of successful transportation, distribution and logistics facilities.
- 9.3.12.TD.4 Identify governmental policies and procedures for transportation, distribution and logistics facilities.
- NATEF Standards:
 - Structural Analysis and Damage Repair, Task A10, Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.
 - Structural Analysis and Damage Repair, Task A11, Align or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.
 - Structural Analysis and Damage Repair, Task B1, Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.
 - Structural Analysis and Damage Repair, Task B2, Realign or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and chassis alignment problems.
 - Non-Structural Analysis and Damage Repair (Body Components), Task B17, Identify one-time use fasteners.
 - Mechanical and Electrical Components, Task A1, Perform visual inspection and measuring checks to identify steering and suspension collision damage.
 - Mechanical and Electrical Components, Task A2, Identify one-time use fasteners.
 - Mechanical and Electrical Components, Task A3, Clean, inspect, and prepare reusable fasteners.
 - Mechanical and Electrical Components, Task A4, Remove, replace, inspect or adjust power steering pump, pulleys, belts, hoses, fittings, and pump mounts.
 - Mechanical and Electrical Components, Task A5, Remove and replace power steering gear (non-rack and pinion type).



- Mechanical and Electrical Components, Task A6, Inspect, remove, and replace power rack-and-pinion steering gear and related components.
- Mechanical and Electrical Components, Task A7, Inspect and replace parallelogram steering linkage components.
- Mechanical and Electrical Components, Task A8, Inspect, remove and replace upper and lower control arms and related components.
- Mechanical and Electrical Components, Task A9, Inspect, remove and replace steering knuckle/spindle/hub assemblies (including bearings, races, seals, etc.).
- Mechanical and Electrical Components, Task A10, Inspect, remove and replace front suspension system coil springs and spring insulators (silencers).
- Mechanical and Electrical Components, Task A11, Inspect, remove, replace, and adjust suspension system torsion bars, and inspect mounts.
- Mechanical and Electrical Components, Task A12, Inspect, remove and replace stabilizer bar bushings, brackets, and links.
- Mechanical and Electrical Components, Task A13, Inspect, remove and replace MacPherson strut cartridge or assembly, upper bearing, and mount.
- Mechanical and Electrical Components, Task A14, Inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings and mounts.
- Mechanical and Electrical Components, Task A15, Inspect, remove, and replace suspension system leaf strings and related components.
- Mechanical and Electrical Components, Task A16, Inspect axle assembly for damage and misalignment.
- Mechanical and Electrical Components, Task A17, Inspect, remove and replace shock absorbers.
- Mechanical and Electrical Components, Task A18, Diagnose, inspect, adjust repair or replace active suspension systems and associated lines and fittings.
- Mechanical and Electrical Components, Task A19, Measure vehicle ride height and wheelbase; determine needed repairs.
- Mechanical and Electrical Components, Task A20, Inspect, remove, replace, and align front and rear frame (cradles/sub).



- Mechanical and Electrical Components, Task A21, Diagnose and inspect steering wheel, steering column, and components.
- Mechanical and Electrical Components, Task A22, Verify proper operation of steering system.
- Mechanical and Electrical Components, Task A23, Diagnose front and rear suspension system noises and body sway problems; determine needed repairs.
- Mechanical and Electrical Components, Task A24, Diagnose vehicle wandering, pulling, hard steering, bump steer, memory steering, torque steering, and steering return problems; determine needed repairs.
- Mechanical and Electrical Components, Task A25, Demonstrate an understanding of suspension and steering alignments (caster, camber, toe, SAI, etc.).
- Mechanical and Electrical Components, Task A26, Diagnose tire wear patterns; determine needed repairs.
- Non-Structural Analysis and Damage Repair (Body Components), Task D3, Inspect, repair or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs.
- Non-Structural Analysis and Damage Repair (Body Components), Task D5, Initialize electrical components as needed.
- Mechanical and Electrical Components, Task B1, Check for available voltage, voltage drop and current, and resistance in electrical wiring circuits and components with a DMM (digital multimeter).
- Mechanical and Electrical Components, Task B2, Repair electrical circuits, wiring, and connectors.
- Mechanical and Electrical Components, Task B3, Inspect, test, and replace fusible links, circuit breakers, and fuses.
- Mechanical and Electrical Components, Task B4, Perform battery state-of-charge test and slow/fast battery charge.
- Mechanical and Electrical Components, Task B5, Inspect, clean, repair or replace battery, battery cables, connectors and clamps.
- Mechanical and Electrical Components, Task B6, Dispose of batteries and battery acid according to local, state, and federal requirements.



