FAA Airframe Prepware Sheet Metal Structures Practice Test (Sample)

Study Guide

BY EXAMZIFY

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Questions

1. **Which method is commonly used to detect flaws in riveted joints?**
   - **A. Visual inspection**
   - **B. X-ray testing**
   - **C. Magnetic particle inspection**
   - **D. Ultrasonic testing**

2. **In terms of rivet placement, what does rivet pitch refer to?**
   - **A. The distance between rivet rows**
   - **B. The total length of the rivet**
   - **C. The distance between adjacent rivets in the same row**
   - **D. The diameter of the rivet**

3. **What is a key advantage of using Hi-Lok fasteners in aircraft construction?**
   - **A. High corrosion resistance**
   - **B. Ability to reduce weight**
   - **C. Inability to be over-torqued**
   - **D. Quick installation time**

4. **What is a good practice when drilling stainless steel sheet material compared to aluminum alloy sheet?**
   - **A. Drill at a higher speed**
   - **B. Use less pressure on the drill**
   - **C. Drill at a lower speed with more pressure**
   - **D. Use a smaller drill bit**

5. **What is the correct method for allowing for stretching on a sheet metal fitting layout with a single bend?**
   - **A. Adding the setback to both legs**
   - **B. Subtracting the setback from one leg**
   - **C. Subtracting the setback from both legs**
   - **D. Leaving the setback unchanged**

6. What must be done to heat-treated rivets in the D and DD series if they are not used within the prescribed time frame?

A. They must be discarded

B. They must be polished

C. They must be reheat treated before use

D. They must be painted

7. When replacing a damaged honeycomb core with balsa wood, how should the plug be cut?

A. Diagonal to the skin

B. Perpendicular to the skin

C. Along the grain

D. With the grain

8. A well-designed rivet joint is subjected mainly to what type of loads?

A. Tensile loads

B. Compressive loads

C. Shear loads

D. Bending loads

9. Which material is primarily identified for aircraft structure due to its high strength-to-weight ratio?

A. Steel

B. Copper

C. Aluminum

D. Titanium

10. Metal fasteners used with carbon/graphite composite structures must be made of which material?

A. Aluminum

B. Titanium or corrosion resistant steel

C. Plastic composites

D. Standard steel

Answers

1. A
2. C
3. C
4. C
5. C
6. C
7. B
8. C
9. C
10. B

Explanations

1. Which method is commonly used to detect flaws in riveted joints?

A. Visual inspection

B. X-ray testing

C. Magnetic particle inspection

D. Ultrasonic testing

Visual inspection is a fundamental method for detecting flaws in riveted joints due to its simplicity, speed, and effectiveness in identifying surface defects. This method allows inspectors to directly observe the joint for any visible signs of issues such as cracks, corrosion, misalignment, or improper installation. It is often the first step in the inspection process because it requires minimal equipment and can be conducted quickly and easily in most environments. While other methods like X-ray testing, magnetic particle inspection, and ultrasonic testing are also useful for detecting certain types of flaws, they are generally more complex, require specialized equipment, and may not always be practical for all situations. X-ray and ultrasonic methods are particularly effective for internal flaws, while magnetic particle inspection is best suited for ferromagnetic materials and surface defects. Therefore, visual inspection is widely regarded as the most accessible and commonly utilized technique for evaluating the integrity of riveted joints.

2. In terms of rivet placement, what does rivet pitch refer to?

A. The distance between rivet rows

B. The total length of the rivet

C. The distance between adjacent rivets in the same row

D. The diameter of the rivet

Rivet pitch specifically refers to the distance between adjacent rivets in the same row, and this is crucial for ensuring proper load distribution and structural integrity in sheet metal assemblies. When rivets are placed too close together, they can weaken the material, while placing them too far apart can lead to inadequate strength and structural support. Proper rivet pitch allows for effective transfer of loads and maintains the overall strength of the joint. Understanding rivet pitch is essential for anyone involved in aircraft assembly or repair, as incorrect rivet spacing can lead to failure of the joint under stress. This principle is foundational in airframe construction, ensuring that load-bearing structures remain safe and reliable throughout their operational life. Other options deal with concepts that do not pertain directly to rivet pitch; for instance, rivet rows relate to overall spacing while diameter and total length are physical characteristics of the rivets themselves, rather than their spacing.

