Becoming an Aircraft Mechanic

Session Time: One, 50- minute session

DESIRED RESULTS

ESSENTIAL UNDERSTANDINGS

Develop interest in one or more aviation/aerospace career pathways and learn what is required to pursue future employment in the industry. (EU3)

Understand the importance of professionalism, ethics, and dedication as they relate to all aviation/aerospace operations. (EU4)

ESSENTIAL QUESTIONS

1. Are aircraft mechanics important to aviation?
2. Can anyone become an aircraft mechanic?
3. Why would someone want to become an aircraft mechanic?

LEARNING GOALS

Students Will Know

- Various types of aircraft mechanics
- Education and training required to become an aircraft mechanic and how to receive the necessary training
- Demand for aircraft mechanics in the future

Students Will Be Able To

- *Compare* their personal strengths/interests against a career as an aircraft mechanic. (DOK-L2)
- *Identify* and *describe* the skills required by aircraft mechanics to keep aircraft safe to fly. (DOK-L2)

ASSESSMENT EVIDENCE

Warm-up
Students will watch a video about a mechanic at Delta Airlines and write about the responsibilities, requirements, and prospects for an aircraft mechanic.

Formative Assessment
Students will use Internet research to complete a graphic organizer that will help them determine the technical knowledge, physical capabilities, and additional skills that airframe and powerplant mechanics and avionics technicians must possess.

Summative Assessment
Students will list and describe three skills they think would make them a good aircraft mechanic or avionics technician. Students also will write a paragraph about whether or not this kind of work interests them and to what extent they think they could acquire the skills and abilities required.

LESSON PREPARATION

MATERIALS/RESOURCES

- Becoming an Aircraft Mechanic Presentation
- Becoming an Aircraft Mechanic Student Activity
- Becoming an Aircraft Mechanic Teacher Notes

LESSON SUMMARY

Lesson 1: Becoming an Air Traffic Controller
Lesson 2: Becoming an Aircraft Mechanic

This lesson will begin by having students watch a video about a female aircraft mechanic at Delta Airlines. While the students watch the video, they will write down skills and abilities that aircraft mechanics must have.

Students then will complete Internet research to answer questions that will help them determine the technical knowledge, physical capabilities, and additional skills that airframe and powerplant mechanics (A&Ps) and avionics technicians must possess.

During a class discussion, students will learn what an aircraft mechanic does and different kinds of aircraft mechanics. After this part of the presentation, students will be asked two questions for discussion: What do you think would be the most challenging part about becoming an aircraft mechanic? What would be the most rewarding part about being an aircraft mechanic?

Students will learn what qualifications they must meet to become FAA-certificated mechanics. The remaining part of the presentation will cover the three main options to receive the education and experience needed to meet the FAA regulations.

Finally, students will list three skills they think would make them a good aircraft mechanic or avionics technician. They will write a paragraph about whether or not this kind of work interests them and to what extent they think they could acquire the skills and abilities required.

BACKGROUND

The Boeing Pilot and Technician Outlook (2018) forecasts that between now and 2037, the aviation industry will need 754,000 maintenance technicians worldwide, and 189,000 of those mechanics will be needed in North America. Aircraft mechanics are in high demand.

Aircraft mechanics are responsible for maintaining and repairing aircraft and aircraft parts, and making inspections to ensure that airplanes and helicopters comply with FAA regulations or military maintenance standards. In addition to inspecting for defective and worn parts, aircraft mechanics diagnose electrical and mechanical problems, keep records, and perform routine maintenance.

Aircraft mechanics earn certificates in “airframe,” “powerplant,” or both “airframe and powerplant.” A mechanic rated for both airframe and powerplant is generally referred to as an “A&P.” A&Ps can work on most parts of an airplane or helicopter, excluding flight instruments. Maintaining an aircraft’s electronic flight instruments is typically the job of specialized avionics technicians.

An airframe-rated mechanic will complete work and service on the airplane's structure and associated systems, such as flight controls, landing gear, flaps, etc. A powerplant-rated mechanic can perform service on an aircraft's engine(s) and propeller(s).

Avionics technicians specialize in working with the aircraft's electronics, including communication radios, navigation systems, autopilots, radar, and other electronic systems. They test electronic instruments, interpret flight-test data to diagnose malfunctions and performance problems, assemble components, such as electrical controls and junction boxes, and install software and instrument panels.

A wide variety of specialist certifications are available so aircraft mechanics can perform repairs and alterations on specialized systems and obtain more valuable experience. A mechanic with an inspection authorization (IA) can perform a greater variety of maintenance and alterations than an A&P mechanic.

Similar to pilot training, an aircraft mechanic must pass an FAA written exam, as well as the accompanying oral and practical exams. Applicants must be at least 18 years of age; be able to read, speak, and understand the English language; and have 18 months of practical experience on powerplants or airframes, 30 months on both, or graduate from an FAA-approved aviation maintenance technician school.