- Mechanical and Electrical Components, Task B7, Identify programmable electrical/electronic components and check for malfunction indicator lamp (MIL); record data for reprogramming before disconnecting the battery.
- Mechanical and Electrical Components, Task B8, Inspect alignment, adjust, remove and replace alternator (generator), drive belts, pulleys, and fans.
- Mechanical and Electrical Components, Task B9, Check operation and aim headlamp assemblies and fog/driving lamps; determine needed repairs.
- Mechanical and Electrical Components, Task B10, Inspect, test, and repair or replace switches, relays, bulbs, sockets, connectors, and wires of interior and exterior light circuits.
- Mechanical and Electrical Components, Task B11, Remove and replace horn(s); check operation.
- Mechanical and Electrical Components, Task B12, Check operation of wiper/washer systems; determine needed repairs.
- Mechanical and Electrical Components, Task B13, Inspect, remove and replace power seat, motors, linkages, cables, etc.
- Mechanical and Electrical Components, Task B14, Inspect, remove and replace power seat, motors, linkages, cables, etc.
- Mechanical and Electrical Components, Task B15, Inspect, remove and replace components of electric door and hatch/trunk lock.
- Mechanical and Electrical Components, Task B16, Inspect, remove and replace components of keyless lock/unlock devices and alarm systems.
- Mechanical and Electrical Components, Task B17, Inspect, remove and replace components of electrical sunroof and convertible/retractable hardtop.
- Mechanical and Electrical Components, Task B18, Check operation of electrically heated mirrors, windshields, back lights, panels, etc.; determine needed repairs.
- Mechanical and Electrical Components, Task B19, Demonstrate the proper self-grounding procedures for handling electronic components.
- Mechanical and Electrical Components, Task B20, Check for module communication errors using a scan tool.



- Mechanical and Electrical Components, Task B21, Use wiring diagrams and diagnostic flow charts during diagnosis of electrical circuit problems.
- Mechanical and Electrical Components, Task D13, Inspect and repair A/C component wiring.
- Mechanical and Electrical Components, Task F3, Remove and replace electronic sensors, wires, and connectors.
- Mechanical and Electrical Components, Task C1, Inspect brake lines, hoses, and fittings for leaks, dents, kinks, rust, cracks or wear; tighten fittings and supports; replace brake lines (double flare and ISO types), hoses, fittings, seals, and supports.
- Mechanical and Electrical Components, Task C2, Identify, handle, store, and install appropriate brake fluids; dispose of in accordance with federal, state, and local regulations.
- Mechanical and Electrical Components, Task C3, Bleed (manual, pressure, vacuum, or surge) hydraulic brake system.
- Mechanical and Electrical Components, Task C4, Pressure test brake hydraulic system; determine needed repair.
- Mechanical and Electrical Components, Task C5, Adjust brake shoes or pads; remove and reinstall brake drums or drum/hub assemblies and wheel bearings.
- Mechanical and Electrical Components, Task C6, Remove, clean and inspect caliper and rotor assembly and mountings for wear and damage; reinstall.
- Mechanical and Electrical Components, Task C7, Check parking brake system operation.
- Mechanical and Electrical Components, Task C9, Check for bent or damaged brake system components.
- Mechanical and Electrical Components, Task C10, Demonstrate an understanding of various types of advanced braking systems (ABS, hydraulic, electronic, traction, and stability control).
-

Essential Question(s)

- How does the steering system contribute to the overall control and maneuverability of a vehicle?
- What are the main differences between manual and power steering systems, and what are their respective advantages and disadvantages?



