Cape Cod Community College AMTS

Curriculum Subject Guide for AMT 109 General Curriculum, Subject Items 14 - 19

Part 147, Appendix B, Subject E – Materials and Processes

Subject: Materials and Processes

Item 14. Identify and select appropriate non-destructive testing methods (Level 1) *T – 7.0 Hrs / L – 0.0 Hrs*
Item 15. Perform dye penetrant, eddy current, ultrasonic, and magnetic particle inspections (Level 2)
T – 3.5 Hrs / L – 9.5 Hrs
Item 16. Perform basic heat-treating processes (Level 1)
T – 6.0 Hrs / L – 0.0 Hrs
Item 17. Identify and select aircraft hardware and materials (Level 3)
T – 20 Hrs / L – 20.5 Hrs
Item 18. Inspect and check welds (Level 3)
T – 1.0 Hrs / L – 4.5 Hrs
Item 19. Perform precision measurements (Level 3)
T – 2.0 Hrs / L – 11 Hrs

Classroom time:	41 hours
Lab or shop time:	44 hours
Test time:	5 hours
Total Time:	90 hours
Teaching Level	1, 2, and 3

Project 1
Item 15 – 4.75 Hrs

Project 2
Item 17 – 6.25 Hrs

Project 3
Item 17 – 4.0 Hrs

Project 4
Item 17 – 4.0 Hrs

Project 5
Item 18 – 4.5 Hr

Project 6
Item 15 – 4.75 Hrs

Project 7
Item 17 – 6.25 Hrs

Project 8
Item 19 – 11 Hrs

Theory Test 1
0.25 Hrs

Theory Test 2
0.25 Hrs

Practical Test 1
1.0 Hrs

Practical Test 2
2.0 Hrs

Practical Test 3
0.5 Hrs

Practical Test 4
1.0 Hrs

Prerequisite(s)

(1) None

Course Interruptions: All interruptions or changes in course sequence will be in accordance with the Order of Instruction policy, located in Cape Cod Community College's Operations Manual, page 17.

Item 14:

Student Performance Goal(s)

Given: Written descriptions of six aircraft defects or flaws including engine crankshaft flaws, surface cracks in aluminum castings and forgings, cracks in materials where only one side of the material is accessible, component defects requiring radiography or X-ray inspection for proper detection, and written information concerning nondestructive testing

Performance: The student will select which method of testing is best suited for detection and evaluation of each described defect or flaw and briefly state how the inspection should be accomplished

Standard: Select proper method for at least four of the described defects or flaws and at least four statements of how inspection is to be done to be in accordance with written information provided

Item 15:

Student Performance Goal(s)

Given: A specimen aircraft part with known invisible surface cracks, a dye penetrant inspection kit with applicable operating instructions, and AC 43.13-1B or an equivalent publication.

Performance: The student will prepare the specimen part for inspection, apply and remove the penetrant, apply developer, inspect for cracks, and complete after inspection cleaning

Standard: Perform all steps in accordance with instructions and locate at least one crack

Given: A steel aircraft part having a known sub-surface flaw or fracture, magnetic particle inspection equipment, applicable operating instructions, and AC 43.13-1B or an equivalent publication

Performance: The student will use the magnetic particle inspection method to locate and identify a sub-surface flaw or fracture and properly demagnetize the part after completing the inspection

Standard: Perform all steps in accordance with instructions provided, locate and identify at least one flaw or fracture

Given: Samples of aircraft welded assemblies which have known cracks and/or blow-holes not easily visible to the unaided eye, magnifying glass (10 power or greater), dye penetrant or Zyglo test equipment, magnetic particle test equipment, AC 43.13-1 or equivalent publication and operating instructions for the test equipment

Performance: The student will locate cracks and/or blow-holes in each of five welded assemblies using a magnifying glass, dye-penetrant, and magnetic particle tests as applicable for the kind of material being tested

Standard: Locate and identify flaws in at least three of the welded assemblies and perform inspection 1n accordance with instructions provided

Item 16:

Student Performance Goal(s)

Given: Written technical information and questions with multiple choice answers concerning the effects of various forms of heat treatment on metal alloys

Performance: The student will select correct answers for ten questions concerning the relationship between tensile strength and metal hardness, how hardness and tensile strength are determined, the effects of heat treatment processes on aluminum alloys, and the results of incorrect heat treatment procedures

Standard: Select at least seven correct answers

Given: Samples of aluminum alloy sheet and AC 43.13-1 or equivalent written data concerning identification of aluminum alloys

