### Occupation: Maintenance Controller/Technical Operations Representative

#### Occupation Description:

The Maintenance Controller/Technical Operations Representative performs or supervises maintenance activities to ensure that work is conducted in an airworthy manner and meets the required quality standards.

He/She provides advanced troubleshooting assistance to customers’ maintenance providers and liaises with engineering teams to resolve in service difficulties. He/She provides recommendations for aircraft out of service for maintenance. He/She coordinates the clearing of minimum equipment list and deferral in the configuration deviation list with customers. He/She coordinates with the planning team to develop adequate maintenance requirements to meet customer’ requirements.

He/She is responsible for the promotion and practice of a safety culture amongst the maintenance teams and participates in quality improvements activities.
SKILLS FRAMEWORK FOR AEROSPACE
SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE

The skills expected of the Maintenance Controller/Technical Operations Representative are summarised as below:

<table>
<thead>
<tr>
<th>Skill Category</th>
<th>Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legislation and Regulation</td>
<td></td>
</tr>
<tr>
<td>AER-LRE-2081-1.1</td>
<td>Apply Basic Human Factors and Error Management</td>
</tr>
<tr>
<td>AER-LRE-2082-1.1</td>
<td>Interpret Basic Regulation Requirements</td>
</tr>
<tr>
<td>AER-LRE-5094-1.1</td>
<td>Interpret Basic Foreign (FAA/ EASA) Part 145 Regulation Requirements</td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
</tr>
<tr>
<td>AER-MAI-5048-1.1</td>
<td>Maintain Aeroplane Propeller (Advanced)</td>
</tr>
<tr>
<td>AER-MAI-4092-1.1</td>
<td>Perform Aircraft Maintenance Planning</td>
</tr>
<tr>
<td>Specialised Processes</td>
<td></td>
</tr>
<tr>
<td>AER-SPR-5076-1.1</td>
<td>Apply Repair Techniques for Composites</td>
</tr>
<tr>
<td>AER-SPR-5077-1.1</td>
<td>Apply Failure Analysis for Composites</td>
</tr>
<tr>
<td>AER-SPR-5078-1.1</td>
<td>Apply Design Techniques for Advanced Composites</td>
</tr>
<tr>
<td>AER-SPR-5079-1.1</td>
<td>Manage Welding Operations</td>
</tr>
<tr>
<td>AER-SPR-5080-1.1</td>
<td>Formulate Weldment Quality Requirements</td>
</tr>
<tr>
<td>Technical and Engineering Fundamentals</td>
<td></td>
</tr>
<tr>
<td>AER-TEF-5038-1.1</td>
<td>Apply Principles of Turbine Aeroplane Aerodynamics, Structure and Systems (Advanced)</td>
</tr>
<tr>
<td>AER-TEF-5046-1.1</td>
<td>Apply Principles of Gas Turbine Engine (Advanced)</td>
</tr>
<tr>
<td>AER-TEF-5042-1.1</td>
<td>Apply Principles of Aircraft Aerodynamics, Structures and Systems (Advanced)</td>
</tr>
<tr>
<td>AER-TEF-5044-1.1</td>
<td>Apply Principles of Propulsion (Advanced)</td>
</tr>
<tr>
<td>AER-TEF-5037-1.1</td>
<td>Apply Principles of Electrical Fundamentals (Advanced)</td>
</tr>
<tr>
<td>AER-TEF-5039-1.1</td>
<td>Apply Principles of Electronic Fundamentals (Advanced)</td>
</tr>
<tr>
<td>AER-TEF-5040-1.1</td>
<td>Apply Principles of Digital Techniques (Advanced)</td>
</tr>
<tr>
<td>AER-TEF-5041-1.1</td>
<td>Select Aerospace Materials and Hardware (Advanced)</td>
</tr>
<tr>
<td>AER-TEF-5043-1.1</td>
<td>Perform Aerospace Maintenance Practices (Advanced)</td>
</tr>
<tr>
<td>Skill Category</td>
<td>Skill</td>
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<tr>
<td>--------------------------------</td>
<td>----------------------------------------------------------------------</td>
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<tr>
<td></td>
<td>AER-TEF-5045-1.1 Apply Principles of Aerodynamics (Advanced)</td>
</tr>
<tr>
<td></td>
<td>AER-TEF-5047-1.1 Apply Principles of Human Factors</td>
</tr>
<tr>
<td>Workplace Safety and Health</td>
<td>PRE-WSH-4005-1 Supervise Manufacturing Work for Workplace Safety and Health</td>
</tr>
<tr>
<td>Quality</td>
<td>AER-QUA-3138-1.1 Implement Quality Procedures</td>
</tr>
<tr>
<td></td>
<td>AER-PIN-5089-1.1 Apply Eight Disciplines (8D) Methodology Problem-solving Approach</td>
</tr>
<tr>
<td></td>
<td>PRE-QUA-3009-1 Apply Failure Mode and Effect Analysis (FMEA)</td>
</tr>
<tr>
<td></td>
<td>AER-PIN-4105-1.1 Implement Lean Six Sigma</td>
</tr>
<tr>
<td></td>
<td>AER-PIN-4107-1.1 Manage Enterprise Productivity Improvement Methodologies</td>
</tr>
<tr>
<td></td>
<td>AER-PIN-4106-1.1 Manage Productivity Improvement to Achieve Business Objectives</td>
</tr>
<tr>
<td></td>
<td>AER-PIN-4108-1.1 Apply Guided Innovation and Improvement Methods</td>
</tr>
<tr>
<td></td>
<td>PRE-MPI-3007-1 Supervise Work Improvement Processes</td>
</tr>
<tr>
<td>Planning and Implementation</td>
