

# Aviation Mechanics: Airframe Maintenance Standards and Skills

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## Introduction

Each framework is made up of standards, skills, and industry recognized credentials. Each standard has a reference to credentials when appropriate. Standards are critical areas of competency aligned to industry identified needs and industry recognized credentials (IRCs) that will support student success in the field. Standards provide the structure that empowers the teacher to choose the best curriculum and instructional approaches to guide skill and knowledge development for students. The standards below are cross walked with the Essential Industry Credentials. Further information about credentials is available in the Credentials of Value section of this document.

## Health & Safety Standards

### Standard 1: Safety and Health in an Aviation Maintenance Environment

Students will apply health and safety practices in an aircraft shop, fostering a safety-conscious environment and using principles of human error prevention to identify and mitigate risks, manage tools and equipment, handle aircraft fuels and chemicals, and utilize PPE to promote a safe work environment and minimize errors.

**Aligned Credentials:** OSHA10 – General Industry. FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Identify, describe, and demonstrate the effective use of Safety Data Sheets (SDS) to meet documentation requirements, including identifying hazards related to chemicals and materials used in aviation maintenance.
2. Locate emergency equipment, first aid kit, and emergency action and response plan, including labels and signage that follow OSHA Hazard Communication Program (HAZCOM).
3. Identify and compile contact information for relevant health and safety agencies and resources to incorporate into the emergency response plan, including agencies for managing natural disasters, hazardous material incidents, and local health departments.
4. Effectively communicate hazards and safety concerns within the maintenance environment, demonstrating the ability to file accurate hazard reports, brief shift turnovers, and communicate critical information about malfunctions, defects, or unsafe conditions to ensure continuity and safety in the workplace.
5. Select and use appropriate PPE that meets OSHA and FAA standards, including goggles, face shields, flame-resistant clothing, aprons, proper footwear, ear protection, safety helmets, gloves, and respirators, ensuring proper protection for tasks with potential exposure to fumes, vapors, or airborne particles.
6. Demonstrate safe body mechanics, including proper lifting techniques and ergonomics to prevent injury.
7. Demonstrate safe use, proper inspection, maintenance, and storage of hand and power tools, ensuring compliance with industry safety standards and OSHA regulations to prevent accidents and prolong tool life in aviation maintenance.
8. Explain OSHA’s four high-hazard areas (falls, electrocutions, struck by, and caught between) and how they apply to aviation maintenance, including working at heights, handling electrical systems, moving aircraft, and operating heavy equipment.
9. Describe and demonstrate safety practices and procedures when working with electrical systems in aviation maintenance, including aircraft batteries, wiring harnesses, avionics systems, and other electrical components.
10. Implement FAA-approved safety measures during the maintenance of pneumatic, hydraulic, electrical, and pressurized aircraft systems, e.g., fuel, hydraulic, oxygen systems, ensuring safe and effective repairs and troubleshooting while identifying and mitigating risks associated with hazardous energy release and high-voltage circuits.
11. Demonstrate safe practices during general aircraft maintenance procedures, including aircraft jacking, fueling/defueling, battery servicing (lead-acid and nickel-cadmium), and corrosion control methods, in compliance with industry safety guidelines.
12. Apply safe handling, storage, and disposal procedures for hazardous materials specific to aviation, e.g., aircraft chemicals, fuels, paints, and cleaning agents, ensuring compliance with OSHA HAZMAT regulations, and minimizing risks to health and the environment.
13. Implement safety protocols for the operation of hangar doors, following OSHA and FAA standards, to ensure proper function and minimize risks during aircraft maintenance operations.
14. Assess and mitigate hazards associated with taxiing and towing aircraft, emphasizing the importance of using wing/tail walkers and maintaining clear communication during aircraft movement.
15. Apply industry-specific safety practices when performing MIG, TIG, and Oxy-acetylene welding operations, including the proper selection of PPE, ensuring safe execution of welding tasks in aircraft maintenance.
16. Demonstrate safety practices during flight control operations, landing gear maintenance, and rigging techniques, including operational tests, ensuring compliance with both safety protocols and technical standards.
17. Evaluate and apply fire suppression and disaster response protocols for hangar and flight line operations, including the identification and use of appropriate fire suppressant systems, such as foam or CO2-based systems, to manage fires involving aircraft fuels and chemicals.
18. Apply safety precautions when working in adverse weather conditions, specifically those encountered in aviation environments, such as high winds affecting aircraft movement, and extreme temperatures impacting maintenance tasks.

## Technical & Integrated Academic Standards

### Standard 2: Role of Aviation Maintenance Technology Professionals in Society

Students will examine the history, regulations, and ethical responsibilities of aviation maintenance professionals, and evaluate the impact of emerging technologies on the field.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Examine the historical evolution of aviation maintenance technology, identifying key milestones in aircraft design, maintenance procedures, and technological advancements, including the evolution of aircraft structural designs, materials, and construction techniques.
2. Explain the role of key regulatory agencies in aviation maintenance, such as the Federal Aviation Administration (FAA), the European Union Aviation Safety Agency (EASA), and international civil aviation authorities including how these agencies establish and enforce safety standards, certifications, and best practices within the aviation industry.
3. Apply the ethical responsibilities of aviation maintenance professionals in ensuring public safety, addressing environmental concerns, and maintaining aircraft systems.
4. Investigate and explain the evolution of certification and training requirements for aviation maintenance professionals, focusing on certifications such as the FAA Airframe and Powerplant (A&P) certification and their relevance in maintaining safety standards in the field.
5. Analyze the influence of emerging technologies, such as automation, robotics, AI, and 3D printing, on aviation maintenance, focusing on improvements in efficiency, reduced downtime, and changes to the skills required by maintenance professionals.
6. Identify and explain the challenges and opportunities for aviation maintenance professionals in Massachusetts, including state-specific regulations, workforce demands, and economic factors affecting the local aviation industry.

