

ORAL AND PRACTICAL EXAM PREPARATION GUIDE

Successfully Demonstrating Your Airframe Mechanic Knowledge and Skills

The FAA Airframe Mechanic certification requires more than passing the written examination—you must demonstrate practical competency through comprehensive oral questioning and hands-on practical projects evaluated by a Designated Mechanic Examiner (DME). This section prepares you for these critical examinations with:

- **Oral Examination Preparation:** Common examiner questions organized by topic area, expected depth of answers, and professional response techniques
- **Test Tips and Strategies:** Professional presentation, time management, resource usage, and handling challenging questions
- **Evaluation Criteria:** Understanding how examiners assess your competency and what constitutes passing performance

The oral and practical examinations evaluate your ability to apply knowledge in real-world scenarios, communicate technical information clearly, work safely and efficiently, and demonstrate the practical skills required of a certificated Airframe Mechanic. Thorough preparation using this guide ensures you approach these examinations with confidence and competence.

Let's begin your oral and practical examination preparation.

SECTION 1: UNDERSTANDING THE ORAL AND PRACTICAL EXAM PROCESS

The FAA Airframe Mechanic certification oral and practical examinations represent the culmination of your training and the final step toward certification. Unlike the written examination, which tests knowledge through multiple-choice questions, these examinations evaluate your ability to apply knowledge in real-world scenarios, communicate technical information clearly, work safely and efficiently, and demonstrate the hands-on skills essential to aircraft maintenance. Understanding what to expect and how examiners evaluate your performance is critical to success.

What To Expect During The Oral Exam

Examination Format and Structure

The oral examination typically lasts 1.5 to 3 hours, though duration varies based on your responses, the examiner's questioning style, and the depth of exploration required. The Designated Mechanic Examiner (DME) conducts a one-on-one interview covering topics from the FAA Airframe Mechanic Practical Test Standards (PTS) aligned with FAA-S-ACS-1.

The examination follows a structured yet flexible format:

The DME selects questions from required subject areas ensuring comprehensive coverage of airframe systems, structures, regulations, and procedures. While examiners must cover specific topic areas mandated by the FAA, they have discretion in how deeply they explore each subject based on your demonstrated competency. Strong initial responses often result in quicker progression through topics, while incomplete or uncertain answers prompt follow-up questions to assess the depth of your understanding.

Typical oral examination progression:

The examination usually begins with general questions establishing baseline knowledge before progressing to more specific technical scenarios. Early questions might cover basic regulatory requirements, general maintenance practices, or fundamental systems operation. As the examination progresses, questions become increasingly specific, scenario-based, and application-focused. Examiners often present real-world maintenance situations requiring you to diagnose problems, explain procedures, or make decisions based on technical knowledge and regulatory compliance.

Types of Questions You'll Encounter

Knowledge-Based Questions assess your understanding of fundamental concepts, systems operation, and theoretical principles. Examples include:

- "Explain how a continuous-loop fire detection system operates."

- "What are the primary structural components of a semi-monocoque fuselage?"
- "Describe the differences between Class A, B, C, and D fires."

These questions evaluate whether you understand core concepts necessary for competent maintenance work. Strong answers demonstrate not just memorization but genuine comprehension of principles and their practical applications.

Application Questions require you to apply knowledge to specific situations, demonstrating practical judgment:

- "You discover a crack in an aluminum skin panel during inspection. Walk me through your evaluation and decision-making process."
- "An aircraft arrives with low hydraulic pressure. What systematic troubleshooting approach would you use?"
- "How would you determine if a dent in a leading edge deice boot requires replacement?"

These questions assess your ability to use knowledge in real maintenance scenarios, demonstrating critical thinking, systematic problem-solving, and sound judgment.

Regulatory Questions verify your understanding of FAA regulations, airworthiness requirements, and compliance obligations:

- "What documentation is required when you perform a major repair?"
- "Under what authority can you approve an aircraft for return to service after an annual inspection?"
- "What are your responsibilities regarding Airworthiness Directives?"

Examiners carefully evaluate regulatory knowledge because compliance is fundamental to certificated mechanic responsibilities. You must demonstrate clear understanding of your legal authority, limitations, and documentation requirements.

Resource-Based Questions test your ability to locate and interpret technical information:

- "Show me how you would find the torque specification for this particular bolt."
- "Where would you find the fuel capacity for this aircraft?"
- "How would you determine if this repair is major or minor?"

These questions recognize that mechanics routinely use reference materials. Examiners assess whether you know which resources to consult and can efficiently extract correct information. You'll have access to reference materials during this portion of the examination.

Scenario-Based Questions present complex situations requiring integrated knowledge from multiple areas:

- "An aircraft is reported to have experienced an in-flight fire indication. What inspection and documentation would be required before returning it to service?"
- "You're performing a 100-hour inspection and discover corrosion in the wing spar attachment area. What factors determine your course of action?"

These comprehensive questions evaluate your ability to integrate knowledge, consider multiple factors, apply regulations appropriately, and make sound maintenance decisions reflecting real-world complexity.

Examiner Questioning Techniques

Progressive Depth Questioning: Examiners often start with a broad question then progressively narrow focus based on your responses. A question about hydraulic systems might begin with "Describe the purpose of an accumulator," then progress to "What would indicate low nitrogen precharge?" and "How would you service the accumulator?" This technique assesses depth of understanding.

Follow-Up Clarification: If your initial answer is incomplete or partially incorrect, examiners typically ask follow-up questions allowing you to clarify, expand, or correct your response. This isn't necessarily a negative sign—it's often part of the evaluation process determining whether you have fundamental understanding despite initial communication issues.

Alternative Phrasing: If you seem confused by a question, examiners may rephrase it using different terminology. This helps distinguish between lack of knowledge and simple miscommunication.