<td>BM-SPI-304E-1 Display Critical Thinking and Analytical Skills</td>
</tr>
<tr>
<td>Project Management</td>
<td>AER-PMA-4111-1.1 Apply Project Management Skills</td>
</tr>
<tr>
<td>Leadership</td>
<td>LPM-VIS-401C-0 Lead Team Leaders to Develop Business Strategies and Governance Management</td>
</tr>
<tr>
<td>People Management and Development</td>
<td>ES-PMD-405G-1 Manage Workplace Challenges with Resilience</td>
</tr>
<tr>
<td>People and Relationship</td>
<td>ES-IP-401G-1 Lead Workplace Communication and Engagement</td>
</tr>
<tr>
<td>Management and Development</td>
<td>ES-IP-402G-1 Develop a Work Team</td>
</tr>
<tr>
<td>Human Resource</td>
<td>AER-HRE-4140-1.1 Appraise and Evaluate Staff</td>
</tr>
<tr>
<td></td>
<td>AER-HRE-4145-1.1 Develop On-the-job Training Programmes</td>
</tr>
<tr>
<td></td>
<td>AER-HRE-4143-1.1 Develop and Review Competency-based Assessments</td>
</tr>
<tr>
<td>Skill Category</td>
<td>Skill Category</td>
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<tr>
<td>----------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>AER-HRE-3142-1.1</td>
<td>Assess Competence</td>
</tr>
<tr>
<td>Personal Management and Development</td>
<td>ES-PMD-301G-1</td>
</tr>
<tr>
<td>Skill Code</td>
<td>AER-LRE-2081-1.1</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Skill Sub-Category</td>
<td></td>
</tr>
<tr>
<td>Skill Description</td>
<td>Apply Basic Human Factors and Error Management</td>
</tr>
<tr>
<td></td>
<td>This skill describes the ability to apply human factors and basic error management in aviation context. It also includes the understanding of human limitations and error, organisational factors and the working environment that might contribute to incident and/or accident.</td>
</tr>
<tr>
<td>Knowledge and Analysis</td>
<td>The ability to understand:</td>
</tr>
<tr>
<td></td>
<td>• Human factors in aviation</td>
</tr>
<tr>
<td></td>
<td>• Human limitations and error</td>
</tr>
<tr>
<td></td>
<td>• Organisational factors and the working environment</td>
</tr>
<tr>
<td></td>
<td>• Error management</td>
</tr>
<tr>
<td>Application and Adaptation</td>
<td>The ability to:</td>
</tr>
<tr>
<td></td>
<td>• Understand the importance of human factors and how they have contributed to aviation accidents</td>
</tr>
<tr>
<td></td>
<td>• Relate how various human limitations and behaviours can affect performance</td>
</tr>
<tr>
<td></td>
<td>• Identify the differences between an error and a violation, and the importance of basic error management principles</td>
</tr>
<tr>
<td></td>
<td>• Describe the effect of the organisation and the working environment on safety and performance</td>
</tr>
<tr>
<td>Innovation and Value Creation</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</td>
</tr>
<tr>
<td>Social Intelligence and Ethics</td>
<td>N/A</td>
</tr>
<tr>
<td>---------------------------------</td>
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</tr>
<tr>
<td>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</td>
<td>The ability to:</td>
</tr>
<tr>
<td></td>
<td>• Relate how various human limitations and behaviours can affect performance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning to Learn</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</td>
<td>Human factors in aviation may include but not limited to:</td>
</tr>
<tr>
<td></td>
<td>• Role of human factors in aviation safety</td>
</tr>
<tr>
<td></td>
<td>• Role of error chains; Murphy’s law; ‘Dirty Dozen’</td>
</tr>
<tr>
<td></td>
<td>• Factors that have attributed to aviation accidents</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range of Application</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the critical circumstances that the skill may be demonstrated.</td>
<td>Human limitations and error may include but not limited to:</td>
</tr>
<tr>
<td></td>
<td>• Limitations that can affect the work of a technician</td>
</tr>
<tr>
<td></td>
<td>• Role of memory, stress, knowledge and experience, complacency</td>
</tr>
<tr>
<td></td>
<td>• Work ethics and compliance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organisational factors and the working environment may include but not limited to:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Organisational factors that can affect safety</td>
<td>Error management may include but not limited to:</td>
</tr>
<tr>
<td>• Effects of staffing, resource levels and workloads</td>
<td>• Types of error and violation</td>
</tr>
<tr>
<td>• Importance of work culture within an organisation</td>
<td>• Methods of reducing and preventing error</td>
</tr>
<tr>
<td></td>
<td>• Reporting processes and procedures</td>
</tr>
</tbody>
</table>
### Skill Code