### Standard 3: Introduction to Airframe Systems

Students will assess the basic structure and components of an airframe, analyze its integration with aircraft systems, and evaluate the significance of airframe maintenance in ensuring safe and efficient operation.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Explain the fundamental role of the airframe in aircraft operation, safety, and performance, detailing its function as the main structure that supports and integrates various aircraft components.
2. Identify and describe the main sections of an airframe, including the fuselage, wings, empennage, and landing gear, and explain how each part contributes to the overall stability and performance of the aircraft.
3. Distinguish between different types of airframe structures, such as truss, monocoque, semimonocoque, and reinforced shell, and explain the advantages and disadvantages of each type.
4. Examine the structural interaction between these key sections and explain how they work together to maintain aircraft integrity during flight.
5. Identify critical structural components, such as wing spars, fuselage frames, and control surfaces, and demonstrate their significance in maintaining the aircraft's structural integrity.
6. Identify common materials used in airframe construction, e.g., aluminum alloys, composite materials, steel, and explain their properties in terms of strength, weight, and durability.
7. Compare and contrast the benefits and challenges of using different materials in aircraft airframe construction and explain their suitability for specific types of aircraft or conditions, e.g., high-stress zones, corrosion resistance.
8. Explain how the airframe integrates with critical aircraft systems, such as electrical, hydraulic, fuel, and flight control systems.
9. Identify key integration points, such as control surfaces, landing gear mounts, and engine attachments, and demonstrate how they are essential for the proper operation and safety of the aircraft.
10. Analyze the role of the airframe in supporting load distribution of the aircraft's systems to ensure overall performance during flight operations.
11. Describe the critical role of airframe maintenance in ensuring the ongoing safety, performance, and longevity of the aircraft.
12. Identify potential structural issues that may arise during operation, e.g., corrosion, fatigue, stress cracks, and explain how regular maintenance helps mitigate these risks.
13. Demonstrate the importance of conducting regular inspections of airframe components, identifying any wear, damage, or deterioration, and applying the correct maintenance procedures.
14. Explain the impact of airframe maintenance on operational costs, safety compliance, and aircraft longevity, ensuring the airframe meets FAA regulatory standards.
15. Demonstrate proper documentation practices for airframe inspections and maintenance, ensuring compliance with industry standards, e.g., Form 337 for repairs.
16. Examine key FAA 14 CFR regulation, maintenance forms, and publications relevant to airframe maintenance, including Part 65 (Certification: Airframe and Powerplant Mechanics), Part 91 (General Operating and Flight Rules), Part 145 (Repair Stations), and Part 43 (Maintenance, Preventive Maintenance, and Alteration), and understand their application to daily maintenance practices.

### Standard 4: Mathematics in Aircraft Maintenance

Students will apply mathematical concepts, including whole numbers, fractions, decimals, ratios, percentages, algebra, and trigonometry, to perform essential calculations for aircraft maintenance, ensuring accuracy in measurements, system specifications, and troubleshooting.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Apply whole numbers in basic measurement calculations, such as determining part dimensions, quantities, or fuel levels during aircraft maintenance procedures.
2. Perform addition, subtraction, multiplication, and division of fractions to handle measurements like material thickness, fuel quantities, or other relevant fractions in aircraft maintenance.
3. Perform addition, subtraction, multiplication, and division of decimal numbers for precise maintenance calculations, such as fuel measurements, torque values, and part specifications.
4. Apply ratios and proportions in real-world aviation maintenance tasks, such as determining fuel-to-weight ratios, pressure ratios, or proportions in fluid systems.
5. Calculate percentages to determine aircraft weight distribution, fuel mixture percentages, or maintenance cost allocations, ensuring accurate maintenance calculations.
6. Perform calculations involving positive and negative numbers to interpret pressure system readings, electrical circuit values, or altitude changes in aviation maintenance tasks.
7. Calculate powers (squared and cubed) and roots (square and cube roots) to assess material properties, structural integrity, and component tolerances in aircraft maintenance.
8. Demonstrate conversions between standard and scientific notation to manage large or small numbers encountered in aircraft maintenance, such as pressure, temperature, or material tolerances.
9. Apply algebraic equations to solve unknown variables in maintenance-related calculations, such as determining torque values or other system specifications in aircraft repairs.
10. Use trigonometric functions (sine, cosine, tangent) and the Pythagorean theorem to solve practical maintenance problems, such as measuring distances and angles for structural alignment or calculating component placement in aircraft maintenance.
11. Convert between U.S. customary and metric units to ensure accurate measurements in tasks, such as part dimensions, pressure readings, or fuel quantities.
12. Demonstrate conversion between binary and decimal numbers to interpret data in avionics or digital systems during maintenance troubleshooting.

### Standard 5: Metallic Structures and Welding Techniques

Students will apply manufacturer guidelines and FAA standards to inspect, maintain, and repair metallic and composite aircraft structures, ensuring safety, structural integrity, and regulatory compliance.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Inspect metallic structures for defects and damages, using appropriate inspection and testing methods to identify weaknesses.
2. Evaluate common defects in sheet metal structures, including corrosion, cracks, and deformations, and assess their impact on aircraft performance and safety.
3. Select and justify the appropriate repair materials, e.g., rivets, fasteners, sheet metal, based on structural repair manuals, the type of damage, and relevant environmental factors.
4. Explain heat treatment processes for aluminum and identify procedures for restoring or maintaining material strength.
5. Design and fabricate sheet metal components, apply layout, forming, and drilling techniques to meet repair specifications.
6. Demonstrate repair techniques by selecting and applying rivet layouts, ensuring proper rivet spacing and edge distance to maintain structural integrity.
7. Prepare and install patches to damaged aircraft components, following industry-standard procedures to restore functionality.
8. Apply safety practices during sheet metal repairs, including the correct use of PPE and proper handling of materials and tools.
9. Manage risks during metal structure repairs by ensuring the safe handling and storage of welding gases and the proper use of welding equipment.
10. Perform rivet removal and installation, ensuring correct alignment and compliance with FAA standards.
11. Demonstrate proficiency in welding techniques (flame and inert-gas), adjusting parameters based on material types and repair needs.
12. Analyze and perform repairs on damaged aluminum sheets, applying techniques, such as countersinking rivet holes and trimming and forming metal.
13. Identify and repair non-metallic surfaces, including fiberglass, honeycomb, and composites, ensuring adherence to FAA guidelines.
14. Evaluate the load-bearing capacity and integrity of metallic components to determine if repairs are viable or replacement is necessary.
15. Perform detailed evaluations of metallic structures to ensure repairs meet safety standards and industry specifications.
16. Design repairs for structural components, creating technical drawings that specify dimensions, rivet placements, and other repair details.
17. Identify and mitigate risks associated with welding processes by ensuring proper ventilation, protective equipment, and safe handling of welding gases.
18. Assess weld repairs to ensure compliance with structural integrity and safety standards, minimizing the potential for heat distortion or material degradation.