Using Reference Materials During the Oral Exam

When Resources Are Appropriate: Examiners expect you to use reference materials for specific information like torque values, parts numbers, technical data, inspection criteria, and regulatory details. No one expects you to memorize every specification in every manual. However, you must demonstrate knowledge of which resources contain needed information and how to navigate them efficiently.

When Resources Are Not Appropriate: Examiners expect you to answer conceptual questions, explain system operation, describe procedures, and discuss fundamental principles from knowledge without consulting references. If asked "How does a vacuum-driven attitude indicator work?" reaching for a manual signals insufficient foundational knowledge.

Demonstrating Resource Competency: When appropriate to use references, state your intention clearly: "I would verify that specification in the aircraft maintenance manual." Then efficiently locate the information, demonstrating familiarity with document organization. This shows professional practice—checking specifications rather than relying on memory for critical data.

Communication Expectations

Clarity and Organization: Examiners value clear, organized responses. Begin with a direct answer, then provide supporting detail. For example, if asked about rivet spacing requirements, start with "Minimum pitch is typically three times the rivet diameter," then explain the reasoning and exceptions.

Technical Accuracy: Use correct technical terminology demonstrating professional knowledge. Instead of "the thing that makes the wheels turn," say "the brake rotor" or "brake disc." Proper terminology indicates depth of training and professional competence.

Appropriate Depth: Match your answer depth to the question. If asked "What does a fuel boost pump do?" respond with "Provides positive fuel pressure to the engine-driven pump, prevents vapor lock, and serves as backup" rather than a 10-minute lecture on pump construction unless the examiner requests additional detail.

Professional Demeanor: Maintain professional composure even if nervous. It's acceptable to pause before answering to organize your thoughts. If you don't know an answer, acknowledge it honestly rather than guessing—"I'm not certain of the exact specification; I would verify that in the maintenance manual" is far better than an incorrect answer stated confidently.

Practical Project Requirements

Overview of Practical Testing

The practical examination typically lasts 3 to 6 hours and requires you to complete hands-on projects demonstrating essential airframe mechanic skills. Unlike the oral examination's question-and-answer format, practical projects involve actual fabrication, repair, inspection, and assembly tasks evaluated against industry standards.

Common Practical Projects Include:

Sheet Metal Repair: You'll typically fabricate a patch for simulated skin damage, demonstrating layout, cutting, forming, drilling, countersinking, and riveting skills. This fundamental airframe skill is almost universally tested.

Safety Wiring: Examiners routinely require safety wiring demonstrations on turnbuckles, drain plugs, or other hardware. You must demonstrate both single-wire and double-wire techniques meeting specification requirements.

Fabric Repair: If your training included fabric-covered aircraft, you may perform a fabric patch repair demonstrating proper technique, doping procedures, and finishing.

Control Cable Rigging: You might install and tension a control cable, demonstrating proper routing, turnbuckle adjustment, and safetying techniques.

Welding: Some examiners require welding demonstrations (oxyacetylene or electric) producing acceptable test welds meeting strength and appearance standards.

Composite Repair: With increasing composite aircraft, some examiners test basic composite patch procedures including surface preparation and layup techniques.

System Servicing: You may demonstrate hydraulic system servicing, landing gear strut servicing, or tire changing procedures.

Electrical Work: Expect to perform basic electrical tasks such as terminal crimping, wire splicing, or connector assembly demonstrating proper techniques and quality standards.

The exact projects vary by examiner and may be influenced by:

- Your training background and experience
- Local aircraft types and common maintenance needs
- Available tools and materials at the testing facility
- Time constraints and examination scheduling
- Specific areas where the examiner wants to verify competency

Most examiners select projects covering a breadth of skills rather than exhaustive depth in every area. The goal is representative sampling demonstrating overall competency across airframe maintenance skills.

Project Evaluation Standards

Workmanship Quality: Your work must meet professional aviation maintenance standards, not merely "good enough" hobbyist quality. Examiners evaluate whether work would be acceptable for installation on a flying aircraft. This means proper technique, appropriate tools, correct specifications, and attention to detail throughout.

Safety Practices: Safe work practices are paramount. Examiners watch for proper tool usage, appropriate personal protective equipment, awareness of hazards, and safe work habits throughout practical projects. Unsafe practices can result in immediate examination failure regardless of work quality.

Regulatory Compliance: Your work must comply with FAA regulations and acceptable industry standards. For example, a sheet metal repair must meet proper edge distance, rivet spacing, and material specifications. Regulatory compliance isn't optional—it's fundamental to airworthiness.

Efficiency and Technique: While examiners don't expect the speed of experienced mechanics, they evaluate whether you work methodically using proper techniques. Excessive time, constant restarts, or trial-and-error approaches suggest insufficient training or practice.

Resource Usage: Examiners evaluate your ability to consult appropriate references, select correct tools and materials, and interpret technical data. They want to see you verify critical specifications rather than guess.

Tools and Materials Provided

Testing facilities typically provide basic hand tools, specialized aviation tools, and materials necessary for projects. However, significant variation exists between testing locations. Some facilities have extensive tool collections and material stocks; others provide only minimum requirements.

What's Typically Available:

- Standard hand tools (screwdrivers, pliers, wrenches, hammers)
- Measuring tools (rulers, calipers, micrometers)
- Sheet metal tools (snips, files, deburring tools)
- Drilling equipment (hand drills, drill press)
- Riveting equipment (rivet guns, bucking bars, squeezer)
- Safety wire and safety wire pliers
- Basic materials (aluminum sheet, rivets, hardware)
- Reference materials (AC 43.13-1B, maintenance manuals)

What You May Need to Provide:

Some examiners expect candidates to bring personal tools, particularly basic hand tools and precision instruments. Confirm requirements when scheduling your examination. Bringing your own tools can be advantageous—you're familiar with them and they're maintained to your standards.

Time Management During Practical Projects

Understanding Time Expectations: Practical projects aren't timed races, but examiners expect reasonable efficiency. A simple patch repair shouldn't require three hours; a safety wire job shouldn't take 45 minutes. Work steadily and methodically without rushing, which causes mistakes.