- How do suspension systems enhance both vehicle stability and passenger comfort?
- What role do hub and wheel assemblies play in maintaining proper contact between the vehicle and the road?
- How can you identify and diagnose common issues in steering, suspension, and wheel assemblies?
- What safety precautions and procedures are essential when conducting steering and suspension system repairs?
- Why is wheel alignment critical for maintaining tire life and vehicle stability?
- What are the key electrical components in vehicles, and how do they contribute to the overall electrical system?
- How can you perform basic electrical tests, and what insights can these tests provide for troubleshooting?
- How does the electrical system in a vehicle encompass areas like lighting, starting, and charging?
- What safety considerations must be taken into account when working with vehicle electrical systems?
- What are the primary components of a brake system, and how do they work together to achieve effective braking?
- How can you identify signs of wear and damage in brake system components?
- What steps are involved in replacing brake pads, resurfacing rotors, and bleeding brake fluid?
- How can an understanding of brake system operations assist in diagnosing braking issues?

Content

- Steering and Suspension:
 - Steering System
 - Steering System Types
 - Suspension Systems
 - Hub and Wheel Assemblies
 - Diagnosing Steering, Suspension, and Wheel Assembly Damage
 - Steering and Suspension System Repair
 - Alignment
- Electrical Systems:
 - Basic Electricity



- Basic Electrical Parts
- Basic Electrical Tests and Service Operations
- Electrical System Service
- Brake Systems:
 - Brake System Operations
 - Brake System Parts
 - Brake System Repair

Skills

- Steering and Suspension:
 - Steering System:
 - Understand the role of the steering system in vehicle control.
 - Identify the key components of a steering system and their functions.
 - Differentiate between manual and power steering systems.
 - Steering System Types:
 - Classify various types of steering systems, including rack-and-pinion, recirculating ball, and more.
 - Compare and contrast the advantages and disadvantages of different steering system types.
 - Suspension Systems:
 - Comprehend the significance of suspension systems for vehicle stability and comfort.
 - Recognize different suspension components and their roles in maintaining contact with the road.
- Hub and Wheel Assemblies:
 - Define the components of hub and wheel assemblies and their roles in supporting the vehicle's weight.
 - Learn how to inspect and maintain hub and wheel assemblies for safe operation.
- Diagnosing Steering, Suspension, and Wheel Assembly Damage:
 - Develop skills to identify common signs of steering, suspension, and wheel assembly issues.



- Learn diagnostic techniques to pinpoint the source of problems in these systems.
- Steering and Suspension System Repair:
 - Gain hands-on experience in repairing and replacing components within steering and suspension systems.
 - Understand the safety precautions and proper procedures for system repair.
- Alignment:
 - Learn the importance of wheel alignment for tire longevity and vehicle stability.
 - Understand the process of aligning wheels and the effects of misalignment.
- Electrical Systems:
 - Basic Electricity
 - Grasp fundamental concepts of electrical circuits, voltage, current, and resistance.
 - Identify common electrical terms and units used in automotive applications.
 - Basic Electrical Parts:
 - Recognize essential electrical components in vehicles, such as batteries, fuses, relays, and switches.
 - Understand the roles of these components in the overall electrical system.
 - Basic Electrical Tests and Service Operations:
 - Acquire skills to conduct basic electrical tests, such as voltage and continuity checks.
 - Learn how to interpret test results and troubleshoot basic electrical issues.
 - Electrical System Service:
 - Understand the broader electrical system of a vehicle, including lighting, charging, and starting systems.
 - Gain insight into servicing electrical systems safely and efficiently.
- Brake Systems:
 - Brake System Operations:
 - Comprehend the vital role of brake systems in vehicle safety.
 - Learn how hydraulic and mechanical brake systems function to slow down and stop the vehicle.
 - Brake System Parts:



- Identify key components of brake systems, including brake pads, rotors, calipers, and master cylinders.
- Understand the functions of these components in the braking process.
- Brake System Repair:
 - Develop practical skills in inspecting, maintaining, and repairing brake systems.
 - Learn proper techniques for brake pad replacement, rotor resurfacing, and fluid bleeding.