### Standard 6: Non-Metallic Aircraft Structures

Students will apply industry-standard techniques to inspect, repair, and maintain wood, fabric, composite, and thermoplastic materials in aircraft structures, ensuring strength, integrity, and airworthiness in accordance with FAA standards.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Examine the impact of environmental factors on non-metallic materials (such as moisture, humidity, and temperature), and identify material-specific deterioration risks for wood, fabric, and composite structures.
2. Evaluate different types of wood, fabric, and composite materials used in aircraft structures, considering their characteristics, common defects, and selection criteria for repairs.
3. Inspect wood, fabric, and composite materials using appropriate inspection procedures to evaluate their suitability for repairs, identify defects, e.g., cracks, delamination, wear, and select appropriate repair materials.
4. Explain wood and composite repair techniques and materials, including adhesive selection and the use of industry standards for structural repairs.
5. Prepare and repair composite surfaces by performing cleaning, surface preparation, and applying patch repairs according to manufacturer’s guidelines and FAA standards.
6. Conduct temporary and permanent repairs to non-metallic structures, including side windows and fabric coverings, using proper fasteners, adhesives, and techniques to restore structural integrity.
7. Assess the appropriate covering materials and methods for different aircraft structures, focusing on the correct types of textile and seam applications for maintaining structural integrity.
8. Apply safety practices for handling non-metallic materials, including the proper use of adhesives, fasteners, and PPE, ensuring compliance with FAA guidelines on material handling, storage, shelf life, and disposal protocols.
9. Identify and manage risks associated with the selection and handling of adhesives and fasteners for non-metallic structures, ensuring material compatibility and adherence to FAA guidelines.
10. Mitigate risks in composite structure repairs by following proper safety protocols for material handling, mixing, and disposal of hazardous substances.
11. Apply safe practices in the handling, storage, and disposal of thermoplastic and composite materials, ensuring compliance with manufacturer recommendations and FAA regulations.
12. Use technical manuals to determine repair procedures for composite materials, including selecting appropriate repair methods and fasteners, and preparing surfaces for painting or patching.
13. Apply advanced repair techniques for composite and thermoplastic materials, such as vacuum bagging for composite panels or fiberglass repairs, ensuring all processes are in line with FAA repair standards.

### Standard 7: Aircraft Flight Controls

Students will apply manufacturer specifications and regulatory guidelines to maintain, inspect, adjust, and rig aircraft flight control systems, ensuring safe and precise control surface movement for optimal flight performance.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Examine the structure and function of control cables, connectors, and guides, identifying the critical components in maintaining proper control surface movement and ensuring safe flight operations.
2. Evaluate the maintenance requirements for primary and secondary control cables, demonstrating inspection techniques to detect wear, damage, or malfunction, and recommending corrective actions.
3. Apply data from cable tension charts and tensiometers to assess cable tension, ensuring the proper balance and functionality of flight control surfaces, while adhering to manufacturer specifications and regulatory guidelines.
4. Inspect control cables, cable connectors, and push-pull tubes for signs of wear, damage, and improper operation, using diagnostic tools to determine their continued airworthiness.
5. Apply proper rigging techniques to adjust and secure flight control cables, ensuring correct tension, smooth operation, and compliance with rigging tolerances to maintain precise control surface movement.
6. Perform a thorough inspection of bellcranks and torque tubes, diagnosing mechanical issues and ensuring that these critical components are free from binding or failure.
7. Analyze and assess the balance of flight control surfaces, checking for flutter, and determining corrective actions to restore proper alignment and ensure smooth, stable operation within specified limits for safe flight.
8. Demonstrate the ability to remove and reinstall primary and secondary flight control surfaces, ensuring that they are aligned, secured, and function as intended, while verifying attachment points and structural integrity.
9. Design and perform a functional check of secondary and auxiliary control surfaces, such as trim tabs, verifying their freeplay, travel limits, and operational efficiency to ensure they meet performance standards.
10. Apply information on allowable axial play limits for flight control bearings, assessing whether components fall within acceptable tolerances and making necessary adjustments or replacements.
11. Fabricate primary flight control cables according to precise specifications, ensuring proper material selection, length, and configuration, and conducting necessary tests to confirm the cable meets operational requirements.
12. Demonstrate the installation and adjustment of push-pull flight control systems, ensuring that these systems are set to the proper travel and tension limits for accurate control of the aircraft.
13. Interpret and apply manufacturer specifications for rigging aircraft flight controls, ensuring that all control surfaces and mechanisms are properly adjusted for safe and efficient flight operations.
14. Calibrate and maintain flight control rigging equipment, including tension meters and tensiometers, to ensure that all tools are accurate and up to date, in compliance with maintenance schedules and regulations.
15. Apply risk management strategies when selecting and using lifting equipment to move aircraft components, ensuring the safe and correct positioning of flight control systems during maintenance and assembly.

## Standard 8: Airframe Inspections

Students will apply regulations, including 14 CFR Part 91 and Part 43, to perform airframe inspections, assessing safety and airworthiness through thorough documentation, inspections, and adherence to specific requirements.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Identify potential risks when interpreting inspection instructions, conducting visual or radiographic inspections, using checklists, and keeping maintenance records to ensure inspections are safe and comply with regulations.
2. Perform an airframe inspection, including a records check, referencing applicable inspection requirements under 14 CFR Part 91 and 43 and including documentation of findings in compliance with recordkeeping regulations.
3. Develop a checklist for conducting a 100-hour inspection, ensuring it includes all regulatory special inspections, manufacturer recommendations for airframe components, and identifies life-limited parts, additional required inspections, and non-destructive testing (NDT) methods, e.g., visual inspections, radiographic inspections, etc., as applicable to the aircraft type.
4. **Demonstrate conducting a portion of a 100-hour inspection** in accordance with 14 CFR Part 43, using the provided checklist to inspect life-limited parts, and identify any additional required inspections based on the manufacturer’s recommendations.
5. Document the results of a 100-hour inspection in maintenance records, ensuring compliance with 14 CFR Part 43 and accurately documenting corrective actions, discrepancies, or AD compliance.
6. Determine compliance with a specific Airworthiness Directive (AD) by applying knowledge of applicable service bulletins, and continued airworthiness instructions.
7. Inspect seat and seatbelt systems, ensuring compliance with Technical Standard Order (TSO) markings and general airworthiness, documenting any findings, or required corrective actions.
8. Assess discrepancies identified during airframe inspections, ensuring proper documentation, communication, and resolution of issues in compliance with regulations and manufacturer guidelines.