<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-LRE-2082-1.1</th>
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</table>

### Skill Category

<table>
<thead>
<tr>
<th>Skill Category</th>
<th>Legislation and Regulation</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### Skill Sub-Category

<table>
<thead>
<tr>
<th>Skill Sub-Category (where applicable)</th>
<th>N/A</th>
</tr>
</thead>
</table>

### Skill

<table>
<thead>
<tr>
<th>Skill</th>
<th>Interpret Basic Regulation Requirement</th>
</tr>
</thead>
</table>

### Skill Description

This skill describes the ability to recall and interpret the aviation regulatory requirements as well as how they are applied to the aircraft maintenance environment.

### Knowledge and Analysis

The ability to understand:
- Regulatory Framework
- Air Navigation Order
- Singapore Airworthiness Requirement
- Aviation legislations relevant to a holder of aircraft maintenance licence

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

### Application and Adaptation

The ability to:
- Understand the functions of and relationships between International Civil Aviation Organisation (ICAO) and Singapore aviation legislation
- Identify the requirement of Air Navigation Order
- Comprehend the aviation legislations relevant to a holder of aircraft maintenance licence

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

### Innovation and Value Creation

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

<table>
<thead>
<tr>
<th>Innovation and Value Creation</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Intelligence and Ethics</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td></td>
</tr>
<tr>
<td>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</td>
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</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning to Learn</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</td>
</tr>
<tr>
<td>The ability to:</td>
</tr>
<tr>
<td>- Interpret the key features of Singapore Airworthiness Requirement and its associated parts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the critical circumstances that the skill may be demonstrated.</td>
</tr>
<tr>
<td>Functions of and relationships between International Civil Aviation Organisation (ICAO) and Singapore aviation legislation may include but not limited to:</td>
</tr>
<tr>
<td>- History and setup of ICAO (UK)</td>
</tr>
<tr>
<td>- Regulation of the Singapore aviation industry</td>
</tr>
<tr>
<td>Requirement of Air Navigation Order may include but not limited to:</td>
</tr>
<tr>
<td>- Setup of the ANO (UK)</td>
</tr>
<tr>
<td>- Delegation of responsibilities to the DGCA</td>
</tr>
<tr>
<td>- Penalties for the violation of ANO</td>
</tr>
<tr>
<td>Features of Singapore Airworthiness Requirement and its associated parts may include but not limited to:</td>
</tr>
<tr>
<td>- Singapore Airworthiness Requirements</td>
</tr>
<tr>
<td>- Requirement of SAR-21</td>
</tr>
<tr>
<td>- Requirement of SAR-39</td>
</tr>
<tr>
<td>- Requirement of SAR-66</td>
</tr>
<tr>
<td>- Requirement of SAR145</td>
</tr>
<tr>
<td>- Requirement of SAR-147</td>
</tr>
<tr>
<td>Aviation legislations relevant to a holder of aircraft maintenance licence may include but not limited to:</td>
</tr>
<tr>
<td>- Air Operator certificate application process</td>
</tr>
<tr>
<td>- Airworthiness notices</td>
</tr>
<tr>
<td>- Concept and special requirements of Extended Deviation Time Operation (EDTO)</td>
</tr>
</tbody>
</table>
## Skill Code

AER-LRE-5094-1.1

<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-LRE-5094-1.1</th>
<th>Skill Category</th>
<th>Legislation and Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td>N/A</td>
<td>(where applicable)</td>
<td></td>
</tr>
</tbody>
</table>

### Skill

Interpret Basic Foreign (FAA/EASA) Part 145 Regulation Requirement

### Skill Description

This skill describes the ability to recall and interpret civil aviation regulatory requirements, relating to the operation of an FAR and EASA Part 145 approved maintenance organisation, as well as basic application of these requirements in such maintenance environments.

