

National Aviation Consortium

Aerospace Manufacturing Core Skills Certificate Program



Version 4.0

Released March, 2013

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1.0 Credits

- 9.5 credits
- 4 weeks online

2.0 Course Titles

1. Aircraft Familiarization
2. Sealing and Safety
3. Manufacturing Paperwork
4. Engineering Processes
5. Precision Instruments
6. Hand Tools
7. Blueprints and Picture Sheets
8. Bonding and Grounding
9. Introduction to Composites



3.0 Program Outcomes

- Demonstrate an understanding of the opportunities and culture of aerospace manufacturing.
- Identify basic aircraft types, manufacturers and models.
- Demonstrate a basic knowledge of sealing principles in aerospace manufacturing.
- Demonstrate a basic knowledge of aerospace manufacturing paperwork and procedures.
- Develop self-strategies for the use of product databases and online resources.
- Understand the use of engineering process requirements in aerospace manufacturing.
- Demonstrate a working knowledge of precision measuring tools.
- Demonstrate a working knowledge of hand held power tools and associated safety procedures.
- Demonstrate a working knowledge of fasteners used in aerospace manufacturing.
- Understand the use of blueprints and picture sheets used in the aerospace manufacturing.
- Understanding of electrical bonding and grounding theory, required tools and procedures.
- Understand the common materials used in composites, their safety considerations and general properties.



4.0 Course Descriptions.

4.1 Aircraft Familiarization

COURSE DESCRIPTION: This course provides an overview for potential aerospace industry technicians, providing an overview of the history of flight, primary assemblies of an aircraft, the principles of flight, common aircraft types, the different materials used in aircraft and an introduction for aircraft regulations.

Chapter 1 – The History of Aviation

- Identify the major milestones in aviation history
- Explain the principles of flight
- Identify basic aircraft based upon their configuration
- Explain how an airplane is constructed
- Explain the importance of regulations in the aviation industry

Chapter 2 – Primary Assemblies of an Aircraft

- Identify the primary assemblies of an airplane
- Identify the components of each of the primary assemblies
- Explain how the primary assemblies work together

Chapter 3 – Principles of Flight

- Identify the four forces that act upon an aircraft
- Explain the impact of atmospheric pressure upon an airplane
- Explain the principles of lift
- Explain the function of an airfoil

Chapter 4 – Airplane Control

- Identify the three axes of control
- Explain the center of gravity of an airplane
- Identify control systems of an airplane
- Identify the nine types of stability

Chapter 5 – Aircraft Configuration

- Identify airplanes based upon their commercial purpose
- Identify airplanes based upon their wing location
- Identify airplanes based upon their tail configuration
- Identify airplanes based upon their engine type and location
- Explain the advantages of each configuration

Chapter 6 – Aircraft Materials

- Identify the types of materials used in aircraft construction
- Identify the properties of each material
- Understand the process of selecting the proper materials
- Explain the strengths and weaknesses of each type of material



Chapter 7 – Aircraft Construction

- Identify the major types of aircraft construction
- Identify the components of an airframe
- Identify the construction methods used in aircraft manufacturing

Chapter 8 – Corrosion

- Define corrosion
- Explain the corrosion process
- Identify the conditions that must exist for corrosion to occur
- Recognize different types of corrosion
- Identify common corrosive agents
- Identify metals that are subject to corrosion
- Identify preventative measures for corrosion



4.2 Sealing and Safety

COURSE DESCRIPTION: This course provides an introduction to sealing and the functions of sealants, chemical safety, sealant selection, cleaning methods and application processes. The student will learn the personal protective equipment required for sealing as an aerospace technician. Also included are procedures of how to apply sealant to the different parts of an airplane.