There are three basic routes students can take to get the required training/education.

- Attend and graduate from one of the FAA-approved aviation maintenance technicians schools. These schools usually offer both the A&P certifications and avionics training. The FAA waives the practical experience requirements stated in the regulations if students complete a program at an FAA-recognized aviation maintenance technical school. Programs at these schools usually last 12 to 24 months, and most require a high school degree or a general equivalency diploma. Students can earn an associate's degree in aviation technology, aviation maintenance management, or avionics at many of the colleges recognized as FAA-approved aviation maintenance technician schools.
- Receive on-the-job training. Students must complete a minimum of 18 months of training under the supervision of a qualified mechanic for either the airframe or powerplant certificate. For both the A&P certifications, a student would complete 30 months of training under the supervision of a qualified mechanic.
- Join the military. Besides getting a great education, the training is paid for. After aircraft mechanics leave the military, the FAA requires them to take the required exams to transition to a civilian aircraft mechanic position; however, the FAA gives military service members credit for practical experience.

LEARNING PLAN

ENGAGE

Teacher Material: Becoming an Aircraft Mechanic Presentation

Slides 1-3: Introduce the topic and learning objectives for today's lesson.

Slide 4: Conduct the **Warm-Up.**

Warm-Up

Have students watch a video about a mechanic at Delta Airlines.

- "What Is an Aircraft Mechanic?" (Length 02:14)
  http://video.link/w/XzMd

After students have watched the video, they should write down answers to the questions found on the slide. Lead a class discussion and allow students to share their responses.

[DOK-L2; *restate, explain*]

Questions

What are the responsibilities of an aircraft mechanic?
Inspect for defective and worn parts, diagnose electrical and mechanical problems, keep records and perform routine maintenance, review schematics to determine solutions to mechanical issues, etc.

What qualities are necessary for becoming an aircraft mechanic?
Need to be responsible, have good character, think outside the box and solve complex problems, pay attention to small details, be ready for unexpected events, enjoy mechanics and fixing mechanical problems

What is the interview subject's opinion of the career of aircraft mechanic?
High demand for good aircraft mechanics, the job requires a lot of responsibility and integrity, it offers a comfortable way of life with opportunities to work for major airlines

EXPLORE

Teacher Materials: Becoming an Aircraft Mechanic Presentation, Becoming an Aircraft Mechanic Teacher Notes
Student Material: Becoming an Aircraft Mechanic Student Activity

Slide 5: Conduct the **Formative Assessment.**

Formative Assessment

Provide students with **Becoming an Aircraft Mechanic Student Activity**. Ask students to pair up and use Internet research to complete the activity that will help them determine the technical knowledge, physical capabilities, and additional skills that A&Ps and avionics technicians must possess. Encourage students to view YouTube for videos that discuss aircraft maintenance as a career.

Each student will submit their own worksheet. Answers can be found on **Becoming an Aircraft Mechanic Teacher Notes**. In a class discussion, ask students to share a fact from each section in the activity before they hand them in.

[DOK-L3; *collect, summarize*]

Teaching Tips

If time allows, have students make posters which organize and communicate the information they've learned through the completion of the activity about what it takes to become an aircraft mechanic.

EXPLAIN

Teacher Material: Becoming an Aircraft Mechanic Presentation

Gauge the time spent in this class discussion on the quality of the responses that students provided in the previous activity.

Slide 6: An aircraft mechanic performs preventive, regularly scheduled, and unexpected maintenance on aircraft. They inspect aircraft to ensure they comply with FAA regulations and also diagnose issues. They keep detailed records and maintain repair logs.

Slide 7: Aircraft mechanics earn certificates in specialized areas such as "airframe," "powerplant," or both. A certification in both is most often referred to as "A & P." Airframe refers to the body of the aircraft, and the powerplant refers to the engine. Airframe and powerplant mechanics can work on most parts of an airplane or helicopter, excluding flight instruments. Maintaining an aircraft's electronic flight instruments is typically the job of specialized avionics technicians.

Slide 8: An airframe-rated mechanic will complete work and service on the airplane's structure and associated systems, such as flight controls, landing gear, flaps, etc.

Slide 9: A powerplant-rated mechanic can perform service on an aircraft's engine(s) and propeller(s).

Slide 10: Avionics technicians specialize in working with the aircraft's electronics, including communication radios, navigation systems, autopilots, radar, and other electronic systems. They test electronic instruments, interpret flight-test data to diagnose malfunctions and performance problems, assemble components, such as electrical controls and junction boxes, and install software and instrument panels.

Slide 11: A mechanic with an inspection authorization (IA) can perform a greater variety of maintenance and alterations than an A&P mechanic. They tend to be leaders within maintenance departments and earn more money.

Slide 12: At the completion of this part of the presentation, ask students the following questions:

- What do you think would be the most challenging part about becoming an aircraft mechanic?
- What would be the most rewarding part about being an aircraft mechanic?