### Knowledge and Analysis

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

The ability to understand:
- FAR Part 145 Awareness
- EASA Part 145 and Part M Awareness

### Application and Adaptation

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

The ability to:
- Comprehend the procedures in the maintenance organisation exposition.
- Manage the requirements to obtain and maintain a Part 145 approved maintenance organisation, which include
  - Facilities,
  - Personnel
  - Maintenance data
  - Equipment, tooling, and materials
  - Documentation and release certification
  - Quality System
  - Approval class and rating system
  - Privileges and limitations
<table>
<thead>
<tr>
<th>Skill Standard</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Innovation and Value Creation</strong></td>
<td>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</td>
</tr>
<tr>
<td><strong>Social Intelligence and Ethics</strong></td>
<td>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</td>
</tr>
<tr>
<td><strong>Learning to Learn</strong></td>
<td>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</td>
</tr>
</tbody>
</table>
**FAR awareness must include:**
- FAA Legislative Introduction
- Code of Federal Regulations – Aeronautics and Space
- FAR Part 1 – Definitions And Abbreviations
- FAR Part 3 – General Requirements
- FAR Part 39 – Air Worthiness Directives
- FAR Part 43 – Maintenance, Preventive Maintenance, Rebuilding and Alteration
- FAR Part 121 – Operating Requirements: Domestic, Flag and Supplement Operation
- FAR Part 145 – Repair Stations

**EASA Part 145 must include:**
- Section A – Technical Requirements
- Acceptable Means of Compliance to Part 145
- Guidance Material to Part 145
- Authorised Release Certificate, EASA Form 1
- EASA Approval Certificate

**EASA Part-M awareness must include:**
- European Aviation Safety Agency (EASA) Overview
- Part M Overview
- Part M Subpart A
- Part M Subpart B
- Part M Subpart C
- Part M Subpart D
- Part M Subpart E
- Part M Subpart F
- Part M Subpart G
- Part M Subpart H
- Part M Subpart I
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>Skill Category</th>
<th>Skill Sub-Category (where applicable)</th>
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<tr>
<td>AER-MAI-4093-1.1</td>
<td>Maintenance</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Skill**
Implement Reliability Centred Maintenance in Aviation Maintenance Programme

**Skill Description**
This skill describes the ability to apply statistic monitoring and events monitoring to supplement or modify aviation maintenance programme to achieve a cost effective maintenance strategy.

**Knowledge and Analysis**
It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.

- The ability to understand:
  - Overview of aircraft maintenance
  - Reliability centred maintenance
  - Definition and types of reliability
  - Reliability programme
  - Reliability alerts

**Application and Adaptation**
It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.

- The ability to:
  - Understand concepts and general practices in implementing reliability monitoring and control in aircraft maintenance programmes

**Innovation and Value Creation**
It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.

- The ability to:
  - Review the reliability analysis used to determine its effectiveness
<table>
<thead>
<tr>
<th>Social Intelligence and Ethics</th>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</td>
<td>Communicate the improved work processes to relevant stakeholders in accordance with organisational procedures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning to Learn</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</td>
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</table>

<table>
<thead>
<tr>
<th>Range of Application</th>
<th>Implement Reliability into Aviation Maintenance Programme must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the critical circumstances that the skill may be demonstrated.</td>
<td>- Administration and/or management of the programme</td>
</tr>
<tr>
<td></td>
<td>- Programme review board</td>
</tr>
<tr>
<td></td>
<td>- Reliability programme document</td>
</tr>
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</table>