### Standard 9: Aircraft Landing Gear Systems

Students will apply manufacturer specifications to inspect, maintain, troubleshoot, and repair aircraft landing gear systems, ensuring compliance with regulatory requirements and maintaining safe, operational landing gear performance.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Identify various landing gear systems, e.g., tail wheel, tricycle, fixed, and retractable, their key components (struts, tires, wheels, brakes, and steering systems), and explain the function of each component and its role in overall system performance.
2. Inspect landing gear systems for functionality, structural integrity, and airworthiness in compliance with 14 CFR Part 43 (maintenance) and 14 CFR Part 91 (operational standards), following manufacturer specifications and maintenance manuals.
3. Inspect and service landing gear struts, including air/oil shock struts, ensuring system integrity, proper pressure, and optimal performance.
4. Identify components of the anti-skid system, e.g., sensors, actuators, control valves, and explain their function.
5. Inspect and service the anti-skid system, troubleshooting potential issues and ensuring proper component functionality, as per manufacturer guidelines.
6. Inspect, service, and troubleshoot hydraulic brake systems, including brake assemblies, bearings, tires, and wheels, addressing issues such as pressure loss, system leaks, and malfunctioning components, while ensuring compliance with regulatory standards.
7. Bleed hydraulic brake systems when necessary to maintain proper brake functionality, ensuring the hydraulic fluid system is free of air and performing optimally.
8. Apply safety protocols to jack the aircraft properly, ensuring correct jack placement and balancing the aircraft during maintenance to prevent damage.
9. Perform landing gear retraction checks, including identifying components involved in the retraction mechanism and troubleshooting any issues with the system to ensure proper alignment and functionality.
10. Inspect and troubleshoot tires, including assessing tread, sidewall, and bead conditions to determine when replacement is necessary, ensuring compliance with industry safety protocols.
11. Service and troubleshoot the nose-wheel steering system, diagnosing issues, such as shimmy or misalignment, and applying necessary repairs to restore proper operation.
12. Evaluate and inspect the landing gear position and warning systems, verify system operation, and troubleshoot any discrepancies during checks.
13. Evaluate the operation of the landing gear alignment and down-lock switch system, ensuring proper adjustment and functionality for safe operation during gear extension and retraction.
14. Inspect and service brake systems, ensuring components like calipers, rotors, and hydraulic lines are functioning correctly, replace or repair worn components to maintain safe braking operations.
15. Locate and apply troubleshooting procedures for landing gear systems, including retraction mechanisms, anti-skid systems, nose-wheel steering, and hydraulic brake systems, resolving operational failures with correct diagnostic techniques and referring to manufacturer service manuals.
16. Demonstrate replacement of master brake cylinder packing seals and troubleshoot any issues related to brake performance, ensuring the brake system is properly sealed and operational.
17. Service the nose-wheel shimmy damper, ensuring proper operation to reduce oscillations during taxi and maintain effective steering.
18. Inspect and repair landing gear position indicating systems, adjusting to ensure the system provides accurate feedback regarding gear position.
19. Replace and adjust landing gear down-lock switches to ensure secure locking mechanisms during gear retraction and extension.
20. Troubleshoot air/oil shock struts, ensuring proper function and pressure and determining when servicing or replacement is required, to maintain optimal shock absorption during landing and taxiing.
21. Inspect and repair bungee and spring steel landing gear systems, identifying components like springs and shock absorbers, and applying corrective actions for wear or malfunction.
22. Demonstrate proper tire storage practices, ensuring tires are stored in compliance with safety and manufacturer recommendations to maintain their integrity until installation.
23. Identify and assess risks associated with landing gear maintenance, including handling high-pressure systems, hydraulic fluid handling, aircraft jacks, and adhering to safety standards, manufacturer recommendations, and regulatory guidelines, e.g., FAA regulations.

### Standard 10: Hydraulic and Pneumatic Systems

Students will apply manufacturer specifications to identify, service, troubleshoot, and maintain hydraulic and pneumatic systems, ensuring proper functionality, integrity, and safety in accordance with industry standards and regulatory guidelines.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Identify hydraulic system components and demonstrate the correct use of hydraulic fluids, including types and seal compatibility, ensuring safe application to prevent cross-contamination and maintain system performance.
2. Relieve system pressure safely prior to servicing or disassembly of hydraulic and pneumatic systems, following protocols to mitigate risks associated with high-pressure fluids and gases.
3. Locate system-specific hydraulic servicing instructions, select the correct hydraulic fluid for the aircraft, and service hydraulic components, e.g., pressure regulators, restrictors, valves, and accumulator), verifying system integrity by checking pressure settings, adjusting, and replacing or installing components as needed.
4. Inspect, clean, and install hydraulic filters to maintain fluid cleanliness and prevent damage to system components.
5. Remove, clean, inspect, and install hydraulic pumps, performing operational checks to confirm correct operation within the system.
6. Replace and install seals, backup rings, or gaskets in hydraulic components, ensuring proper alignment and fluid compatibility to prevent leaks and maintain system pressure.
7. Service pneumatic systems by checking and purging air from the system, inspecting bleed air overheat warning systems, and performing maintenance or adjustments, as needed, to ensure efficient and safe operation.
8. Check, adjust, and troubleshoot pressure regulators in both hydraulic and pneumatic systems to ensure proper pressure levels during operation.
9. Remove, install, and troubleshoot system pressure relief valves, performing checks to ensure the valve operates correctly and prevents overpressure in the hydraulic or pneumatic systems.
10. Troubleshoot and repair hydraulic and pneumatic system leaks by inspecting hoses, lines, seals, and other components for defects, applying the correct repair or replacement procedures to restore system integrity.
11. Service hydraulic system accumulators by checking fluid levels, pressures, and overall condition, ensuring they meet manufacturer specifications to support system performance.

### Standard 11: Environmental Systems

Students will apply manufacturer specifications to perform inspections, maintenance, and troubleshooting of critical aircraft environmental systems, including oxygen, air conditioning, pressurization, and heating, ensuring all systems function safely and comply with regulatory standards.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Identify components of the oxygen system, including chemical oxygen generators and pressure cylinders, and perform thorough inspections to ensure proper functionality and serviceability, following manufacturer guidelines and safety standards.
2. Inspect emergency oxygen masks and supply hoses for wear, damage, or contamination, and demonstrate proper cleaning and maintenance techniques to ensure functionality during emergency use.
3. Inspect pressure regulators for proper function and wear, ensuring they maintain correct pressure settings and provide safe, reliable oxygen supply to the crew and passengers.
4. Examine oxygen cylinders for damage, leaks, or corrosion, ensuring compliance with safety standards and proper oxygen storage at the designated pressure.
5. Identify and inspect components of chemical oxygen generators, ensuring they are serviceable, safe to use, and comply with handling and operational standards.
6. Purge the oxygen systems prior to servicing, ensuring the system is free of contaminants and safe for maintenance.
7. Apply proper procedures for servicing oxygen systems, including checking pressure levels, refilling pressure cylinders, and ensuring fluid compatibility with aircraft specifications.
8. Locate and follow manufacturer’s troubleshooting procedures for oxygen system issues, including pressure irregularities or system malfunctions.
9. Apply procedures for servicing a vapor-cycle refrigeration system, ensuring proper refrigerant handling, and maintaining operation within designated pressure and temperature specifications.
10. Identify the components of the combustion heater fuel system and inspect for fuel leaks or damage, ensuring safe and efficient system operation.
11. Inspect, test, and troubleshoot an air-cycle air conditioning system, following appropriate procedures to ensure the system operates efficiently.
12. Inspect the cabin heater system with an exhaust heat exchanger for signs of wear, such as cracks, and ensure proper function in compliance with safety standards during operation
13. Inspect and clean the outflow valve in the pressurization system, ensuring it operates correctly to maintain optimal cabin pressure during flight.
14. Implement troubleshooting procedures for the pressurization system to address issues related to cabin altitude, air leaks, or system malfunctions.