Assessments

- Written Quiz: Provide a quiz with multiple-choice, true/false, and short-answer questions that cover topics such as steering system components, suspension types, and diagnostic techniques.
- Hands-On Inspection: Provide a real or simulated vehicle and ask students to perform a basic inspection of its steering and suspension components, noting any visible signs of wear or damage.
- Safety Quiz: Administer a quiz that assesses students' knowledge of safety protocols when working with electrical systems in vehicles.
- Brake System Troubleshooting: Provide a series of brake-related symptoms and ask students to diagnose the possible issues based on their understanding of brake system operations.

Course: Custom Painting and Color Matching

Length: Semester

Standards

- 9.3.12.TD.3 Describe the key operational activities required of successful transportation, distribution and logistics facilities.
- 9.3.12.TD.4 Identify governmental policies and procedures for transportation, distribution and logistics facilities.
- NATEF Standards:



- Painting and Refinishing, Task D4, Apply selected product on test and let-down panel; check for color match.
- Painting and Refinishing, Task D13, Identify poor hiding colors; determine necessary action.
- Painting and Refinishing, Task D14, Tint color using formula to achieve a blendable match.
- Painting and Refinishing, Task D15, Identify alternative color formula to achieve a blendable match.
- Painting and Refinishing, Task E27, Identify pigment flotation (color change through film build); determine the cause(s) and correct the condition
- Painting and Refinishing, Task D4, Apply selected product on test and let-down panel; check for color match.
- Painting and Refinishing, Task D5, Apply single-stage topcoat.
- Painting and Refinishing, Task D6, Apply basecoat/clearcoat for panel blending and panel refinishing.
- Painting and Refinishing, Task D7, Apply basecoat/clearcoat for overall refinishing.
- Painting and Refinishing, Task D8, Remove nibs or imperfections from basecoat.
- Painting and Refinishing, Task D9, Refinish rigid or semi-rigid plastic parts.
- Painting and Refinishing, Task D10, Refinish flexible plastic parts.
- Painting and Refinishing, Task D11, Apply multi-stage coats for panel blending and overall refinishing.
- Painting and Refinishing, Task E1, Identify blistering (raising of the paint surface, air entrapment); determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E2, Identify a dry spray appearance in the paint surface; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E3, Identify the presence of fish-eyes (crater-like openings) in the finish; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E4, Identify lifting; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E5, Identify clouding (mottling and streaking in metallic finishes); determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E6, Identify orange peel; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E8, Identify solvent popping in freshly painted surface; determine the cause(s) and correct the condition.



- Painting and Refinishing, Task E9, Identify sags and runs in paint surface; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E10, Identify sanding marks or sand scratch swelling; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E11, Identify contour mapping/edge mapping while finish is drying; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E19, Identify water spotting; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E22, Identify dieback conditions (dulling of the paint film showing haziness); determine the cause(s) and correct the condition.
- Painting and Refinishing, Task E25, Identify pin-holing; determine the cause(s) and correct the condition.
- Painting and Refinishing, Task B23, Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials needed, preparation, and refinishing procedures.

Essential Question(s)

- How does light influence our perception of color, and why is understanding this relationship crucial for achieving accurate color matches in automotive paint repairs?
- What are the key factors that can lead to discrepancies between the refinish color and the existing vehicle color, and how can these discrepancies be effectively corrected?
- How does the process of altering the refinish color involve techniques like tinting and blending, and how do these techniques contribute to achieving seamless paint repairs?
- What steps are involved in planning an effective paint repair, and how does this planning contribute to achieving high-quality results?
- Why is blending an essential technique in auto body repair, and how can different blending strategies be employed to seamlessly integrate new and existing paint?
- Why is baking used in the paint curing process, and how does controlled heat application contribute to the durability and quality of the painted finish?