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<td>- Programme review board</td>
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<tr>
<td>- Reliability programme document</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Overview of aircraft maintenance must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Definition</td>
</tr>
<tr>
<td>- Reliability control programme</td>
</tr>
<tr>
<td>- Scheduled and unscheduled maintenance</td>
</tr>
<tr>
<td>- Maintenance programme</td>
</tr>
<tr>
<td>- Maintenance checks</td>
</tr>
<tr>
<td>- Maintenance Task Interval Escalation</td>
</tr>
<tr>
<td>- Variations</td>
</tr>
<tr>
<td>- Continuous improvement</td>
</tr>
<tr>
<td>- Operator responsibilities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reliability centred maintenance must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Failure mechanisms</td>
</tr>
<tr>
<td>- Failure Modes and Effect Analysis</td>
</tr>
<tr>
<td>- Maintenance processes HT/OC/CM</td>
</tr>
<tr>
<td>- Statistical Reliability Element</td>
</tr>
<tr>
<td>- Reliability Centred Maintenance (RCM)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Definition and types of reliability must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Types of reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical reliability</td>
</tr>
<tr>
<td>Historical reliability</td>
</tr>
<tr>
<td>Event-oriented reliability</td>
</tr>
<tr>
<td>Dispatch reliability</td>
</tr>
<tr>
<td>Reliability parameters</td>
</tr>
<tr>
<td>MTBF versus MTBUR</td>
</tr>
<tr>
<td>NFF and rogue component</td>
</tr>
<tr>
<td>Example on reliability calculation</td>
</tr>
</tbody>
</table>

Reliability centered programme must include:
- Programme process
- Elements of a reliability programme
- Data collection
- Data display
- Data analysis
- Follow-up analysis
- Data reporting
- Corrective actions

Reliability alerts must include:
- Investigation of Reliability Alerts
- Cross-functional process
- Zeroing on the problem
- Alert analysis flowcharts
- Reliability alert levels
- Establishing Alert Levels
- Alert level calculations
- Re-calculation of alert levels
- An airline example
### Skill Code
AER-MAI-5048-1.1

### Skill Category
Maintenance

### Skill Sub-Category
Aircraft Maintenance (Mechanical)

### Skill
Maintain Aeroplane Propeller (Advanced)

### Skill Description
This skill describes the ability to apply a sound knowledge of propeller theory and construction and engine support systems towards maintenance, repair and/or overhaul of propeller and auxiliary propeller systems.

### Knowledge and Analysis
It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.

The ability to understand:
- Propeller theory
- Propeller construction
- Propeller pitch control
- Propeller synchronisation
- Propeller ice protection system
- Propeller maintenance
- Propeller preservation and storage

### Application and Adaptation
It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.

The ability to:
- Analyse the factors affecting propeller performance
- Characterise propeller construction
- Discuss the functions and operation of aircraft propeller operating systems
- State the requirements for aircraft propeller maintenance, storage and preservation

### Innovation and Value Creation
It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.

N/A
**Social Intelligence and Ethics**
*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Observe all rules and regulations embodied in the Singapore Airworthiness Requirements and the Workplace Safety and Health Act</td>
</tr>
<tr>
<td>• Apply organisational processes and procedures</td>
</tr>
<tr>
<td>• Interact with co-workers, supervisors and regulatory auditors as appropriate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning to Learn</th>
</tr>
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<tbody>
<tr>
<td><em>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</em></td>
</tr>
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</table>

| N/A |

<table>
<thead>
<tr>
<th>Range of Application</th>
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<tbody>
<tr>
<td><em>It refers to the critical circumstances that the skill may be demonstrated.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analyse the factors affecting propeller performance must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Types of factors affecting performance</td>
</tr>
<tr>
<td>• Pitch distribution</td>
</tr>
<tr>
<td>• Shape changing forces</td>
</tr>
<tr>
<td>• Pitch changing forces</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characterised propeller construction must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Types of material used</td>
</tr>
<tr>
<td>• Manufacturing process</td>
</tr>
<tr>
<td>• Installation methods</td>
</tr>
<tr>
<td>• Remedy for installation errors</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discuss the functions and operation of aircraft propeller operating systems must include:</th>
</tr>
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<tbody>
<tr>
<td>• Operation of counterweight and/or non-counterweight propeller</td>
</tr>
<tr>
<td>• Types of feathering and unfeathering system</td>
</tr>
<tr>
<td>• Reversible pitch propeller</td>
</tr>
<tr>
<td>• Types of synchronising system</td>
</tr>
<tr>
<td>• Types of ice protection system</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State the requirements for aircraft propeller maintenance, storage and preservation must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Types of maintenances performed on propeller</td>
</tr>
<tr>
<td>• Essential storage and preservation procedures for both installed and removed propeller</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topics on fundamentals of propeller must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Propeller theory</td>
</tr>
<tr>
<td>• High and/or low blade angle, reverse angle, angle of attack, rotational speed</td>
</tr>
</tbody>
</table>
### Topics on propeller construction must include:
- Construction methods and materials used in wooden, composite and metal propellers
- Blade station, blade face, blade shank, blade back and hub assembly
- Fixed pitch, controllable pitch, constant speeding propeller
- Propeller and/or spinner installation