Planning Before Executing: Take time to plan your approach before beginning physical work. Review specifications, gather necessary tools and materials, visualize the sequence of operations, and identify potential challenges. Five minutes of planning can prevent thirty minutes of rework.

Quality Over Speed: If you must choose between working quickly with marginal quality or working more slowly with excellent results, always choose quality. Examiners can accept slower work from newer mechanics, but they cannot pass substandard workmanship.

Examiner Evaluation Criteria

Understanding the Pass/Fail Standard

The FAA requires examiners to evaluate whether you demonstrate the knowledge and skills necessary to perform certificated airframe mechanic duties safely and in compliance with regulations. This isn't a comparison to other candidates or a preset percentage score—it's an absolute standard of minimum competency.

You must demonstrate:

Adequate Knowledge: You understand fundamental principles, systems operation, maintenance procedures, and regulatory requirements at a level allowing safe, effective work. You don't need encyclopedic knowledge, but you must demonstrate solid understanding of core concepts and know how to find information you don't have memorized.

Practical Skill: You can perform essential airframe maintenance tasks to acceptable quality standards using proper techniques, appropriate tools, and safe practices. Your work must be airworthy—suitable for installation on aircraft in service.

Sound Judgment: You make appropriate decisions based on available information, recognize when to seek additional guidance, understand your authority and limitations, and prioritize safety and regulatory compliance.

Professional Practice: You work in ways reflecting industry standards including proper documentation, resource consultation, systematic problem-solving, and awareness of airworthiness implications.

Specific Evaluation Areas

Technical Knowledge Depth: Examiners assess whether you understand concepts well enough to apply them in varied situations, not just recite memorized facts. They listen for explanations demonstrating genuine comprehension versus rote repetition of textbook language.

Troubleshooting Ability: Aviation maintenance constantly requires systematic problem diagnosis. Examiners evaluate whether you approach problems logically, consider multiple possibilities, use appropriate diagnostic methods, and work from symptoms to root causes rather than guessing.

Regulatory Awareness: Understanding FAA regulations isn't optional. Examiners verify you know your authority under FAR Part 65, understand Part 43 maintenance requirements, recognize the difference between major and minor repairs, know documentation requirements, and understand the significance of Airworthiness Directives.

Safety Consciousness: Safety awareness must be ingrained, not an afterthought. Examiners watch for proper eye protection, correct tool usage, awareness of pinch points and crush hazards, appropriate handling of chemicals and hazardous materials, and general safety mindset throughout the examination.

Communication Skills: Aviation maintenance requires clear communication with inspectors, other mechanics, pilots, and parts suppliers. Examiners evaluate whether you can explain technical concepts clearly, use appropriate terminology, and communicate in ways promoting understanding and safety.

Practical Skills Execution: Your hands-on work must demonstrate proper technique refined through practice. Examiners distinguish between minor imperfections natural for newer mechanics and fundamental technique problems indicating insufficient training or practice.

Common Reasons for Unsatisfactory Performance

Insufficient Fundamental Knowledge: Gaps in basic knowledge about systems operation, structures, materials, or regulations indicate incomplete training. While you can look up specifications, you must understand core concepts from knowledge.

Unsafe Practices: Any unsafe action—failure to wear safety glasses, improper tool usage creating hazards, disregard for safety procedures—can result in immediate examination failure. Safety is non-negotiable in aviation maintenance.

Inability to Use Resources: If you cannot efficiently locate needed information in appropriate references, you'll struggle in actual maintenance work. Examiners expect you to demonstrate resource competency.

Poor Workmanship: Work failing to meet minimum quality standards—improperly formed rivets, incorrect safety wire technique, poor sheet metal forming—indicates insufficient practical skill development requiring additional training.

Lack of Regulatory Compliance Awareness: Not understanding what requires approval, what documentation is needed, or what your authority permits suggests you're not ready for the responsibilities of a certificated mechanic.

Communication Difficulties: If you cannot explain procedures, describe systems, or discuss your work clearly, it raises concerns about your ability to function effectively in maintenance environments requiring clear communication.

What Happens If You Don't Pass

Partial Credit: The FAA examination process doesn't provide partial credit. You must demonstrate competency across all required areas. However, if you perform well in most areas but show deficiency in specific topics, examiners often focus retesting on those areas rather than repeating the entire examination.

Remedial Training: Unsuccessful candidates receive a written notice of disapproval identifying specific deficiency areas. This letter guides remedial training, indicating exactly what knowledge or skills need strengthening before retesting.

Retesting Requirements: There's no mandatory waiting period for FAA mechanic retesting. You can schedule another examination as soon as you and your instructor believe you've addressed the deficiencies.

However, examiners want to see evidence of additional training, not just a second attempt hoping for easier questions.

Learning from the Experience: Many successful mechanics failed their first attempt. If this happens to you, view it as valuable feedback identifying areas needing attention. Use the examiner's feedback to guide focused study and practice, return better prepared, and succeed on your next attempt.

Strategies For Demonstrating Knowledge

Preparation Strategies

Comprehensive Review: In the weeks before your examination, systematically review all subject areas. Don't just focus on favorite topics or areas where you feel confident—examiners specifically probe for weak spots. Use the practice tests in this guide to identify areas needing additional study.

Hands-On Practice: For practical projects, practice isn't optional. You cannot develop proper sheet metal technique, safety wire proficiency, or welding skill through reading alone. Arrange practice time with training equipment, ideally under supervision from experienced mechanics who can correct technique problems.

Reference Material Familiarity: Spend time navigating FAA Advisory Circulars, particularly AC 43.13-1B (Acceptable Methods, Techniques, and Practices). Know the document organization, understand how information is structured, and practice finding specific information quickly. Familiarity with references translates directly to examination efficiency.