- What are some common challenges and defects that can occur during the paint application process, and how can they be identified and addressed to achieve a flawless finish?
- How do different types of plastics used in automotive components impact paint adhesion and finish quality, and what techniques can be employed to enhance adhesion on plastic substrates?

Content

- Color Matching:
 - Light and color
 - Altering the refinish color
- Paint Application:
 - Planning the repair
 - Contamination prevention
 - Applying paint
 - Blending strategies
 - Baking
 - Troubleshooting
- Specialty Painting:
 - Plastic types and characteristics
 - Preparing and spraying plastic parts
 - Surface preparation for specific types of plastic
 - Painting specific types of plastic
 - Custom painting

Skills

- Color Matching:
 - Light and Color:
 - Understand the properties of light and how they influence color perception.



- Recognize the basics of the color wheel and color theory in the context of automotive painting.
- Altering the Refinish Color:
 - Learn techniques to adjust and match refinish colors to the existing vehicle's color.
 - Understand the role of tinting and blending in achieving accurate color matching.
- Paint Application:
 - Planning the Repair:
 - Develop skills in assessing the extent of damage and planning an effective paint repair process.
 - Learn to select appropriate tools, materials, and techniques for each repair scenario.
 - Contamination Prevention:
 - Understand the importance of a clean and controlled painting environment.
 - Learn techniques to prevent dust, debris, and contaminants from affecting paint quality.
 - Applying Paint:
 - Gain hands-on experience in properly applying basecoat and clearcoat layers.
 - Understand the principles of even application, layer thickness, and avoiding imperfections.
 - Blending Strategies:
 - Explore techniques for seamlessly blending new paint with existing finishes.
 - Learn how to feather the edges and achieve a smooth transition between painted and unpainted areas.
 - Baking:
 - Understand the purpose and benefits of using heat to cure paint.
 - Learn proper baking procedures and temperature control to achieve optimal paint curing.
 - Troubleshooting:
 - Develop skills to identify and address common issues that can arise during the paint application process.
 - Learn problem-solving techniques for achieving high-quality finishes.
- Specialty Painting:
 - Plastic Types and Characteristics:
 - Understand the various types of plastics used in automotive components and their unique characteristics.



- Learn how plastic properties affect paint adhesion and finish quality.
- Preparing and Spraying Plastic Parts:
 - Develop techniques for preparing plastic surfaces, including cleaning, sanding, and priming.
 - Gain proficiency in spraying paint on plastic parts to achieve consistent and durable finishes.
- Surface Preparation for Specific Types of Plastic:
 - Learn specialized surface preparation methods for different types of plastic substrates.
 - Understand the importance of proper adhesion promotion for successful paint application.
- Painting Specific Types of Plastic:
 - Gain experience in selecting the right paint products and techniques for painting specific plastic components.
 - Understand how to achieve optimal paint adhesion and long-lasting finishes on different plastic parts.
- Custom Painting:
 - Explore the world of custom paint finishes, graphics, and designs.
 - Develop creative skills and techniques for achieving unique and personalized automotive paint jobs.

Assessments

- Color Matching Exercise: Provide students with a set of paint swatches and ask them to alter the refinish color to match a specific vehicle's color using tinting and blending techniques.
 - Paint Application Demonstration: Have students demonstrate the proper technique for applying paint using a model or simulation. Evaluate their ability to achieve an even and consistent finish.
 - Blending Practical: Provide a practice panel with a painted and unpainted area. Ask students to demonstrate a blending technique to create a smooth transition between the two areas.
 - Custom Painting Project: Assign students a custom painting project where they need to create a unique paint design on a provided panel. Assess their creativity, attention to detail, and execution.
-



Course: Custom Auto Body Modifications

Length: Semester

Standards

- 9.3.12.TD.4 Identify governmental policies and procedures for transportation, distribution and logistics facilities.
- 9.3.12.TD.5 Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.
- 9.3.12.TD.6 Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution & Logistics Career Pathways.
- NATEF Standards:
 - Non-Structural Analysis and Damage Repair (Body Components), Task E14, Perform the following welds: continuous, plug, butt weld with and without backing, fillet, etc.
 - Structural Analysis and Damage Repair, Task B18, Remove and replace damaged sections of steel body