3. What is a key advantage of using Hi-Lok fasteners in aircraft construction?

A. High corrosion resistance

B. Ability to reduce weight

C. Inability to be over-torqued

D. Quick installation time

The use of Hi-Lok fasteners in aircraft construction provides a significant advantage due to their design, which helps prevent over-torquing during installation. Hi-Lok fasteners are engineered with a feature that allows them to reach a predetermined torque value that, when met, causes a part to break off, thereby ensuring that the fastener is tightened to the correct specification without the risk of excessive torque being applied. This reduces the possibility of damaging the fastener or the materials being joined, which is crucial for maintaining the structural integrity of the aircraft. While the other options such as corrosion resistance, weight reduction, and installation speed may also be noteworthy characteristics of certain fasteners, the specific design feature of Hi-Lok fasteners that prevents over-torquing is a distinctive advantage that enhances the safety and performance of aircraft assemblies.

4. What is a good practice when drilling stainless steel sheet material compared to aluminum alloy sheet?

A. Drill at a higher speed

B. Use less pressure on the drill

C. Drill at a lower speed with more pressure

D. Use a smaller drill bit

When drilling stainless steel sheet material, the practice of drilling at a lower speed with more pressure is important due to the characteristics of stainless steel. Unlike aluminum alloy, which is softer and can be drilled efficiently at higher speeds, stainless steel has higher tensile strength and a tendency to work-harden. Drilling at a lower speed helps to minimize the risk of overheating the material and the drill bit, which is crucial for maintaining the integrity of both the tool and the workpiece. The additional pressure while drilling allows for effective cutting through the tougher material, ensuring that the drill bit can engage the steel properly and overcome its resistance. This approach helps achieve clean holes without excessive burr formation. The other options focus on practices that are not optimal for stainless steel. For instance, increasing the speed may lead to rapid wear of the drill bit and potential burning of the stainless steel. Using less pressure could result in the drill bit slipping or failing to penetrate the material effectively. Selecting a smaller drill bit might not be suitable unless it is necessary for the specific application, as it may also lack the necessary rigidity to drill through tougher materials effectively.

5. What is the correct method for allowing for stretching on a sheet metal fitting layout with a single bend?

A. Adding the setback to both legs

B. Subtracting the setback from one leg

C. Subtracting the setback from both legs

D. Leaving the setback unchanged

When preparing a sheet metal fitting layout that involves a single bend, the approach to account for stretching is critical in ensuring that the final dimensions are accurate. The correct method involves subtracting the setback from both legs of the fitting. In sheet metal work, the setback is the distance from the bend line to the edge of the material, which accounts for material deformation due to bending. When a bend is made, the material on the inside of the bend compresses while the material on the outside stretches. To achieve the desired final dimensions, it is necessary to adjust both legs of the fitting layout to reflect this deformation. By subtracting the setback from both legs, you ensure that the total length of the part remains correct after the bend is formed. This adjustment takes into account how the metal will react during the bending process, which is vital for producing components that fit together properly in assembly. Hence, accurately subtracting the setback from both legs allows for the proper compensation for stretching and creates a fitting that will match the intended design dimensions when completed.

6. What must be done to heat-treated rivets in the D and DD series if they are not used within the prescribed time frame?

A. They must be discarded

B. They must be polished

C. They must be reheat treated before use

D. They must be painted

Heat-treated rivets, specifically in the D and DD series, have a predetermined shelf life once they are manufactured. This shelf life is designed to ensure that the rivets maintain their desired mechanical properties and structural integrity. Over time, if these rivets are not utilized, they can lose their strength due to changes in the material structure that might occur during storage. If the rivets have exceeded their prescribed usage time, reheat treating them before use is necessary to restore their mechanical properties and ensure they perform as expected in structural applications. Reheat treating involves subjecting the rivets to specific temperature controls that re-align the material grain structure, thus reinstating the hardness and strength characteristics that are critical for their performance in an application. Discarding the rivets would not be the best choice as it does not allow for possible reuse after proper re-treatment. Polishing and painting do not address the underlying material properties that may have deteriorated, so they would also not be viable solutions to ensure the rivets meet performance standards. Hence, reheat treating is the proper approach to ensure these rivets are safe and effective for use in sheet metal structures.