Have students share their responses with the class.

EXTEND

Teacher Material: Becoming an Aircraft Mechanic Presentation

Slide 13: Students will learn the certification and training required to become an FAA-certified mechanic. Similar to becoming a pilot, mechanics need to pass a written exam, oral exam, and practical exam. Mechanics must be 18 years old at minimum (private pilots, by comparison, must be 17 years old).

Slide 14: Students have three options for receiving the education and experience needed to meet the FAA regulations. Students can attend an FAA-approved aviation maintenance technician school, receive on-the-job training, or learn how to be a mechanic in the military.

Slide 15: Students may attend and graduate from one of the FAA-approved aviation maintenance technicians schools. These schools usually offer both the A&P certifications and avionics training. The FAA waives the practical experience requirements stated in the regulations if students complete a program at an FAA-recognized aviation maintenance technical school.

Programs at these schools usually last 12 months to 24 months, and most require a high school degree or a general equivalency diploma. Students can earn an associate's degree in aviation technology, aviation maintenance management, or avionics at many of the colleges recognized as FAA-approved aviation maintenance technician schools.

Slide 16: Students also may receive on-the-job training. They must complete a minimum of 18 months of training under the supervision of a qualified mechanic for either the airframe or powerplant certificate. For both the A&P certifications, a student would complete 30 months of training under the supervision of a qualified mechanic.

Slide 17: Finally, students may opt to join the military. Besides getting a great education, the training is paid for. After aircraft mechanics leave the military, the FAA requires them to take the required exams to transition to a civilian aircraft mechanic position; however, the FAA gives military service members credit for practical experience. To be a mechanic in the Air Force, students must have graduated from high school or completed a GED.

Show students a video of an Air Force tactical aircraft maintenance technician (or crew chief) explaining his job and those of other specialized military aircraft technicians.

- "U.S. Air Force: F-22 Crew Chief" (Length 1:24)
  http://video.link/w/b8Ke

Slide 18: The Boeing Pilot and Technician Outlook (2018) forecasts that between now and 2037, the aviation industry will need 754,000 maintenance technicians worldwide, and 189,000 of those mechanics will be needed in North America. Aircraft mechanics are in high demand.

EVALUATE

Slide 19: Conduct the **Summative Assessment.**

Summative Assessment

About 5-10 minutes before the end of class, have each student complete a three-part summative assessment

- Part 1 - list and describe three skills needed by good aircraft mechanics or avionics technicians
- Part 2 - write a personal reflection about the extent to which they have an interest in learning more about being an aircraft mechanic
- Part 3 - describe to what extent they could have the skills and abilities required to be an aircraft mechanic

[DOK-L1; *list*; DOK-L3; *draw conclusions*]

Summative Assessment Scoring Rubric

- Completion of responses
- Responses shows evidence of one or more of the following:
  - Understanding of at least three skills and abilities needed to be a successful aircraft mechanic
  - An honest reflection of the student's interest in learning more about becoming a mechanic and whether or not they could develop the skills necessary to become a mechanic

- Responses show an understanding of the concepts covered in the lesson
- Responses show an in-depth thinking, including analysis or synthesis of lesson objectives

Points	Performance Levels
9-10	Consistently demonstrates criteria
7-8	Usually demonstrates criteria
5-6	Sometimes demonstrates criteria
0-4	Rarely to never demonstrates criteria

STANDARDS ALIGNMENT

NGSS STANDARDS

Three-dimensional Learning

- **HS-ETS1-3** – Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
    - Science and Engineering Practices
        - Constructing Explanations and Designing Solutions
    - Disciplinary Core Ideas
        - ETS1.B: Developing Possible Solutions
    - Crosscutting Concepts
        - Influence of Science, Engineering, and Technology on Society and the Natural World
- **HS-ETS1-4** – Use a computer simulation to model the impact of proposed solutions to a complex real- world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
    - Science and Engineering Practices
        - Using Mathematics and Computational Thinking
    - Disciplinary Core Ideas
        - ETS1.B: Developing Possible Solutions and Actions
    - Crosscutting Concepts
        - Systems and System Models

COMMON CORE STATE STANDARDS

- **RL.9-10.2** – Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

- **RL.9-10.4** – Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).
- **RST.9-10.1** – Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- **WHST.9-10.2** – Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
- **WHST.9-10.4** – Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- **WHST.9-10.6** – Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
- **WHST.9-10.8** – Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
- **WHST.9-10.9** – Draw evidence from informational texts to support analysis, reflection, and research.

REFERENCES

https://www.boeing.com/commercial/market/pilot-technician-outlook/2018-technician-outlook/
https://www.transportation.gov/careers/veterans/aviation-maintenance-technician
https://www.avjobs.com/careers/detail.asp?Job_Title=Aircraft+Mechanic+(A&P)&Category=Airline&Related=Aviation+Maintenance&RecID=95