Chapter 1 – Introduction to Sealing

- Understand the purpose of sealing
- Describe how sealing prevents corrosion
- List the other important functions of sealants

Chapter 2 – Chemical Safety

- Define a physical hazard in relation to working with chemicals
- Define a health hazard in relation to working with chemicals
- List some potential physical hazards associated with chemicals
- List some health hazards associated with chemicals
- Understand what is meant by exposure to a chemical
- Understand some of the personal protective equipment used to minimize your exposure to chemicals

Chapter 3 – Preparing the Surface

- List the steps in the cleaning process
- Recognize the tools used for cleaning surfaces in the airplane
- Know some common solvents used for cleaning surfaces in the airplane
- Describe the steps necessary to correctly apply solvents to a surface that must be cleaned
- Recognize when a surface is properly cleaned and ready for sealing

Chapter 4 – Selecting the Right Sealant

- List the common categories of sealants
- Know the difference between pre-mixed and two part sealants
- Know why some pre-mixed sealants must be stored in the freezer
- List the different sealant applications
- Understand the function of the different sealant applications
- Know where to look for the information you'll need to ensure you use the right sealant for the right application

Chapter 5 – Personal Protective Equipment

- Name the federal agency charged with regulating safety
- Describe the function of personal protective equipment
- Know the types of personal protective equipment designed to protect your body
- Explain why proper fit of personal protective equipment is important



Chapter 6 – Applying the Sealant

- Identify the parts of the sealing gun
- Assemble a sealing gun
- Describe fillet sealing the injection sealing



4.3 Manufacturing Paperwork

COURSE DESCRIPTION: This course provides specific technical and manufacturing knowledge of various manufacturing documentation and database processes and procedures. The student will learn the purpose and use of a production order and purpose and sections of an installation plan.

Chapter 1 – Airplane Regulations

- Identify the federal agency charged with regulating the aviation industry
- Understand the role of paperwork in regulating the aviation industry
- List the different levels of paperwork
- Recognize the types of paperwork you will see on the assembly floor
- Understand why completing paperwork is important

Chapter 2 – The Production Order

- Understand the purpose of a production order
- Identify the people responsible for creating the production order
- Describe the information you can find in a production order
- Understand how to use the production order
- Understand why following all the steps in a production order are important

Chapter 3 – The Installation Plan

- Understand the purpose of an installation plan
- List the sections of an installation plan
- Describe the information you can find in each section of the installation plan
- Understand why following all the steps in an installation plan is important



4.4 Engineering Processes

COURSE DESCRIPTION: This course provides technical knowledge and skills in the engineering processes in aerospace manufacturing. The student will learn the phases and functions of each stage in the engineering process and importance of information sharing.

Chapter 1 – The Engineering Process

- List the phases in the engineering process
- Understand the function of each stage in the engineering process

Chapter 2 – Information Sharing

- Describe why it is important to share information
- Understand why electronic information sharing systems are used
- Describe the different types of information stored electronically
- Explain how document storage will impact you in your job



4.5 Precision Instruments

COURSE DESCRIPTION: This course provides an introduction to the various precision measuring instruments, their correct use and proper care for aerospace manufacturing.

Chapter 1 – Introduction to Precision Instruments

- Explain the difference between precision and accuracy
- Identify the resolution of a precision instrument
- Determine the discrimination of a precision instrument
- Identify the basic components of a measurement

Chapter 2 – Rules

- Identify the key components of the precision rule
- Interpret a rule's graduation lines
- Identify rules based upon their measurement scale
- Choose which type of precision rule to use to measure a length
- Use the precision rule to accurately measure a length

Chapter 3 – Calipers

- Identify all of the parts of a caliper
- Describe how the parts work together to measure
- Interpret the graduation scales on the caliper
- Zero set your caliper
- Use the caliper accurately to measure a length and depth
- Properly care for your caliper

Chapter 4 – Micrometers

- Identify all of the parts of a micrometer
- Describe how the parts work together to measure a product
- Interpret the graduation scales on the standard and vernier micrometer
- Use the micrometer to accurately measure a distance
- Properly care for your micrometer

Chapter 5 – Small Hole Gauges

- Identify all of the parts of a small hole gauge
- Describe how the parts work together to measure
- Use the small hole gauge to accurately measure a diameter and width
- Properly care for your small hole gauge

Chapter 6 – Bore Gauges

- Identify the most common types of bore gauges
- Define the characteristics of a precision hole
- Identify and explain the major components of bore gauges
- Demonstrate how to use different types of bore gauges to inspect hole size and hole shape



Chapter 7 – Go and NoGo Gauges

- Identify the different types of Go and NoGo gauges used to inspect holes
- Use a Go and NoGo gauge to inspect hole features