### Standard 12: Aircraft Instrumentation Systems

Students will apply manufacturer specifications to inspect, maintain, and troubleshoot various aircraft instruments and systems, ensuring proper operation, accuracy, and compliance with FAA standards to maintain safe and reliable flight operations.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Explain the operation of annunciator systems, interpreting warning, caution, and advisory lights, and demonstrate proper response procedures to maintain safe operations.
2. Demonstrate the inspection and calibration of magnetic compasses, performing compass swinging procedures to correct heading discrepancies.
3. Conduct inspection and troubleshoot the direction indicating instruments, ensuring accurate functionality for safe flight operations.
4. Demonstrate inspection and servicing pressure indicating instruments, ensuring accuracy and compliance with safety standards.
5. Inspect and service temperature indicating instruments, confirming proper operation and compliance with system requirements.
6. Demonstrate inspection and calibration of position-indicating sensors for accurate navigation.
7. Inspect and maintain gyroscopic instruments, ensuring reliable operation for essential flight data, such as attitude and heading.
8. Perform service and inspect the pitot-static system, performing leak tests and verifying the proper operation of instruments like altimeters and airspeed indicators.
9. Perform static system leak tests, confirming integrity and ensuring components are leak-free.
10. Inspect and troubleshoot fuel quantity indicating systems, applying corrective actions to maintain accurate fuel level readings.
11. Inspect and maintain engine indication systems, troubleshooting malfunctions to ensure accurate flight crew alerts.
12. Inspect and maintain electronic displays, ensuring functionality and clarity for operational standards.
13. Inspect and service head-up displays (HUDs), adjusting for alignment, clarity, and functionality.
14. Locate and follow manufacturer’s troubleshooting procedures for vacuum-operated instruments, diagnosing and correcting issues.
15. Inspect and clean vacuum system filters, ensuring they are free from blockages for optimal performance.
16. Clean, inspect, and adjust gyro/instrument air pressure or vacuum systems to maintain stable pressure and proper gyro function.
17. Remove and install instruments, verifying correct placement and connections, while ensuring safe handling during installation or removal.
18. Demonstrate inspection and testing of the stall warning system, confirming it functions correctly and provides timely alerts.
19. Inspect outside air temperature gauges, ensuring accurate and reliable readings.
20. Install range markings on instruments, ensuring visibility, accuracy, and compliance with operational specifications.
21. Conduct barometric pressure checks with an altimeter, verifying accurate altitude readings and regulatory compliance.

### Standard 13: Communication and Navigation Systems

Students will apply FAA guidelines and industry standards to identify, inspect, and maintain key communication and navigation systems used in aircraft, including radio systems, antennas, navigation aids, and flight safety systems.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Identify and explain the operating principles of various radio systems (VHF, HF, SATCOM) and demonstrate their role in aircraft communication.
2. Inspect radio components for condition, functionality, and secure installation, ensuring compliance with operational standards.
3. Examine communication and navigation antennas, ensuring proper placement, secure mounting, and correct coaxial connections for optimal signal clarity, reliability, and functionality, including inspecting static discharge wicks and verifying installation procedures.
4. Inspect and test interphone and intercom systems, verifying clear communication and identifying necessary repairs or adjustments.
5. Evaluate the Emergency Locator Transmitter (ELT), including checking ELT batteries for expiration and confirming proper operation in compliance with safety standards.
6. Inspect the components of the Automatic Direction Finder (ADF), confirming its functionality for accurate navigation support.
7. Evaluate the VOR and DME systems, ensuring their proper functionality and integration for accurate directional guidance and distance measurement during flight operations.
8. Inspect the Instrument Landing System (ILS), ensuring all components are aligned for smooth and safe landing procedures.
9. Inspect GPS systems for compliance with aircraft specifications and ensure precise navigation.
10. Test the Traffic Collision Avoidance System (TCAS), ensuring its functionality and system response for collision avoidance during flight.
11. Inspect weather radar systems, ensuring proper calibration and operational effectiveness for accurate weather monitoring.
12. Examine the Ground Proximity Warning System (GPWS) for proper operation and system integrity to avoid terrain-related accidents.
13. Inspect autopilot systems, identifying key components, explaining their role, and following manufacturer procedures for routine inspection and servicing.
14. Evaluate the auto-throttle system, ensuring proper response to flight adjustments and maintaining engine performance.
15. Inspect stability augmentation systems (SAS) in rotorcraft, confirming correct operation for stable flight.
16. Inspect radio altimeters, ensuring accurate altitude readings and compliance with operational standards.
17. Inspect and verify the operation of Automatic Dependent Surveillance-Broadcast (ADS-B) systems, ensuring accurate surveillance and reporting.
18. Inspect transponder and encoder systems, checking for proper alignment and operation for accurate position reporting.
19. Create a list of required placards for communication and navigation avionics equipment to ensure necessary documentation is in place.
20. Inspect VHF communications, verifying signal clarity and troubleshooting issues, as necessary.
21. Inspect coaxial cable installations for security, grounding, and connection integrity to ensure optimal signal transmission.
22. Inspect electronic equipment, mounting bases for condition and security, ensuring safe operation during flight.
23. Inspect shock mount bonding jumpers, checking for appropriate resistance to ensure vibration protection and proper functionality.
24. Inspect and verify the proper operation of runway and taxiway lights, including edge lights, centerline lights, and approach lighting systems, ensuring proper alignment, brightness, and functionality for safe aircraft navigation during landing and takeoff.
25. Identify and demonstrate the use of visual signaling systems, such as light signals, e.g., steady green, red, and yellow, and explain their role in communication between ground personnel and aircraft, particularly in low-visibility or emergency situations.