### Topics on propeller pitch control must include:
- Speed control and pitch change methods, mechanical and electrical and/or electronic
- Feathering and reverse pitch
- Over-speed protection

### Topics on propeller synchronising must include:
- Synchronising equipment
- Synchro-phasing equipment

### Topics on propeller ice protection must include:
- Fluid de-icing equipment
- Electrical de-icing equipment
- Pneumatic de-icing equipment

### Topics on propeller maintenance must include:
- Static and dynamic balancing
- Blade tracking
- Assessment of blade damage, erosion, corrosion, impact damage delamination
- Propeller treatment and/or repair schemes
- Propeller engine running

### Topics on propeller storage and preservation must include:
- Propeller preservation and de-preservation
### Skill Framework for Aerospace

**Skill Standard for Maintenance Controller/Technical Operations Representative**

<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-MAI-4092-1.1</th>
<th>Skill Category</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skill</strong></td>
<td></td>
<td>Skill Sub-Category</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Skill Description</strong></td>
<td>This skill describes the ability to comprehend and interpret the requirements for aircraft maintenance programme.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge and Analysis</strong></td>
<td>The ability to understand:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Maintenance and reliability</td>
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<tr>
<td></td>
<td>- Aviation maintenance and management</td>
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<tr>
<td></td>
<td>- ATA document standards</td>
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<tr>
<td></td>
<td>- Continuous Airworthiness Maintenance Programme</td>
<td></td>
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<tr>
<td></td>
<td>- Maintenance Philosophies</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Maintenance Review Board Process</td>
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<tr>
<td></td>
<td>- Maintenance Tasks Analysis</td>
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<td></td>
<td>- Maintenance Planning</td>
<td></td>
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<tr>
<td></td>
<td>- Continuing analysis and surveillance</td>
<td></td>
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<tr>
<td></td>
<td>- Safety Initiatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Application and Adaptation</strong></td>
<td>The ability to:</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>- Interpret the maintenance requirements as per the Maintenance Planning Document</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>- Manage an aircraft maintenance programme</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Adopt a Continuing Analysis and Surveillance System</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Innovation and Value Creation</strong></td>
<td>The ability to:</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>- Review maintenance programme with traditional processes to meet maintenance requirements to assess value add of implementation</td>
<td></td>
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<tr>
<td></td>
<td>- Ensure the optimal utilisation of aircrafts when establishing an aircraft maintenance programme</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**SKILLS FRAMEWORK FOR AEROSPACE**  
**SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE**

| Social Intelligence and Ethics | The ability to:  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Communicate with customers, colleagues and team to assist in establishing timeframes and requirements</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning to Learn</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</td>
</tr>
</tbody>
</table>

| Range of Application | Establish an aircraft maintenance programme must include:  
|----------------------|--------------------------------------------------|
|                      | • Maintenance planning document  
|                      | • Sampling programme  
|                      | • Maintenance intervals |

Develop a continuing analysis and surveillance system must include:  
• Objectives of a continuing analysis and surveillance system  
• Functional areas  
• Principal elements  
• Proactive surveillance and analysis  
• Reactive surveillance and analysis  
• Programme effectiveness

Determine maintenance tasks for aircraft must include:  
• Maintenance tasks for airframe systems  
• Maintenance tasks for structural items  
• Corrosion protection and control programme  
• Zonal maintenance tasks  
• Airworthiness limitation section

Maintenance and reliability must include:  
• Rational for maintenance  
• Failure rate patterns  
• Scheduled and Unscheduled Maintenance  
• Managing Unscheduled Maintenance  
• Reliability  
• Redesign

Aviation maintenance and management must include:  
• History
## Cost of Ownership
- Definitions
- Regulatory Documentation

ATA document standards must include:
- ATA 100 Specification
- Effectively and Configuration Numbering
- Manufacturer’s Documentation
- Modified ATA

Continuous airworthiness maintenance programme must include:
- Regulatory Requirements
- Elements of Maintenance Programme
- Objectives of Maintenance Programmes
- Consideration of Maintenance Cost
- Development of Maintenance Programme
- Requirement on Personnel Licensing include
- Operation of Aircraft
- Airworthiness of Aircraft
- Regulatory Requirements for Federal Aviation Administration (FAA)
- Regulatory Requirements for European Aviation Safety Agency (EASA)
- Regulatory Requirements for Civil Aviation Authority of Singapore (CAAS)

Maintenance Philosophies include:
- Maintenance steering group methodology

Maintenance Review Board Process include:
- Maintenance review board organisations and duties