Chapter 8 – Countersink Gauge

- Identify all of the parts of a countersink gauge
- Describe how the parts work together to measure a product
- Use the countersink gauge accurately to measure a diameter
- Properly care for your countersink gauge

Chapter 9 – Fastener Height Gauges

- Identify all of the parts of a fastener height gauge
- Describe how the parts work together to determine fastener height
- Use the fastener height gauge accurately measure fastener height
- Properly care for your fastener height gauge

Chapter 10 – Inspecting Rivet Installation

- Define all of the inspection requirements for a rivet installation
- Identify and explain all of the precision instruments used to inspect rivet installations
- Perform all of the inspection processes

Chapter 11 – Fastener Inspection Gauges

- Identify all of the parts of a Hi-Lok fastener
- Identify all of the parts of a lockbolt
- Identify all of the fastener gauges
- Use the pin protrusion gauge to accurately measure a fastener installation
- Properly care for your fastener gauges



4.6 Hand Tools

COURSE DESCRIPTION: This course provides technical knowledge of the components of the various hand tools and fasteners used in aerospace manufacturing. The student will learn about hand tool safety, proper drilling and countersinking techniques, the use of and how to install temporary fasteners, bolts, Hi-Loks, lockbolts, and rivets. Also included is the identification standards used in fastener codes in the aviation industry.

Chapter 1 – Hand Tool Safety

- Identify the types of personal protective equipment you may be required to wear when operating hand tools
- Describe the safety practices associated with certain hand tools
- List the potential hazards that may be present when operating hand tools

Chapter 2 – Drilling

- Recognize the parts of a drill bit
- Recognize the basic components of a pneumatic drill
- Know how to hold the drill properly
- List the different types of drill bits you might use
- Recognize the tools and accessories you need to drill a quality hole

Chapter 3 – Countersinking

- List the common reasons for countersinking a hole
- Identify the different types of countersink cutters
- Understand how countersinks are identified
- Describe the purpose of a microstop countersink tool
- Describe the proper technique for countersinking a hole

Chapter 4 – Temporary Fasteners

- Identify different types of temporary fasteners
- Determine how temporary fastener sizes are identified
- Understand why temporary fasteners are used
- Explain how to install Cleco clamps
- Explain how to install the different kinds of Cleco fasteners

Chapter 5 – Bolts

- Name the types of bolts used in aviation
- List the parts of a bolt
- Describe how these bolts work
- Explain how bolts are identified



Chapter 6 – Hi-Loks

- Explain the benefits of a Hi-Lok fastener
- Identify and explain the major components of a Hi-Lok
- Explain the process of selecting the proper Hi-Lok
- Install a Hi-Lok fastener

Chapter 7 – Inspecting Hi-Lok Installations

- Define all of the inspection requirements for a Hi-Lok installation
- Identify and explain all of the precision instruments used to inspect Hi-Lok installations
- Perform all of the inspection processes

Chapter 8 – Lockbolts

- Explain the benefits of a lockbolt fastener
- Identify and explain the major components of a lockbolt
- Explain the process of selecting the proper lockbolt
- Install a lockbolt fastener

Chapter 9 – Inspecting Lockbolts Installations

- Define all of the inspection requirements for a lockbolt installation
- Identify and explain all of the precision instruments used to inspect lockbolt installations
- Perform all of the inspection processes

Chapter 10 – Rivets

- Name two types of rivets used in aviation
- List the parts of a rivet and blind rivet
- Describe how rivets and blind rivets work
- Describe the rivet installation process

Chapter 11 – Inspecting Rivets

- Define all of the inspection requirements for a rivet installation
- Identify and explain all of the precision instruments used to inspect rivet installations
- Perform all of the inspection processes

Chapter 12 – Identifying Fasteners

- Recognize the identification standards used in fastener codes
- Recognize the codes that identify fasteners
- Understand the more common materials that fasteners are made of
- Identify the information in the National Aerospace Standard Code cross



4.7 Blueprints & Picture Sheets

COURSE DESCRIPTION: This course provides the technical knowledge and skills of blueprint terminology, views, lines dimensions and tolerances. The student will learn to distinguish between perspective, isometric and orthographic drawings, identify the sections of blueprint, and understand how to read a blueprint used in the aviation industry.