### Standard 14: Aircraft Fuel Systems

Students will apply FAA regulations (14 CFR Parts 43, 91, and 135) and industry safety standards to safely operate, maintain, troubleshoot, and inspect aircraft fuel systems, ensuring compliance with regulatory standards and minimizing operational risks related to fuel system components, fueling procedures, and fuel management.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Explain the various types of fuel systems used in aircraft, including their operational principles and key components, such as filters, selector valves, and other critical parts.
2. Describe the different types of fuel tanks (metal, bladder, and integral) and their specific applications and inspect their condition during routine checks.
3. Follow and perform fuel system inspection procedures, evaluating the condition of components, such as filters, selector valves, and tanks, checking for leaks, wear, and ensuring compliance with operational standards.
4. Follow appropriate safety procedures during inspections and repairs to prevent hazards like fuel spills, fire risks, and environmental contamination, ensuring compliance with manufacturer instructions and regulatory requirements.
5. Explain the principles of fuel flow through an aircraft’s fuel system, methods for fuel transfer, fueling, defueling, and the operation of fuel jettisoning systems.
6. Demonstrate proper fueling and defueling procedures according to manufacturer specifications, managing fuel safely and avoiding risks like spills, fire, or contamination.
7. Inspect and verify the proper operation of fuel jettisoning systems to ensure safety during flight operations and take corrective actions to mitigate risks, such as environmental contamination.
8. Describe the different types of aviation fuel, their characteristics, and their impact on aircraft performance.
9. Demonstrate the ability to select and verify the appropriate fuel type for specific aircraft and flight conditions, while assessing the risks of using incorrect fuel types, including performance degradation and engine damage.
10. Explain the operation and importance of fuel quantity indicating systems for flight safety.
11. Inspect and verify the accuracy of fuel quantity gauges, taking corrective actions to mitigate risks related to gauge failure, and ensuring reliable fuel level management during flight.
12. Explain and demonstrate troubleshooting procedures for fuel system components, including valves, filters, sensors, selector valves, and fuel quantity transmitters, and apply repair techniques for faulty components.
13. Assess and mitigate risks associated with troubleshooting fuel system issues, such as fuel leakage, pressure loss, or component failure, during repairs.
14. Explain and apply fuel system cross feed procedures to ensure proper fuel distribution during flight or emergencies, while identifying and mitigating risks, such as imbalance or engine failure.
15. Identify and assess risks related to fuel system maintenance, including improper fuel type selection, contamination, component failure, and malfunctions, and apply appropriate risk mitigation measures.
16. Locate, verify, and explain the importance of fuel system placards, ensuring their presence and compliance with regulatory requirements.
17. Assess risks related to missing or incorrect placards, ensuring that all placards are properly displayed and in compliance with regulatory requirements.

### Standard 15: Aircraft Electrical Systems

Students will apply FAA regulations and industry standards to operate, maintain, and troubleshoot aircraft electrical systems, ensuring safety and effective performance.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Explain the operation and components of aircraft electrical systems, including DC and AC generation systems, power distribution, starters, and inverters.
2. Inspect and troubleshoot electrical circuits, identify faulty components, and apply corrective actions.
3. Inspect aircraft wiring to ensure proper installation, routing, and securing of wires and bundles, verifying compliance with wiring standards, types, and circuit protection requirements.
4. Assess and mitigate risks related to improper wire routing and securing to prevent electrical malfunctions.
5. Install, terminate, and splice electrical wires, assemble connectors, and perform soldering techniques while adhering to safety practices.
6. Evaluate and measure electrical components, including checking the output voltage of generators, inspecting system components, and verifying generator brush serviceability, ensuring systems meet operational standards.
7. Use wiring diagrams to diagnose and test airframe electrical systems, conduct continuity tests, and identify faults, such as shorts to ground or between conductors.
8. Explain the function and operation of aircraft lighting and electrical protection systems, including anti-collision, position, and landing lights, and verify their proper operation.
9. Install and maintain bonding jumpers, electrical switches, and protective devices, ensuring compliance with operational standards and assessing risks related to improper installation or damage.
10. Recognize and address the risks associated with testing or maintaining energized circuits, connecting, or disconnecting external power, and working in areas containing aircraft wiring.

### Standard 16: Aircraft Ice and Rain Control Systems

Students will apply FAA regulations and industry standards to operate, maintain, troubleshoot, and repair aircraft ice and rain control systems, ensuring optimal performance in adverse weather conditions.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Explain the causes and effects of aircraft icing and demonstrate the ability to identify ice buildup and apply corrective actions to mitigate its impact on aircraft performance and safety.
2. Inspect, test, and verify the operation of ice detection systems, ensuring accurate readings and operational efficiency under varying environmental conditions.
3. Identify and describe the components of anti-ice and de-ice systems, including powerplant and aircraft systems, and demonstrate maintenance procedures to ensure their proper operation.
4. Inspect, test, and maintain de-ice systems, including de-icer boots, pneumatic, and chemical systems, to ensure their functionality during flight operations.
5. Perform operational checks and inspections on wiper blade systems, rain control systems, and pneumatic bleed air systems, ensuring compliance with manufacturer specifications and safety standards.
6. Assess and mitigate the risks associated with testing and maintaining ice and rain control systems, including risks from improper handling, contamination, and degradation of anti-ice fluids or components.
7. Apply safe storage and handling procedures for deicing fluids, ensuring compliance with environmental and regulatory standards.
8. Demonstrate the correct procedures for inspecting and cleaning pneumatic deicer boots and applying corrective actions to ensure their operational readiness.
9. Inspect and verify the operation of thermal anti-ice systems, ensuring the components function within specified parameters to maintain safe flight conditions.
10. Perform troubleshooting on electrically heated pitot-static systems and apply necessary repairs to maintain system integrity and performance.
11. Locate, explain, and perform inspections and maintenance tasks on electrically heated windshields, ensuring their proper operation and preventing vision degradation due to ice or rain buildup.
12. Inspect and perform operational checks on the windshield wiper system, replacing blades as needed, and demonstrate the correct procedures for maintaining system functionality.
13. Locate, explain, and perform inspections and repairs on pneumatic rain removal systems, ensuring safe and efficient operation during adverse weather conditions.