Mock Examinations: If possible, arrange mock oral and practical examinations with your instructor or experienced mechanics. This familiarizes you with the examination format, helps you practice answering questions under pressure, and identifies areas needing additional preparation.

Study Groups: Discussing topics with fellow students reinforces learning and exposes you to different perspectives. Teaching concepts to others is one of the most effective ways to solidify your own understanding.

During the Oral Examination

Listen Carefully: Many examination mistakes result from misunderstanding questions. Listen to the complete question before formulating your answer. If anything is unclear, ask for clarification: "Are you asking about the operational check or the rigging procedure?"

Think Before Speaking: Taking a few seconds to organize your thoughts before answering demonstrates thoughtfulness and typically results in clearer, more complete responses than rushing into answers.

Answer Directly, Then Elaborate: Lead with a clear, direct answer to the question, then provide supporting detail or explanation. This structure ensures the examiner knows you understood the question and have the core knowledge even if you lose your place during elaboration.

Admit Knowledge Gaps Honestly: If you don't know an answer, say so honestly. "I'm not certain of the exact requirement; I would need to reference Part 43" is far better than guessing incorrectly. Examiners respect honesty and understand you won't know everything—but they need to verify you know how to find information.

Don't Overexplain: Answer the question asked without launching into unrelated topics. Volunteering information beyond the question scope risks revealing knowledge gaps in areas the examiner hadn't planned to explore.

Ask for Clarification When Needed: If a question is ambiguous or could be interpreted multiple ways, ask for clarification rather than guessing what the examiner wants. "Are you asking about the system operation or the inspection procedure?" shows you understand the difference.

Manage Nervousness: Some nervousness is normal and expected. Take deep breaths, remember that examiners want you to succeed, and focus on demonstrating what you know rather than worrying about what you don't.

During the Practical Examination

Read Project Requirements Completely: Before beginning any project, read the complete instructions or requirements. Rushing into work before understanding what's required wastes time and risks mistakes.

Gather Everything First: Collect all necessary tools, materials, and references before starting work. Constant interruptions to find tools or materials disrupt workflow and suggest poor planning.

Work Systematically: Follow a logical sequence of operations. For sheet metal repair: layout, cut, deburr, form, mark holes, drill, deburr holes, countersink, install rivets. Skipping around creates confusion and errors.

Check Your Work Progressively: Don't wait until a project is complete to verify quality. Check measurements before cutting, verify hole alignment before drilling, inspect each rivet after installation. Catching problems early prevents extensive rework.

Demonstrate Safe Habits: Consistently wear appropriate safety equipment, use tools correctly, maintain organized work area, and dispose of scrap properly. Safety consciousness should be automatic, not something you remember when the examiner is watching.

Verbalize Your Process When Appropriate: Sometimes it's helpful to explain what you're doing and why: "I'm checking the rivet length to ensure it provides proper grip length." This demonstrates your understanding of the purpose behind each step.

Don't Rush: Work at a steady, deliberate pace. Rushing causes mistakes requiring time-consuming correction. Quality work performed methodically is faster overall than rushed work needing rework.

Ask Questions If Specifications Are Unclear: If project requirements are ambiguous, ask for clarification rather than proceeding with assumptions. "Should I use 3/32 or 1/8 rivets for this thickness material?" shows you understand the decision factors.

Professional Presentation

Appropriate Dress: Dress professionally—clean work clothes, closed-toe shoes, long pants. Avoid excessive jewelry that could create hazards. First impressions matter, and professional appearance suggests professional attitude.

Punctuality: Arrive on time or slightly early. Late arrival creates stress and suggests poor time management or lack of seriousness about the examination.

Respectful Communication: Address the examiner professionally. "Yes, sir" or "Yes, ma'am" is appropriate. Maintain respectful tone even if frustrated or nervous.

Prepared Materials: Bring required documents (identification, graduation certificate, training records, medical if applicable). Having everything organized demonstrates preparedness and professionalism.

Positive Attitude: Approach the examination as an opportunity to demonstrate your knowledge and skills, not an ordeal to survive. Positive attitude helps manage stress and creates better examiner interaction.

Final Preparation Tips

The Week Before: Focus on review rather than learning new material. Reinforce existing knowledge, practice weak areas, and ensure you're rested and mentally prepared.

The Day Before: Do light review, get adequate sleep, prepare materials you'll need, and visualize successful examination performance. Avoid cramming—last-minute studying often increases anxiety without significantly improving performance.

Examination Day: Eat a proper meal, arrive early allowing time for unexpected delays, bring water and any allowed snacks for breaks, and use any pre-examination time to relax and review mentally.

Confidence Through Preparation: The best confidence builder is thorough preparation. If you've studied comprehensively, practiced extensively, and honestly assessed your readiness, approach the examination confident in your preparation. The examiner is there to verify competency you've already developed—demonstrate what you know, work safely and skillfully, and trust your training.

Your oral and practical examinations represent the culmination of significant training investment and the gateway to your aviation maintenance career. Approach them with thorough preparation, professional demeanor, and confidence in the knowledge and skills you've developed. Thousands of mechanics have successfully completed these examinations—with proper preparation and the guidance in this study guide, you will too.

SECTION 2: AIRFRAME SUBJECT AREA ORAL PREPARATION

The oral examination covers a broad range of airframe topics, but certain questions appear consistently across examiners and testing locations. This section provides the most commonly asked questions organized by subject area, along with guidance on structuring comprehensive answers that demonstrate competency. Understanding not just what examiners ask but how to answer effectively is crucial for examination success.

Structures, Assembly, And Rigging Questions

Aircraft Structural Concepts

Question: "Explain the difference between monocoque, semi-monocoque, and truss structures. Which is most common in modern aircraft?"