Essential Question(s)

- What are the primary tools and techniques used in sheet metal shaping, and how do they allow for the manipulation and transformation of metal panels?
- How does an understanding of panel beating, stretching, and shrinking contribute to repairing dents and achieving desired sheet metal forms?
- What considerations should be taken into account when reshaping sheet metal to ensure structural integrity and aesthetic appeal?
- How can the knowledge of heat shrinking and cold shrinking techniques be utilized to address localized deformations in sheet metal panels?
- What are the advantages and challenges of working with fiberglass and composite materials in auto body modifications?



- What distinguishes specialty paints from conventional automotive paints, and what types of finishes fall under the category of specialty paints?
- What techniques and considerations are involved in achieving an even application and seamless blending of specialty paints, such as metallic or pearlescent finishes?
- How can the choice of specialty paint impact the overall aesthetic appeal and reflectivity of the painted surface?
- These essential questions encourage critical thinking and in-depth exploration of the foundational concepts in modifications involving sheet metal shaping, fiberglass and composites, and specialty paints within the context of auto body repair.

Content

- Modifications:
 - Sheet metal shaping
 - Fiberglass and composites
 - Specialty paints

Skills

- Modifications:
 - Sheet Metal Shaping:
 - Develop proficiency in using various tools and techniques to reshape and manipulate sheet metal.
 - Understand the principles of panel beating, stretching, shrinking, and forming to achieve desired shapes.
 - Learn how to repair dents, creases, and other forms of sheet metal damage.
 - Fiberglass and Composites:
 - Acquire knowledge of different types of fiberglass and composite materials commonly used in auto body modifications.



- Understand the techniques for working with fiberglass, including lay-up, molding, and resin application.
- Gain skills in repairing and fabricating composite panels and components.
- Specialty Paints:
 - Explore different types of specialty paints, such as metallic, pearlescent, and matte finishes.
 - Learn how to properly prepare surfaces for specialty paints to achieve optimal adhesion and finish quality.
 - Develop the ability to apply and blend specialty paints, taking into account their unique characteristics and properties.

Assessments

- Practical Shaping Task: Provide students with a damaged sheet metal panel and assess their ability to reshape it using appropriate tools and techniques, taking into account the original contours.
 - Shrinking and Stretching Demonstration: Have students demonstrate their understanding of shrinking and stretching techniques on a sample metal panel to correct localized deformations.
 - Composite Panel Fabrication: Assign students to create a small composite panel using lay-up and molding techniques. Evaluate their ability to follow the process and produce a functional panel.
 - Composite Identification Quiz: Provide samples of different composite materials and ask students to identify their types based on visual characteristics and properties.
 - Written Exams: Develop written exams that cover theoretical knowledge of concepts related to sheet metal shaping, fiberglass and composites, and specialty paints.
 - Hands-On Demonstrations: Ask students to demonstrate specific techniques, such as shaping, molding, or paint blending, during practical exam sessions.
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Course: Advanced Welding and Plastic Repair

Length: Semester

Standards

- 9.3.12.TD.6 Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution & Logistics Career Pathways.
- NATEF Standards:
 - Non-Structural Analysis and Damage Repair (Body Components), Task E14, Perform the following welds: continuous, plug, butt weld with and without backing, fillet, etc.
 - Structural Analysis and Damage Repair, Task B18, Remove and replace damaged sections of steel body

Essential Question(s)

- "Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.
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Content

- Patch Repairs:
 - MIG welding machines
 - Airless plastic welder
 - Hot-air plastic welder

Skills

- MIG Welding Machines:
- Understand the principles of MIG (Metal Inert Gas) welding and its application in auto body patch repairs.