7. When replacing a damaged honeycomb core with balsa wood, how should the plug be cut?

A. Diagonal to the skin

B. Perpendicular to the skin

C. Along the grain

D. With the grain

When replacing a damaged honeycomb core with balsa wood, the plug should be cut perpendicular to the skin. This orientation is crucial because it ensures that the new core material bonds effectively with the skin of the aircraft structure. When the plug is cut perpendicular, it allows for a stronger and more reliable joint between the balsa wood and the skin. Cutting the plug in this manner helps maintain the structural integrity of the assembly by allowing for even distribution of stress across the bonded surfaces. It is essential to create a surface that has maximum surface area contact with the skin, promoting better adhesion and reducing the chances of any delamination or separation under load. Additionally, cutting the plug perpendicular helps to maintain the geometric integrity of the structure, as this alignment matches the load paths. In contrast, other cutting methods could compromise the plug's strength and the overall structural performance of the repair.

8. A well-designed rivet joint is subjected mainly to what type of loads?

A. Tensile loads

B. Compressive loads

C. Shear loads

D. Bending loads

A well-designed rivet joint is primarily subjected to shear loads. This is due to the nature of the structural applications where rivets are commonly used, particularly in aircraft and other transportation vehicles. When two pieces of material are joined together using rivets, the primary force that acts across the joint during load application is often lateral or perpendicular to the axis of the rivets, resulting in shear stress. In typical applications such as wing structures or fuselage assemblies, rivets hold components together in a way that they must resist forces trying to slide one material past the other rather than pulling them apart or compressing them. The shear strength of rivets is a critical design factor; engineers specifically calculate the shear capacity to ensure that the joint can withstand operational loads without failure. While rivets can experience tensile and compressive stresses due to the connection they create, these loads are not the primary concern when designing riveted joints. Instead, the resilience of rivet joints to shear forces is explicitly taken into account during the design process to ensure structural integrity under various loads encountered during service.

9. Which material is primarily identified for aircraft structure due to its high strength-to-weight ratio?

- **A. Steel**
- **B. Copper**
- **C. Aluminum**
- **D. Titanium**

The material primarily identified for aircraft structure due to its high strength-to-weight ratio is aluminum. This characteristic makes aluminum an ideal choice for aviation applications, as it offers a significant advantage in reducing overall weight while still providing sufficient strength to withstand the stresses encountered during flight. Aluminum's benefits include its ability to resist corrosion, ease of fabrication, and good thermal and electrical conductivity. Its strength-to-weight ratio is particularly important in aerospace design, where minimizing weight is crucial for improving fuel efficiency and enhancing performance without compromising structural integrity. While steel and titanium also possess favorable properties, they typically have higher densities, which can increase the overall weight of the aircraft. Similarly, copper, while strong and ductile, is heavy and not commonly used for structural components in aviation. Therefore, aluminum stands out as the material of choice when considering the requirements for aircraft structure.

10. Metal fasteners used with carbon/graphite composite structures must be made of which material?

- **A. Aluminum**
- **B. Titanium or corrosion resistant steel**
- **C. Plastic composites**
- **D. Standard steel**

Metal fasteners used with carbon/graphite composite structures should be made of titanium or corrosion-resistant steel due to their compatibility with composite materials and resistance to galvanic corrosion. Carbon/graphite composites can react with metals such as aluminum and standard steel, leading to corrosion and degradation of both the fastener and the composite structure. Titanium and corrosion-resistant steel are not only strong and lightweight, but they also possess properties that prevent corrosion from occurring when in contact with carbon/graphite materials. This compatibility is crucial in ensuring the longevity and integrity of the aircraft structure. Using materials that do not react adversely with the composites is essential for maintaining structural integrity and safety in aviation applications. Materials like plastic composites, while lightweight, do not provide the necessary strength and durability required for fasteners in demanding aerospace environments. Therefore, titanium or corrosion-resistant steel is the optimal choice for fasteners in these applications.