Expected Answer Depth: Examiners want you to demonstrate understanding of load distribution principles, not just definitions. A strong answer includes:

Monocoque structure relies entirely on stressed skin to carry all loads with no internal framework. The skin must be thick and strong, making this design heavy and susceptible to catastrophic failure if skin is damaged. Used in some early aircraft and modern composite gliders.

Semi-monocoque combines stressed skin with internal framework including bulkheads, longerons, and stringers. Loads distribute between skin and framework, allowing lighter construction while maintaining strength. Damage is localized rather than catastrophic. This is the most common design in modern aircraft because it offers the best strength-to-weight ratio.

Truss structures use welded steel tube framework covered with fabric or light skin. The framework carries all loads; covering provides aerodynamic shape. Common in light aircraft and vintage designs. Simple, repairable, but heavier than semi-monocoque for larger aircraft.

Why This Depth Matters: This answer demonstrates you understand the engineering principles behind structural choices, not just vocabulary. You've connected design features to practical implications (weight, damage tolerance, applications).

Question: "What are the primary structural components of a semi-monocoque wing?"

Expected Answer: *The primary structural components include the wing spars (main fore-aft structural members, typically front and rear spar), ribs (span-wise members forming airfoil shape and transferring loads to spars), stringers (longitudinal stiffeners preventing skin buckling), and stressed skin (carries flight loads in combination with internal structure). Some wings also include compression struts between spars to resist crushing loads.*

Follow-Up You Might Encounter: "What happens if a stringer is damaged?" This tests whether you understand component functions. Answer: *Stringers prevent skin buckling under compression loads. Damaged stringers reduce the skin's ability to carry compression, potentially leading to skin buckling and structural failure. The damage must be evaluated against structural repair manual limits and repaired or the stringer replaced.*

Stress and Load Distribution

Question: "Explain the five types of stress that can act on aircraft structures."

Expected Answer: *The five types of stress are:*

Tension - pulling force attempting to stretch or elongate material, like control cables under load or wing skin on upper surface during negative G.

Compression - pushing force attempting to shorten material, like landing gear struts during touchdown or wing spars during flight loads.

Torsion - twisting force, like forces on a propeller shaft or wing experiencing roll moments.

Shear - sliding force where layers try to slide past each other, like rivets connecting two sheets or bolts in structural fittings.

Bending - combination of tension and compression, like a wing spar in flight with tension on bottom and compression on top.

Key Point: Always explain with aircraft examples. This demonstrates you understand how theoretical concepts apply to actual structures.

Question: "Where is the neutral axis in a beam, and what significance does it have?"

Expected Answer: *The neutral axis is the line through a beam's cross-section where stress transitions from compression to tension during bending. At the neutral axis itself, stress is zero. Material above the neutral axis experiences compression; material below experiences tension. This is significant because maximum stress occurs at the surfaces farthest from the neutral axis, which is why I-beams concentrate material at top and bottom flanges rather than at the neutral axis where it contributes less to bending strength.*

Control Rigging Fundamentals

Question: "Walk me through the steps to properly rig a flight control system."

Expected Answer: Examiners want to see systematic thinking and safety awareness.

First, I would consult the aircraft maintenance manual for specific rigging procedures and specifications. Then I would:

1. Ensure aircraft is properly supported and secured to prevent movement.

2. *Neutralize the control surface using a rigging board or protractor to establish the correct neutral position per specifications.*
3. *Center the cockpit control (stick, yoke, or rudder pedals) using a rigging fixture or measurement.*
4. *Connect the control cable system, ensuring proper routing through pulleys and fairleads without interference.*
5. *Adjust cable tension using turnbuckles to achieve the specified tension measured with a tensiometer, accounting for temperature per the cable tension chart.*
6. *Safety all turnbuckles with safety wire or clips, ensuring proper installation preventing loosening.*
7. *Check full control surface travel in both directions against specifications, ensuring stops engage properly and no binding occurs.*
8. *Perform operational check of entire system through full range of motion.*
9. *Document the rigging in maintenance records.*

Follow-Up Questions:

- "How do you safety wire a turnbuckle?" (Demonstrate knowledge of both single and double-wrap methods)
- "Why does cable tension change with temperature?" (Thermal expansion/contraction of cable)
- "What would cause insufficient control travel?" (Mis-rigged cables, damaged stops, worn components)

Question: "What is control surface flutter and why is proper rigging important to prevent it?"

Expected Answer: *Control surface flutter is rapid, self-excited oscillation of a control surface caused by aerodynamic forces coupling with structural flexibility. It can cause catastrophic structural failure within seconds. Proper rigging prevents flutter by ensuring surfaces are balanced (mass balanced to prevent inertial coupling), properly tensioned cables prevent excess play, and travel limits are correct preventing over-travel that could initiate flutter. Any rigging issue affecting surface balance, free play, or travel can contribute to flutter risk.*

Cable Systems and Components

Question: "Explain the purpose of fairleads and pulleys in control cable systems."

Expected Answer: *Fairleads are non-rotating guides that prevent cables from rubbing against structure, maintaining proper cable routing, and minimizing friction where cable direction changes slightly. They're used for minor directional changes.*

Pulleys are rotating guides used where cables change direction significantly. They reduce friction through rotation, support cable loads, and maintain cable position. Pulleys must be properly aligned with cable direction and secured to prevent shifting.

Both prevent cable wear and maintain system efficiency. Damaged or misaligned fairleads and pulleys cause cable fraying and increased control forces.

Question: "What inspection points are critical for cable systems?"

Expected Answer: *Critical inspection points include:*

Cable condition - checking for broken strands, corrosion, kinks, or wear. More than one broken strand in standing cable requires replacement.

Proper tension - verified with tensiometer against specifications.

Turnbuckle engagement - minimum of three threads visible beyond the barrel, proper safetying.

Pulley condition - checking for bearing wear, cracked flanges, proper rotation, cable tracking in pulley groove.

Fairlead condition - checking for wear, cracks, proper securing.

Cable routing - ensuring no interference, chafing, or contact with structure.