Chapter 1 – Introduction to Blueprints

- Explain the history of blueprints
- Define the language of blueprints
- List the types of blueprints
- Explain why blueprints are standardized

Chapter 2 – Blueprint Terminology

- List the basic shapes used in on blueprints
- Identify line types used on blueprints
- Identify the angle types you will see on blueprints
- Explain the relationships that exist between two or more lines
- Explain the relationships that exist between two or more circles

Chapter 3 – Blueprint Views

- Explain how blueprints are drawn
- Explain the difference between perspective, isometric and orthographic drawings
- Define each of the orthographic views on a blueprint
- Visualize three dimensional objects drawn as two dimensional objects

Chapter 4 – Blueprint Lines

- Identify each type of line used in a blueprint drawing
- Interpret a product based upon a line drawing
- Interpret hidden features on a blueprint drawing
- Identify other views of the product on the blueprint drawing

Chapter 5 – Blueprint Dimensions and Tolerances

- Identify the different types of dimensions
- Identify the different types of tolerances
- Explain the purpose of dimension lines and extension lines
- Identify tolerancing methods
- Calculate tolerances



Chapter 6 – Blueprint Symbols

- Define the product datum
- List the categories of blueprint symbols
- Identify the most common symbols used on blueprints
- Identify the type of fastener specified on a blueprint
- Locate product feature symbols on a product drawing



4.8 Bonding and Grounding

COURSE DESCRIPTION: This course introduces the principles and laws of electrical resistance and how to calculate resistance. Includes converting ohms to other units of measure and the fundamental rules for unit conversion. The student will learn about the major components and how to use five different ohmmeters when testing resistance as an electrical assembly mechanic.

Chapter 1 – Electricity and the Airplane

- Explain electrical resistance
- Calculate electrical resistance
- Explain why low resistance metals are important in airplane construction
- List the electrical hazards that occur if electricity is not controlled
- Explain Ohm's Law
- Explain how Ohm's law can be used to calculate resistance

Chapter 2 – Measurement and Unit Conversion

- Explain how resistance is measured
- Demonstrate converting ohms to other units of measure
- List all of the units of measure for ohms
- Explain the fundamental rules for unit conversion

Chapter 3 – Resistance Test Equipment

- Explain the potential hazards of resistance testing
- List the correct ohmmeter to use in hazardous areas
- List the correct ohmmeters and multimeters to use in non-hazardous areas
- Define the equipment inspection steps you must perform before using an ohmmeter or multimeter

Chapter 4 – The Fluke® Multimeter

- List the major components of the Fluke multimeter
- Explain how to prepare the Fluke multimeter for resistance testing
- Use the Fluke multimeter to test resistance

Chapter 5 – The Biddle® Ohmmeter

- List the major components of the Biddle ohmmeter
- Explain how to prepare the Biddle ohmmeter for resistance testing
- Use the Biddle ohmmeter to test resistance

Chapter 6 – The Avtron® Ohmmeter

- List the major components of the Avtron ohmmeter
- Explain how to prepare the Avtron ohmmeter for resistance testing
- Use the Avtron ohmmeter to test resistance



4.9 Introduction to Composites

COURSE DESCRIPTION: This course provides an introduction to a types of materials used in composites in the aviation industry. The student will learn safety considerations, general properties which can be achieved with different manufacturing and orientation procedures and the equipment and materials used in bagging and laying up composite components.

Chapter 1 – Materials Used in Composites

- Identify the types of materials commonly used in composites in the aviation industry
- Identify weaves generally found in composite materials
- Describe the core materials used in composites
- Identify types of resin systems used in composite materials

Chapter 2 – Bagging and Lay-up Equipment

- Identify the equipment and materials used in bagging and laying up composite components
- Identify the purpose of each piece of equipment
- Understand the role of the equipment in the bagging and lay-up process

Chapter 3 – Preparation for the Lay-up Process

- Identify the documentation used in laying up composite components
- Identify material orientation used in laying up composite components
- Understand the purpose of material orientation used in composite lay-up
- Identify different lay-up types



5.0 180 Skills Contact Information

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