

1. Title	Materials and hardware II (Mechanics Repair and Maintenance)
2. Code	EMAMBG431A
3. Range	The knowledge is needed for a wide range of aircraft repair and maintenance works, e.g. applicable to aircrafts, analysis, machineries, airworthiness, airframes, avionics, materials, tests, documentation, safety, health and tools etc.
4. Level	4
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Knowledge</p> <ul style="list-style-type: none"> ◆ Able to understand the Aircraft Materials - Ferrous <ul style="list-style-type: none"> • Characteristics, properties and identification of common alloy steels used in aircraft. • Heat treatment and application of alloys steels. • Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance. ◆ Able to understand the Aircraft Materials – Non-ferrous <ul style="list-style-type: none"> • Characteristics, properties and identification of common non-ferrous materials used in aircraft. • Heat treatment and application of nonferrous materials. • Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.

- ◆ Able to understand the Aircraft Materials – Composite and Non-metallic
 - Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft.
 - Sealants and bonding agents.
 - The detection of defects in composite material.
 - Repair of composite material.
- ◆ Able to understand the corrosion
 - Chemical fundamentals.
 - Formation by: galvanic action process, microbiological, stress.
 - Types of corrosion and their identification.
 - Causes of corrosion.
 - Material types, susceptibility to corrosion.
- ◆ Able to understand the Fasteners
 - Screw threads
 - Screw nomenclature.
 - Thread forms, dimensions and tolerances for standard threads used in aircraft.
 - Measuring screw threads.
 - Bolts, studs and screws
 - Bolt types: specification, identification and marking of aircraft bolts, international standards.
 - Nuts: self locking, anchor, standard types.
 - Machine screws: aircraft specifications.

- Studs: types and uses, insertion and removal.
 - Self tapping screws, dowels.
- Locking devices
 - Tab and spring washers, locking plates, split pins, pal-nuts, wire locking, quick release fasteners, keys, circlips, cotter pins.
- Aircraft rivets
 - Types of solid and blind rivets: specifications and identification, heat treatment.
- ◆ Able to understand the Pipes and Unions
 - Identification of, and types of rigid and flexible pipes and their connectors used in aircraft.
 - Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.
- ◆ Able to understand the Springs
 - Types of springs, materials, characteristics and applications.
- ◆ Able to understand the Bearings
 - Purpose of bearings, loads, material, construction.
 - Types of bearings and their application.
- ◆ Able to understand the Transmissions
 - Gear types and their application.
 - Gear ratios, reduction and multiplication gear
 - systems, driven and driving gears, idler gears,
 - mesh patterns.
 - Belts and pulleys, chains and sprockets.

	<ul style="list-style-type: none"> ◆ Able to understand the Control Cables <ul style="list-style-type: none"> • Types of cables. • End fittings, turnbuckles and compensation devices. • Pulleys and cable system components. • Bowden cables. • Aircraft flexible control systems. ◆ Able to understand the Electrical Cables and Connectors <ul style="list-style-type: none"> • Cable types, construction and characteristics. • High tension and co-axial cables. • Crimping. • Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes. <p>6.2 Theoretical and practical aspects</p> <ul style="list-style-type: none"> ◆ Able to apply the following knowledge in the aircraft maintenance. <ul style="list-style-type: none"> • Aircraft Materials – Ferrous • Characteristics, properties and identification • Aircraft Materials - Non-Ferrous • Characteristics, properties and identification • Aircraft Materials - Composite and Non-Metallic • Corrosion • Types of corrosion and their identification. • Causes of corrosion. • Material types, susceptibility to corrosion. • Fasteners • Pipes and Unions • Springs
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	<ul style="list-style-type: none"> • Bearings • Transmissions • Control Cables • Electrical Cables and Connectors <p>6.3 Professional approach</p> <ul style="list-style-type: none"> ◆ Able to understand the principal elements of the subjects. ◆ Able to understand the general knowledge of the theoretical and practical aspects of the following subjects. <ul style="list-style-type: none"> • Aircraft Materials – Ferrous <ul style="list-style-type: none"> ▸ Characteristics, properties and identification • Aircraft Materials - Non-Ferrous <ul style="list-style-type: none"> ▸ Characteristics, properties and identification • Aircraft Materials - Composite and Non-Metallic • Fasteners • Pipes and Unions • Springs • Bearings • Transmissions • Control Cables • Electrical Cables and Connectors ◆ Able to apply the knowledge in the aircraft maintenance task. ◆ Able to understand the detailed knowledge of the theoretical and practical aspects of the following subjects. <ul style="list-style-type: none"> • Corrosion <ul style="list-style-type: none"> ▸ Types of corrosion and their identification.
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	<ul style="list-style-type: none"> ▸ Causes of corrosion. ▸ Material types, susceptibility to corrosion. <p>◆ Able to combine and apply the separate elements of knowledge in a logical and comprehensive manner.</p>
7. Assessment Criteria	<p>The integral outcome requirement of this UoC is:</p> <ul style="list-style-type: none"> (i) Able to understand the theory of the subjects and interrelationships with other subjects. (ii) Able to give a detailed description of the subject using theoretical fundamentals and specific examples. (iii) Able to understand and be able to use mathematical formulae related to the subject. (iv) Able to read, understand and prepare sketches, simple drawings and schematics describing the subject. (v) Able to apply the knowledge relating to mechanics repair and maintenance in a practical manner using manufacturer's instructions. (vi) Able to interpret results from various sources and measurements and apply corrective action where appropriate.
8. Remarks	Ref: HKAR-66 Module 6: Materials and Hardware.