Swaged terminals - checking for slippage, cracking, or distortion.

Materials And Repair Questions

Aluminum Alloys and Heat Treatment

Question: "Explain the aluminum alloy numbering system and what the numbers tell you about the material."

Expected Answer: *The four-digit aluminum alloy numbering system identifies alloy composition. The first digit indicates the major alloying element: 1xxx is essentially pure aluminum, 2xxx contains copper (high strength, heat-treatable), 3xxx contains manganese, 4xxx silicon, 5xxx magnesium (non-heat-treatable, good corrosion resistance), 6xxx magnesium and silicon (heat-treatable, medium strength), and 7xxx contains zinc (highest strength, heat-treatable).*

The second digit indicates modifications to the original alloy. The last two digits identify the specific alloy composition.

Common aircraft alloys include 2024 (high strength, fuselage skins, structural applications) and 7075 (highest strength, highly stressed parts).

Question: "What does the T6 heat treatment designation mean, and what properties does it provide?"

Expected Answer: *T6 indicates solution heat treatment followed by artificial aging. The material is heated to dissolve alloying elements, rapidly quenched to trap them in solution, then artificially aged at controlled temperature to precipitate them in a way that maximizes strength.*

T6 provides maximum strength for the alloy. For example, 2024-T3 is solution heat-treated and cold-worked, while 2024-T6 is solution heat-treated and artificially aged to higher strength.

This matters because you cannot use T6 material where specifications call for T3—the different tempers have different strength and formability characteristics.

Corrosion Identification and Treatment

Question: "Describe the different types of corrosion found on aircraft and how you identify each."

Expected Answer: Examiners want comprehensive coverage showing you can recognize various corrosion types.

Surface corrosion appears as white or gray powdery deposits on aluminum, caused by oxidation. It's the most common type and easiest to treat if caught early.

Pitting corrosion creates small, deep cavities in metal from localized attack. It's dangerous because surface appearance may hide deep penetration. Depth must be measured to determine if within repair limits.

Intergranular corrosion attacks grain boundaries within metal structure with minimal surface indication. Often appears as lifting or flaking of surface layers. Very serious because it significantly reduces strength with little visible damage.

Exfoliation corrosion appears as layered lifting of metal surfaces, like pages of a book separating. Most common in extruded sections. Indicates severe corrosion requiring replacement in most cases.

Stress corrosion cracking requires both corrosive environment and tensile stress, appearing as fine cracks typically perpendicular to stress direction. Difficult to detect and very dangerous.

Filiform corrosion appears as worm-like patterns under paint or protective coatings, typically on aluminum. Indicates coating breakdown and active corrosion beneath.

Question: "Walk me through the process of treating surface corrosion on an aluminum panel."

Expected Answer: *First, I would identify the corrosion extent and determine if it's within repairable limits per structural repair manual.*

For repairable surface corrosion: Remove corrosion using aluminum wool, non-metallic abrasive pads, or approved chemical removers—never steel wool which leaves iron contamination. Work gently to avoid unnecessary material removal.

Neutralize any acid residue with baking soda solution, then rinse with clean water and dry thoroughly.

Measure remaining material thickness to ensure it meets minimum thickness requirements. If too thin, the area requires repair or reinforcement.

Apply conversion coating like Alodine for corrosion protection and paint adhesion.

Apply appropriate primer and finish coating per specifications.

If corrosion exceeds limits or has caused structural damage, the area requires repair per approved data or engineering evaluation.

Composite Materials

Question: "What special considerations apply when working with composite materials?"

Expected Answer: *Composite materials require several special considerations:*

Health hazards - Carbon fiber dust and uncured resins are hazardous. Proper respiratory protection, skin protection, and ventilation are essential. Never dry sand carbon fiber.

Moisture sensitivity - Composites absorb moisture affecting properties. Damaged areas must be dried before repair. Pre-preg materials require freezer storage.

Cure requirements - Precise temperature and pressure control during cure. Deviations compromise strength. Cure monitoring is critical.

Electrical conductivity - Carbon fiber conducts electricity, requiring special lightning protection and bonding. It can also create galvanic corrosion with aluminum.

Damage detection - Impact damage may not be visible on surface but cause internal delamination. Tap testing or ultrasonic inspection often required.

Tool requirements - Special tools needed to prevent damage. Diamond-coated bits for drilling, proper backup when drilling to prevent exit damage.

Repair complexity - Most repairs require engineering approval. Scarf ratios typically 20:1 to 50:1, much shallower than metal repairs.

Sheet Metal Repair Fundamentals

Question: "What determines whether a repair is classified as major or minor?"

Expected Answer: *Classification depends on whether the repair might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness.*

Generally, repairs to primary structure or complex repairs are major, requiring FAA approval via Form 337. Simple repairs to non-structural areas following approved data are minor.

AC 43.13-1B provides guidance, but when in doubt, the repair should be classified as major and submitted for approval. The aircraft structural repair manual may also specify classification.

As an A&P mechanic, I can approve minor repairs for return to service. Major repairs require inspection authorization (IA) or FAA approval.

Question: "Explain rivet pitch, transverse pitch, and edge distance requirements."

Expected Answer: *Rivet pitch is the distance between centers of adjacent rivets in the same row. Minimum pitch is typically 3 times rivet diameter; maximum is 10 times diameter to ensure load distribution.*

Transverse pitch is the distance between rows of rivets. Similar spacing requirements apply.

Edge distance is the distance from rivet center to material edge. Minimum is typically 2 times rivet diameter to prevent edge tearing. Maximum edge distance ensures edge material is adequately secured.

These requirements ensure proper load distribution, prevent material tearing, and maintain structural integrity. Following specifications prevents stress concentration and premature failure.

Systems And Components Questions

Hydraulic Systems

Question: "Explain Pascal's Law and how it applies to aircraft hydraulic systems."