- Learn to set up and operate MIG welding machines for joining and repairing metal panels.
- Acquire skills in selecting appropriate welding parameters, such as voltage, wire feed speed, and gas flow.
- Airless Plastic Welder:
 - Gain knowledge of airless plastic welding techniques and their significance in repairing plastic components.
 - Learn to operate an airless plastic welder for fusing plastic panels, identifying suitable welding rods, and adjusting heat settings.
- Hot-Air Plastic Welder:
 - Understand the concept of hot-air plastic welding and its role in repairing and fusing plastic materials.
 - Develop proficiency in using a hot-air plastic welder to join plastic parts, focusing on temperature control and proper welding speed.
 - By achieving these objectives, students will be equipped with the knowledge and practical skills needed to perform patch repairs in auto body work, utilizing MIG welding machines, airless plastic welders, and hot-air plastic welders effectively and safely.

Assessments

- Written Exams: Develop written exams that cover theoretical knowledge of concepts related to MIG welding, airless plastic welding, and hot-air plastic welding techniques.
- Hands-On Welding Tests: Organize practical welding exams where students need to complete specific welding tasks using MIG machines, airless plastic welders, or hot-air plastic welders.
- Project Work: Assign students a patch repair project involving both metal and plastic components. Evaluate their ability to choose the appropriate welding method and produce high-quality repairs.

Course: Auto Collision Repair Business

Length: Semester



Standards

- 9.3.12.TD.1 Describe the nature and scope of the Transportation, Distribution & Logistics Career Cluster and the role of transportation, distribution and logistics in society and the economy.
- 9.3.12.TD.2 Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems.
- 9.3.12.TD.3 Describe the key operational activities required of successful transportation, distribution and logistics facilities.
- 9.3.12.TD.4 Identify governmental policies and procedures for transportation, distribution and logistics facilities.
- 9.3.12.TD.5 Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.
- 9.3.12.TD.6 Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution & Logistics Career Pathways.
- NATEF Standards:
 - Non-Structural Analysis and Damage Repair (Body Components), Task B16, Diagnose and repair water leaks, dust leaks, and wind noise.
 - Damage Analysis, Estimating and Customer Service, Task A1, Position the vehicle for inspection.
 - Damage Analysis, Estimating and Customer Service, Task A2, Prepare vehicle for inspection by providing access to damaged areas.
 - Damage Analysis, Estimating and Customer Service, Task A3, Analyze damage

Essential Question(s)

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Content

- Business Skills:
 - Customer relations
 - Job opportunities in a collision repair shop
 - Shop Operations
 - Estimating

Skills

- Business Skills:
 - Customer Relations:
 - Develop effective communication skills to interact professionally with customers, addressing their concerns and explaining repair processes.
 - Understand the importance of excellent customer service in building trust and maintaining a positive reputation for the collision repair shop.
 - Job Opportunities in a Collision Repair Shop:
 - Explore different roles within a collision repair shop, such as technician, painter, estimator, and customer service representative.
 - Gain awareness of the skills and responsibilities associated with each job role, allowing for informed career choices.
 - Shop Operations:
 - Gain insight into the overall workflow and organization of a collision repair shop, from receiving a damaged vehicle to delivering the repaired vehicle to the customer.
 - Understand the collaboration between various departments and individuals in achieving efficient and high-quality repairs.
 - Estimating:
 - Learn the fundamentals of estimating repair costs for collision-damaged vehicles, including evaluating visible and hidden damage, parts, labor, and materials.



- Develop the ability to create accurate and comprehensive repair estimates that meet industry standards and customer expectations.

Assessments

- Written Tests: Develop written exams that cover theoretical knowledge of customer relations, job roles, shop operations, and estimation principles.
- Estimating Case Study: Present a real-world collision repair scenario. Ask students to create an estimation for the repair, considering various factors such as labor rates and parts availability.
- Workflow Diagram: Have students create a visual representation of the workflow in a collision repair shop, illustrating the steps from vehicle intake to final delivery.
- Customer Feedback Analysis: Provide a set of customer feedback statements. Ask students to analyze and respond to each feedback, outlining how they would address the concerns.

Resources

→ Course Resources

- ◆ "Auto Collision Repair and Refinishing"
 - Copyright 2017
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