### Standard 17: Airframe Fire Protection Systems

Students will apply manufacturer specifications to operate, maintain, troubleshoot, and repair aircraft fire protection systems, ensuring safety, optimal performance under various operational conditions, and FAA compliance.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Explain the types of fires and aircraft fire zones, identifying potential fire hazards in different areas of the airframe, and apply appropriate fire protection measures based on the fire risk location and type.
2. Inspect, test, and maintain fire detection and suppression systems (including overheating, smoke, and carbon monoxide detection systems), ensuring they function accurately and are operationally ready for safety.
3. Troubleshoot and repair fire detection and extinguishing systems, identifying, and correcting malfunctions to maintain system integrity and performance.
4. Inspect fire extinguishing systems, checking fire extinguishing agent bottles for serviceability, pressure, and discharge cartridges, ensuring compliance with operational standards.
5. Demonstrate knowledge of fire extinguishing agents, their properties, and their appropriate application within different fire suppression systems.
6. Follow safe procedures for handling fire extinguishing agents, including using personal protective equipment (PPE) and adhering to environmental and safety protocols.
7. Inspect smoke, toxic gas, and carbon monoxide detection systems, ensuring proper operation and preventing health and safety risks to aircraft occupants.
8. Perform operational checks on fire detection and protection systems (including continuous-loop and smoke detection systems) to ensure they are ready for emergency use.
9. Verify the serviceability of fire protection system cylinders, checking for hydrostatic test dates and performing necessary maintenance to ensure compliance with operational standards.
10. Assess and mitigate risks associated with fire extinguisher systems, including safe handling practices, PPE use, and working on circuits related to fire bottle squibs.

### Standard 18: Aircraft Weight and Balance

Students will be able to apply industry-standard methods to perform accurate weight and balance calculations, ensuring proper aircraft weight distribution to optimize flight safety and performance.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Prepare an aircraft for weighing, ensuring it is properly leveled, all fluids are accounted for (fuel, oil, etc.), and all required equipment (scales, spirit levels, hydrometers) is in place.
2. Demonstrate or describe the weighing of the aircraft and record data such as empty weight, empty weight center of gravity (EWCG), and moment values.
3. Interpret and apply manufacturer-furnished information in weight and balance calculations.
4. Calculate the moment and CG location based on the weight and balance data.
5. Compute and apply the empty weight center of gravity (EWCG) and determine the acceptable operating CG range.
6. Perform calculations to verify that the aircraft is within the CG limits, both for empty weight and operating weight.
7. Calculate and apply the correct weight distribution for aircraft loading, ensuring the center of gravity remains within safe operational limits.
8. Perform adverse-loaded CG checks (forward and aft CG checks) and correct the load as necessary to meet weight and balance requirements.
9. Calculate and adjust weight and balance after aircraft modifications, such as equipment changes or new installations, ensuring that the aircraft’s weight and CG remain within limits.
10. Use ballast to ensure proper weight distribution, applying both temporary and permanent ballast, as needed.
11. Perform weight and balance calculations for different aircraft types, including helicopters, weight-shift control aircraft, and powered parachutes, recognizing their unique characteristics.
12. Explain the concepts of mean aerodynamic chord (MAC) and its impact on weight and balance for various aircraft types.
13. Complete and maintain accurate weight and balance records according to FAA standards, documenting aircraft modifications and weight changes.
14. Demonstrate knowledge of FAA reporting requirements for weight and balance data and ensure the aircraft is compliant with FAA regulations.

### Standard 19: Rotorcraft Fundamentals

Students will be able to apply FAA regulations (such as 14 CFR Parts 43 and 91) and manufacturer specifications to maintain rotorcraft systems, including aerodynamics, rotor systems, flight controls, and transmissions, ensuring safe operation, regulatory compliance, and proper performance during inspections, maintenance, and ground operations.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Explain the principles of rotorcraft aerodynamics and describe the function and operation of rotor systems, including design types, components, and rotor blade construction.
2. Inspect and identify key components of a helicopter rotor system, including blades, control systems, and drive systems, ensuring proper installation and function.
3. Demonstrate knowledge of helicopter skid shoe and tube inspection procedures, checking for wear and ensuring compliance with operational standards.
4. Locate, explain, and apply the procedures for rigging helicopter flight controls, ensuring precise calibration and system responsiveness.
5. Perform rotor blade track and balance procedures, ensuring proper alignment and vibration control for optimal rotorcraft performance.
6. Assess and mitigate risks associated with working around helicopter blades during ground operations, implementing proper ground-handling procedures to ensure safety.
7. Demonstrate the ability to identify and inspect rotorcraft transmission systems and components, ensuring they meet operational standards.
8. Identify and address drive system vibrations, perform necessary inspections and balancing procedures to minimize vibration-related issues.
9. Conduct ground operations and functional tests on rotorcraft systems, verifying the integrity and performance of key components.
10. Apply safety protocols during maintenance and inspection of rotorcraft systems, including proper handling of rotorcraft components and adherence to manufacturer instructions and regulatory requirements.

### Standard 20: Water and Waste Systems

Students will be able to apply FAA regulations and manufacturer specifications to inspect, service, and repair aircraft water and waste systems, ensuring safe and effective operation of potable water and lavatory waste systems, while maintaining regulatory compliance.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Explain the components and operation of potable water systems, including water storage, distribution, filtration, and safety mechanisms used in aircraft to maintain safe drinking water during flight.
2. Identify and explain the components and operation of lavatory waste systems, detailing how waste is collected, stored, and disposed of, and ensuring proper functionality of these systems for passenger and crew convenience and hygiene.
3. Demonstrate the ability to inspect, service, and repair a potable water system, including tasks, such as checking water quality, refilling water tanks, inspecting hoses and valves for leaks, and ensuring the system meets operational standards.
4. Inspect and service lavatory waste systems safely and effectively, following manufacturer guidelines to avoid risks such as exposure to hazardous materials or contamination.
5. Demonstrate proper risk mitigation techniques during the servicing of water and waste systems, including handling hazardous materials safely and ensuring compliance with aircraft maintenance safety protocols.
6. Evaluate potential risks associated with water and waste system maintenance, including contamination, malfunction, and improper disposal, and apply strategies to mitigate these risks during servicing operations.
7. Ensure compliance with FAA and manufacturer requirements during all water and waste system servicing tasks, and accurately complete maintenance logs to maintain regulatory compliance.