Expected Answer: *Pascal's Law states that pressure applied to a confined fluid is transmitted undiminished in all directions throughout the fluid, acting with equal force on all equal areas and perpendicular to container walls.*

In aircraft hydraulic systems, this allows mechanical advantage. A small actuator piston creates pressure transmitted through fluid to a larger actuator piston. Because pressure is equal throughout the system, the larger piston produces greater force proportional to its area. This allows lightweight cockpit controls to move heavy flight control surfaces.

Force multiplication equals the ratio of piston areas. A 1-square-inch input piston and 10-square-inch output piston provides 10:1 force multiplication.

Question: "What's the difference between MIL-H-5606 and Skydrol, and why can't they be mixed?"

Expected Answer: *MIL-H-5606 is petroleum-based (mineral oil) hydraulic fluid, red colored, operating temperature range -65°F to +275°F. It's flammable, used in most general aviation aircraft.*

Skydrol is phosphate ester-based synthetic fluid, purple colored, fire-resistant, used primarily in transport aircraft where fire resistance is critical. Operating temperature range is better than petroleum fluids.

They absolutely cannot be mixed because they're chemically incompatible. Mixing causes seal swelling or deterioration, fluid gelling, precipitate formation, and complete system failure. If contamination occurs, the entire system must be flushed and all seals replaced.

Different fluids also require different seal materials—petroleum fluid uses synthetic rubber seals; phosphate ester requires different compounds. Using wrong fluid destroys seals.

Question: "How do you properly service a hydraulic system accumulator?"

Expected Answer: *Accumulator servicing requires specific procedures:*

First, completely depressurize the hydraulic system—accumulators store pressure even when systems are off.

Check nitrogen precharge pressure with system depressurized using proper charging equipment and gauge. Never use oxygen (fire/explosion hazard) or compressed air (moisture contamination).

Precharge pressure is typically 1/3 to 2/3 operating system pressure per specifications. Correct pressure ensures proper accumulator operation.

If charging is needed, use dry nitrogen from a regulated source, charging slowly while monitoring pressure.

After servicing, operate system checking for proper accumulator function—it should supplement pump flow during high demand and maintain pressure briefly if pump fails.

Document accumulator servicing in aircraft records.

Landing Gear Systems

Question: "What are the advantages of tricycle landing gear over conventional (tailwheel) gear?"

Expected Answer: *Tricycle gear provides several advantages:*

Better ground visibility - level attitude provides excellent forward visibility during taxi, takeoff, and landing.

Directional stability - nose wheel ahead of center of gravity provides natural directional stability, reducing ground loop tendency that challenges tailwheel aircraft.

Easier landing - aircraft lands in flying attitude, making wheel landings simpler with less technique required.

Better braking - weight on main gear during braking provides better traction compared to tailwheel where braking raises tail, reducing main gear traction.

Crosswind handling - more forgiving in crosswind landings.

However, tricycle gear is heavier, more complex, requires reinforced nose structure, and provides less propeller ground clearance than tailwheel designs.

Question: "Explain how an oleo-pneumatic shock strut works."

Expected Answer: *An oleo strut uses hydraulic fluid and compressed air or nitrogen working together. During compression, hydraulic fluid is forced through a metering orifice, creating damping resistance that controls compression rate and absorbs landing energy. The compressed gas provides spring action.*

During extension, the compressed gas pushes fluid back through the orifice, extending the strut at a controlled rate. This prevents rapid rebound that would cause the aircraft to bounce.

The metering orifice is critical—it may be variable, providing different rates for compression versus extension, optimizing shock absorption.

Proper servicing requires aircraft weight on gear, filling fluid to specification when compressed, then inflating gas chamber to proper pressure. Incorrect fluid level or gas pressure causes hard bottoming or excessive ride height.

Fuel Systems

Question: "What's the purpose of fuel system vents, and what happens if they become blocked?"

Expected Answer: *Fuel system vents allow atmospheric pressure to replace fuel volume as fuel is consumed, preventing vacuum formation in tanks. They also allow pressure relief as fuel expands from temperature or altitude changes.*

If vents become blocked, a vacuum forms as fuel is consumed. The increasing vacuum either collapses flexible tanks, stops fuel flow (fuel starvation despite adequate fuel), or causes structural damage to rigid tanks.

Blocked vents can also cause fuel to siphon overboard through the vent system during climb as fuel expands but cannot vent properly.

During preflight inspection, fuel vents must be checked for obstructions like ice, insects, or debris. Some aircraft have check valves or standpipe vents requiring specific inspection procedures.

Question: "How do you check for water in aircraft fuel, and why is this critical?"

Expected Answer: *Water contamination is checked by draining fuel samples from all tank sumps and the gascolator into a clear container. Water, being denser than fuel, settles to bottom and appears as clear globules or cloudy suspension in the fuel.*

This is critical because water in fuel systems causes several serious problems:

In piston engines, water doesn't burn, causing rough running, power loss, or engine stoppage.

In turbine engines, water can freeze at altitude blocking fuel filters and lines.

Water supports microbiological growth forming sludge that blocks filters and corrodes tanks.

Water causes corrosion throughout the fuel system.

Fuel sampling must be done during preflight and after refueling. Continue draining until clear, uncontaminated fuel flows. If water persists, investigate the source—it indicates tank contamination requiring more extensive draining or repair.

Ice and Rain Protection

Question: "Explain the difference between anti-icing and deicing systems."

Expected Answer: *Anti-icing systems prevent ice formation by keeping surfaces above freezing temperature continuously. They're proactive—applied before entering icing conditions. Examples include thermal anti-ice using hot bleed air on wing leading edges and engine inlets, or electric heating elements on windshields and pitot tubes.*

Deicing systems remove ice after it forms. They're reactive—ice is allowed to accumulate, then removed. Examples include pneumatic boots that inflate breaking ice, or cycled heating systems that periodically melt ice.