Performance: The student will identify samples of aluminum alloys, at least five of which are considered heat treatable, five non-heat-treatable, and three with trademarks indicating surface corrosion prevention treatment

Standard: Correctly identify at least two types of heat-treatable aluminum alloys, at least three types of non-treatable, and two types with surface corrosion prevention treatment

Given: Written technical information and questions concerning heat treatment processes, tempering, and strain hardening of metals

Performance: The student will answer five questions concerning the steps in heat treatment of aluminum alloys, five questions concerning the effect of heating a metal such as steel slightly above its critical temperature, then cooling it rapidly, and five

questions concerning strain hardening and its effect on the tensile strength of aluminum alloy

Standard: Correctly answer at least three questions in each of the three categories

Item 17:

Student Performance Goal(s)

Given: A random display of aircraft quality bolts, a bolted installation problem on an aircraft powerplant or mock-up and written information

Performance: On an aircraft, powerplant, or mock-up, the student will determine the correct length of bolts to install some bolts with castle nuts and some with self-locking nuts and torque to correct values

Standard: Correctly identify ten different bolts from AN markings and by measurement and install bolts and nuts in accordance with return-to-flight standards

Given: A random display of sheet aluminum samples including at least ten different alloy types and written aluminum alloy reference data

Performance: The student will identify ten samples of the various family groups of aluminum alloy by visual recognition of code designators and select appropriate alloys for ten specified aircraft applications

Standard: Correctly select at least eight aluminum family group samples and at least eight alloys for specified applications

Given: Written information and a series of questions, with multiple choice answers, concerning the economic and engineering criteria involved in selection of materials for specific aircraft applications

Performance: The student will select answers for thirty questions covering the economic and engineering criteria involved in selecting materials for specific aircraft applications. The questions will be concerned with shaping and forming of metals, joining of materials, the composition of metal alloys, plastics, and rubber, and the determination of the mechanical properties of materials

Standard: Select correct answers for at least twenty-one questions

Given: A random unlabeled display consisting of 30 different types of AN, MS, NAS and trademark aircraft rivets and standard rivet publications

Performance: The student will identify each rivet by head shape, alloy, dimensions, and where applicable, type letter designating strength characteristics. The student will answer ten questions concerning use limitations for certain types of rivets, chilling, "age hardening," and which types of rivets need heat treatment

Standard: Correctly identify at least twenty-five types of rivets and correctly answer at least eight questions.

Given: Written technical information and samples of materials suitable for use in aircraft firewalls and exhaust shrouds

Performance: The student will identify six samples of materials suitable for use in aircraft firewalls and exhaust shrouds. The student will use pertinent technical reference information or aircraft manuals to illustrate the suitability of the materials

Standard: At least five materials will be correctly identified and at least five applications correctly listed

Given: Written technical information and sample materials for structural aircraft repairs

Performance: The student will select suitable materials for use in aircraft structural repairs to pressurized sections of a fuselage, fuel cell areas, wing rib sections, flight control surfaces and honeycomb or laminated structures. He will use and interpret information pertaining to the specific types of repairs

Standard: Proper selection of material in conformance with technical information provided

Given: Written technical information and samples of aircraft control cables including nonflexible, flexible and extra-flexible types

Performance: The student will identify six different samples of aircraft control cable as to type of cable, number of strands, number of wires per strand, material, and whether preformed or non-preformed

Standard: Correctly identify at least five samples

Item 18:

Student Performance Goal(s)

Given: Assorted aircraft welded assemblies of acceptable and unacceptable quality, written information concerning welding including A.C 43.13-1 or equivalent publication

Performance: The student will inspect and evaluate the quality of the weld in each of ten welded aircraft assemblies. The student will point out any faults or defects in each weld and decide whether it is acceptable or should be rejected

Standard: Decision of acceptance or rejection will be correct for at least 8 welded assemblies and at least 80% of the defects and flaws pointed out will be valid in accordance with written information provided.

Item 19: Student Performance Goal(s)

Given: Used and worn aircraft components including shafts, bearings, bearing journals, cylinders with associated pistons, connecting rods, crankshaft, sheet metal parts, and inspection tools, including micrometers, calipers, snap and hole gauges, dial indicators, "5" blocks, surface plates and written inspection data, blank report forms and status tags

Performance: The student will perform inspections using appropriate inspection tools to detect wear and/or deterioration in twenty used and worn aircraft components and complete typical report forms or status tags indicating acceptance or rejection of the inspected components

Standard: At least fifteen inspections and report forms will be completed in conformance with the written data provided

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