Safety Initiatives include:
- Aging Airplane Programme (AAP)
- PART 26 - Continued Airworthiness and Safety Improvements
- Enhanced Airworthiness Programme for Airplane Systems and/or Fuel Tank Safety (EAPAS/FTS)
- Aging Airplane Safety Rule (AASR)
- Widespread Fatigue Damage (WFD)
- Fatigue damage
- Limit Of Validity (LOV)
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-SPR-5076-1.1</th>
<th>Skill Category</th>
<th>Specialised Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td>Composite</td>
<td>(where applicable)</td>
<td>Composite</td>
</tr>
<tr>
<td>Skill</td>
<td>Apply Repair Techniques for Composites</td>
<td>Skill Description</td>
<td>This skill describes the ability to analyse the sources and causes of damage to composite structures requiring repair. It also includes the selection of appropriate repair methods and materials to restore the integrity of the structure using appropriate tools, equipment, materials and methods in accordance with applicable technical manuals and organisational procedures.</td>
</tr>
</tbody>
</table>
| Knowledge and Analysis | The ability to understand: | it refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities. | • Fundamentals of composite damage and repair assessment  
• Laminate repair design  
• Core and bonded joint repair design  
• Mechanically fastened joints  
• Repair techniques  
• Non-destructive testing |
| Application and Adaptation | The ability to: | it refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work. | • Explain fundamental concepts of composite repair with safety, health and environmental considerations  
• Perform repair assessment on composite structure  
• Develop repair plan for composite structures |
| Innovation and Value Creation | N/A | it refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals. |
### Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Communicate with co-workers for accurate composite structure damage evaluation and repair assessment plans</td>
</tr>
<tr>
<td>• Obtain approval of supervisors to perform repair procedures on composite structures in accordance with organisational requirements</td>
</tr>
<tr>
<td>• Reinstate the work areas in accordance with organisational housekeeping requirements</td>
</tr>
</tbody>
</table>

### Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

| N/A |

### Range of Application

*It refers to the critical circumstances that the skill may be demonstrated.*

<table>
<thead>
<tr>
<th>Fundamental of composite damage and repair assessment must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Need for repairs</td>
</tr>
<tr>
<td>• Types and classification of damage on composites</td>
</tr>
<tr>
<td>• Safety, health and environmental considerations during repair</td>
</tr>
<tr>
<td>• Understanding the need for repairs</td>
</tr>
<tr>
<td>• Interpreting types and classification of damage on composites</td>
</tr>
<tr>
<td>• Evaluating the safety, health and environmental considerations during repairs</td>
</tr>
<tr>
<td>• Repair assessment</td>
</tr>
<tr>
<td>• Challenges of composite repairs</td>
</tr>
<tr>
<td>• Types of repair methods</td>
</tr>
<tr>
<td>• Fundamentals of laminates</td>
</tr>
<tr>
<td>• Typical laminate repairs</td>
</tr>
<tr>
<td>• Different repair techniques</td>
</tr>
<tr>
<td>• Laminate repair design considerations</td>
</tr>
</tbody>
</table>

**Core and bonded joint repair design must include:**

- Bonded repair
  - Stepped repair
  - Scarf repair
  - Bonded joint failures
  - Considerations for bonded repair
- Core repair
- Test for composite repairs
- Performing non-destructive test to identify damage areas
- Performing repair assessments

**Mechanically fastened joints must include:**

- Fundamentals of bolted repairs
- Design considerations for bolted joints
- Failure of bolted joints
• Calculations

Repair techniques must include:
• Laser assisted preparation
• Joule heating using carbon nanotubes
• Using nano-materials and microwaves
• Electron beam processing and/or curing
• Surface preparation by jetting
• Composite interlock repair

Non-destructive techniques must include:
• Visual Inspection:
  o General visual inspection
  o Borescope
• X-ray
• Ultrasonic inspection
• Tap test
• Optical
• Thermography

Develop repair plan for composite must include:
• Evaluating the type of repair design required:
  o Laminate repair design
  o Core repair design and bonded joint repair design
  o Mechanically fastened joints
• Selecting the appropriate repair techniques:
  o Laser assisted preparation
  o Joule heating using carbon nanotubes
  o Using nano-materials and microwaves
  o Electron beam processing and/or curing
  o Surface preparation by jetting
  o Composite interlock repair
• Evaluating appropriate repair methods based on evaluation of repair assessment, repair design requirement and repair techniques
## Apply Failure Analysis for Composites

### Skill Description
This skill describes the ability to analyse the various modes of composite failure that include delamination, dis-bonding and buckling. It also includes microscopic examination, mechanical and thermal testing to determine the failure modes and to identify the root cause of composite damage and failure.