Anti-icing is generally more effective as it prevents ice rather than removing it, but requires more power since heat is applied continuously. Deicing systems use less power but allow ice accumulation before removal.

System choice depends on aircraft design, available power, and certification requirements. Understanding which system is installed affects operational procedures—boots shouldn't be activated too early (ice won't break properly), while anti-ice should be activated before entering icing.

Regulations And Documentation Questions

Mechanic Privileges and Limitations

Question: "What are your privileges and limitations as a certificated airframe mechanic?"

Expected Answer: *Under FAR 65.81, as an airframe mechanic I can:*

Perform and supervise maintenance, preventive maintenance, and alterations on airframes and associated systems per Part 43.

Approve for return to service any airframe work I've performed or supervised, except major alterations and major repairs.

For major repairs and alterations, I can perform the work but cannot approve for return to service—that requires inspection authorization (IA) or FAA approval.

I cannot work on powerplants (engine, propeller) without a powerplant rating.

I cannot perform annual inspections without IA.

I must have current Part 43 knowledge and appropriate data for any work performed.

My signature in aircraft records certifies the work was performed per approved data and the aircraft is airworthy for that work.

Question: "Under what conditions can you approve an aircraft for return to service?"

Expected Answer: *I can approve return to service when:*

I've performed or supervised maintenance, preventive maintenance, or minor alterations on airframe systems.

The work was performed per approved data (manufacturer's manual, AC 43.13-1B, STC, etc.).

The aircraft is in condition for safe operation regarding the work performed.

All required inspections have been completed.

All discrepancies noted during the work have been corrected or properly deferred.

Proper documentation has been completed in aircraft maintenance records.

I cannot approve return to service for: major repairs or alterations (requires IA or FAA), annual inspections (requires IA), 100-hour inspections unless I have appropriate authority, or powerplant work without a powerplant rating.

Airworthiness Directives

Question: "What is an Airworthiness Directive, and what are your responsibilities regarding ADs?"

Expected Answer: *An Airworthiness Directive is a regulatory requirement issued by the FAA when an unsafe condition exists in an aircraft, engine, propeller, or appliance. ADs are mandatory—they have the force of law.*

As a mechanic, I'm responsible for:

Ensuring compliance with applicable ADs during any maintenance, inspection, or repair work.

Verifying AD compliance status before approving aircraft for return to service.

Properly documenting AD compliance in aircraft records including AD number, compliance date, method, and signature.

Understanding which ADs apply to the specific aircraft—by serial number, model, component, or other criteria.

Recognizing that recurring ADs must be complied with at specified intervals.

Being aware that AD compliance cannot be deferred unless specific provisions allow alternative compliance.

The aircraft owner is ultimately responsible for ensuring AD compliance, but as the mechanic approving return to service, I must verify compliance before signing off work.

Maintenance Documentation

Question: "What information must be included in a maintenance record entry?"

Expected Answer: *Per FAR 43.9, maintenance record entries must include:*

Description of work performed, including enough detail so another mechanic understands what was done.

Date work was completed.

Certificate number and type held by person approving return to service.

Signature of person approving return to service.

For major repairs or alterations, reference to Form 337.

For inspections, the type of inspection and brief description of scope.

For preventive maintenance, similar information required.

The entry must be in ink or otherwise permanent, legible, and in English.

Good practice includes additional information like total time in service, part numbers of replaced components, measurements taken, and inspection results, though not all are regulatory requirements.

Question: "When is FAA Form 337 required, and what is its purpose?"

Expected Answer: *Form 337 (Major Repair and Alteration) is required for all major repairs and major alterations. It's not required for minor repairs and alterations.*

The form serves several purposes:

Documents the major repair or alteration with detailed description of work performed.

Provides data on materials used, replacement parts, and altered components.

Records FAA approval method—whether approved data was used, or field approval was obtained.

Becomes a permanent part of aircraft records.

The original is submitted to the FAA Aircraft Registration Branch; a copy goes in the aircraft permanent records.

As an A&P mechanic without IA, I can complete the mechanic section describing work performed, but cannot approve for return to service—that requires IA or FAA.

Form 337 is critical for maintaining aircraft airworthiness history and is required for aircraft registration and sale.

Approved Data Sources

Question: "What constitutes 'approved data' for aircraft maintenance?"

Expected Answer: *Approved data includes:*

Aircraft manufacturer's maintenance manuals, service bulletins, and structural repair manuals.

FAA Advisory Circulars, particularly AC 43.13-1B (Acceptable Methods, Techniques, and Practices) for general repairs and alterations.

Supplemental Type Certificates (STCs) for modifications.

FAA-approved data from the aircraft type certificate holder.

Military specifications when civilian equivalents aren't available, if listed in Type Certificate Data Sheet.

For major repairs and alterations without approved data, field approval can be obtained from FAA.

It's critical to verify data applies to the specific aircraft model and serial number—data approved for one model may not apply to another.

Using unapproved data or data for wrong aircraft model can result in unairworthy aircraft and certificate action.

Question: "Where would you find information to determine if a repair is major or minor?"

Expected Answer: *Classification guidance is found in:*

Part 43, Appendix A defines major alterations and major repairs versus minor repairs and alterations.

AC 43.13-1B provides examples and guidance on common repairs.

Aircraft structural repair manual may specify classification for certain repairs.

The key test is whether the repair might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other airworthiness qualities.

When in doubt, classify as major and obtain appropriate approval. It's better to be conservative than to incorrectly classify a major repair as minor.

These question categories represent the core knowledge areas examiners probe during oral examinations. Success requires not just memorizing facts but understanding concepts well enough to explain them clearly, apply them to scenarios, and demonstrate sound judgment about when to use resources versus relying on knowledge. Practice articulating answers aloud, not just reading them mentally—oral examination performance depends on clear verbal communication under pressure. Work with instructors or experienced mechanics conducting mock orals to refine your response techniques and build confidence for examination day.