## Employability Standards

### Standard 21: Employability Skills

Students will apply employability skills in the aviation airframe maintenance industry, focusing on effective communication, teamwork, leadership, and problem-solving while addressing challenges related to airframe systems and operational safety.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Demonstrate effective communication and interpersonal skills with team members, supervisors, and other aviation professionals, e.g., pilots, engineers, to collaboratively address airframe maintenance issues, ensuring high standards of aircraft safety and performance.
2. Demonstrate active listening by giving full attention to conversations with colleagues, team leaders, and stakeholders, asking relevant questions to clarify needs, providing timely and clear responses, and ensuring that all information is accurately conveyed during maintenance tasks and inspections.
3. Collaborate effectively with other technical departments, e.g., avionics, powerplant mechanics, during airframe maintenance projects, ensuring clear communication, coordinated troubleshooting, and adherence to safety protocols to meet industry standards.
4. Demonstrate the ability to apply a high level of attention to detail throughout all stages of airframe maintenance and repair, ensuring that nothing is overlooked that could compromise safety, compliance, or the proper functioning of aircraft systems.
5. Analyze complex problems related to airframe systems, such as structural integrity, corrosion, and wear, using critical thinking and problem-solving skills to propose practical, compliant solutions that meet FAA regulations and maintain aircraft safety.
6. Apply time management techniques in aviation maintenance settings, effectively prioritizing repair schedules, inspections, and routine maintenance tasks to minimize aircraft downtime, meet regulatory compliance deadlines, and ensure the aircraft’s readiness for operation.
7. Demonstrate leadership skills by guiding a maintenance team during inspections, repairs, or modifications to airframe systems, ensuring adherence to safety protocols, maintaining efficient workflows, and promoting a culture of continuous improvement in operational practices.
8. Demonstrate ethical behavior by adhering to aviation safety standards, FAA regulations, and company policies in all aspects of airframe maintenance, ensuring compliance with industry standards for airframe repairs, inspections, and environmental protection.

## Entrepreneurship Standards

### Standard 22: Entrepreneurship

Students will be able to evaluate entrepreneurial opportunities in the aviation maintenance and repair sector, determine the value proposition of business ownership, and apply regulatory and operational considerations for establishing and running an FAA-certified repair station.

**Aligned Credentials:** FAA Mechanic Certificate – Airframe (A) Rating

Skills:

1. Evaluate the licensing, regulatory, and certification requirements for establishing and operating an FAA-certified maintenance and repair station, including FAA regulations, technician certifications, waste disposal, hazardous materials handling, and the implications for self-employment versus W-2 employment in the aviation maintenance industry.
2. Conduct market research on aviation trends, customer needs, and competitor strategies, to develop business models that address emerging challenges, such as regulatory changes, technological advancements, and the demand for eco-friendly or cost-effective maintenance services.
3. Understand basic financial principles such as budgeting, forecasting, and managing cash flow specifically for aviation maintenance businesses, including overhead costs, labor rates, and materials costs, while ensuring profitability and sustainability.
4. Assess the impact of technological advancements on business opportunities and strategies in aviation maintenance, including the integration of new diagnostic equipment, software tools, and maintenance management systems, and how these innovations can enhance operational efficiency, reduce turnaround times, and improve customer satisfaction.
5. Implement effective business strategies for customer retention, marketing, and service differentiation in the aviation maintenance industry, focusing on high-quality service, meeting FAA compliance standards, and delivering value to individual aircraft owners and commercial clients.
6. Explain the importance of industry partnerships and networking with suppliers, aviation operators, and regulatory bodies to foster business growth, ensure compliance, and establish a reputable, customer-focused business model.

## Digital Literacy Standards

### Standard 23: Digital Literacy

Students will be able to apply digital literacy skills in airframe maintenance, using diagnostic software, data management tools, and digital communication systems to perform efficient, accurate, and safe aircraft maintenance and repair procedures.

Skills:

1. Demonstrate effective electronic communication (written and oral), collaborating with team members, customers, and suppliers to address technical issues and ensure proper aircraft maintenance.
2. Utilize online resources, forums, and diagnostic software to troubleshoot and resolve technical issues related to airframe systems, including structural components, landing gear, and environmental control systems.
3. Use digital tools and software for airframe maintenance and business management, including project management platforms, maintenance tracking systems, finance and budgeting tasks, and parts inventory software to streamline repair schedules and optimize operations.
4. Analyze and interpret data from diagnostic tools, sensors, and maintenance logs to make data-driven decisions for airframe inspections, repairs, and system performance improvements.
5. Utilize digital tools to track and optimize maintenance efforts, such as monitoring scheduled maintenance, tracking component wear, and reducing operational downtime for aircraft systems.
6. Demonstrate the ability to use advanced aviation technologies, including computer-aided design (CAD) software, maintenance tracking systems, and aircraft health monitoring systems, for aircraft maintenance, repair planning, and real-time diagnostics.

## Credentials of Value

### Safety Credentials

For this program area, students must (1) be prepared to take and (2) be provided with an opportunity to achieve at least one of the listed Essential Safety Credentials.

For this program area, these are the essential safety credentials:

* [OSHA 10 - General Industry](https://www.osha.com/courses/10-hour-general.html), OSHA

### Essential Credentials

All programs must (1) prepare all students in the program to take, and (2) provide an opportunity for them to achieve at least one essential credential.

Credentials on the essential list are included based on the following criteria:

* + The certification must have high-value currency in the market, which can be gained through various processes including transparency initiatives, general awareness, endorsements and validations, regulations, hiring policies and practices, and/or procedures that can be used to translate the credential into academic credit.
	+ Must lead to improved hiring outcomes and/or increased earnings for students who attain the credential.
	+ Credentials required for employment in program field must be included.

For this program area, these are the essential credentials:

* + [Aviation Mechanic - Airframe (A) Certificate](https://www.faa.gov/mechanics/become), Federal Aviation Administration

### Supplemental Credentials

Programs may choose to differentiate and expand upon their program by offering additional credentials.

Credentials listed as Supplemental/Specialized may include:

* Credentials that are endorsed by local or regional industry associations or workforce boards.
* Must be attainable for students in the program who master the competencies outlined in the relevant Career Technical Education Framework such as an advanced/stacked credential above the essentials.
* May be equipment, tool, software or process specific if valued by industry.

For this program area, these are the supplemental credentials:

* [Heartsaver First Aid CPR AED Certification](https://cpr.heart.org/en/cpr-courses-and-kits/heartsaver/heartsaver-first-aid-cpr-aed-training), American Heart Association

### Supplemental Credentials – Postsecondary

Additionally, these credentials are identified as credentials of value available for further advancement post high school graduation.

For this program area, these are the postsecondary credentials:

* [Aircraft Maintenance Technician Certificate (AMT)](https://www.faa.gov/mechanics/become), Federal Aviation Administration (FAA)
* [Aviation Mechanic Airframe and Power Plant Certificate (A&P)](https://www.faa.gov/mechanics/become), Federal Aviation Administration (FAA)
* [Electricity Introduction, Measurement and Circuits Certification](https://www.nc3.net/wp-content/uploads/2023/04/ElectricalIntrofinal.pdf), National Coalition of Certification Centers (NC3)
* [Precision Measurement Instruments Certification](https://www.nc3.net/wp-content/uploads/2023/06/Precision-Measuring-Instruments-1.pdf), National Coalition of Certification Centers (NC3)