### Knowledge and Analysis

<table>
<thead>
<tr>
<th>The ability to understand:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Failure analysis process and common causes of failure</td>
</tr>
<tr>
<td>• Failure investigation process and methodology</td>
</tr>
<tr>
<td>• Theoretical and experimental evaluation of mechanical properties of composites</td>
</tr>
<tr>
<td>• Micro-mechanics and macro-mechanics of failure</td>
</tr>
<tr>
<td>• Delamination behaviour of composites</td>
</tr>
<tr>
<td>• Basics and measurement of fracture toughness for composites</td>
</tr>
<tr>
<td>• Fatigue damage of laminated fibrous composites</td>
</tr>
<tr>
<td>• Fundamental of failure analysis</td>
</tr>
<tr>
<td>• Advance NDT methods for damage detection</td>
</tr>
<tr>
<td>• Material characterisation methods</td>
</tr>
<tr>
<td>• Application of composite material in wind turbine blades</td>
</tr>
<tr>
<td>• Consideration for the selection of composite testing methods</td>
</tr>
</tbody>
</table>

### Application and Adaptation

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Describe the failure analysis process</td>
</tr>
<tr>
<td>• Identify different methods of analysis</td>
</tr>
<tr>
<td>• Evaluate the failure analysis to determine the cause of failure</td>
</tr>
<tr>
<td>• Identify the delamination behaviour of composites</td>
</tr>
<tr>
<td>• Understand the micro-mechanics and macro-mechanics of failure</td>
</tr>
<tr>
<td>• Determine fracture toughness</td>
</tr>
<tr>
<td>• Select appropriate NDT methods for damage detection</td>
</tr>
<tr>
<td>• Understand the material characterisation methods</td>
</tr>
<tr>
<td>• Interpret the results of composite materials testing under anisotropic conditions</td>
</tr>
<tr>
<td>• Interpret results obtained from the macro-mechanical analysis of a laminated composite</td>
</tr>
<tr>
<td>• Evaluate non-standard tests used in certain applications</td>
</tr>
<tr>
<td>• Identify failure modes related to moisture diffusion</td>
</tr>
</tbody>
</table>
| SKILLS FRAMEWORK FOR AEROSPACE  
| SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE |

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<tr>
<th>Innovation and Value Creation</th>
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<th>Learning to Learn</th>
<th>The ability to:</th>
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<tbody>
<tr>
<td>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</td>
<td>Perform self-reflection on non-standard tests and recommend appropriate improvements</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range of Application</th>
<th>Failure analysis process and common causes of failure must include but not limited to: (Failure analysis process, Different methods of analysis, Common causes of failure, Importance of failure analysis in determining the cause of a failure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the critical circumstances that the skill may be demonstrated.</td>
<td>Failure investigation process and methodology must include but not limited to: (Methodology in failure investigation, Failure investigation concepts)</td>
</tr>
<tr>
<td>Theoretical and experimental evaluation of mechanical properties of composites must include but not limited to: (Basic mechanics of composites, Methods of composite testing)</td>
<td>Micro-mechanics and macro-mechanics of failure must include but not limited to: (Micro-mechanics of composites, Classical laminate theory, Failure criteria)</td>
</tr>
<tr>
<td>Delamination behaviour of composites must include but not limited to:</td>
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<tr>
<td>---------------------------------------------------------------</td>
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</tr>
<tr>
<td>• Failure modes for composites</td>
<td></td>
</tr>
<tr>
<td>• Delamination behaviour of composites</td>
<td></td>
</tr>
<tr>
<td>• Sources and aspects of delamination</td>
<td></td>
</tr>
<tr>
<td>• Physical phenomena behind delamination onset</td>
<td></td>
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<tr>
<td>• Delamination growth and management</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement of fracture toughness for composites must include but not limited to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mathematical methods to determine the elastic stress, strain and displacement fields at a crack tip</td>
</tr>
<tr>
<td>• Failure criteria for fracture analysis</td>
</tr>
<tr>
<td>• Fracture toughness measurement methods</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fatigue damage of laminated fibrous composites must include but not limited to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Principles of fatigue behaviour of materials and specifically with composite structures</td>
</tr>
<tr>
<td>• Enhanced safety factor</td>
</tr>
<tr>
<td>• Mathematical methods to determine the fatigue life of composite components</td>
</tr>
<tr>
<td>• Design criteria for fatigue behaviour</td>
</tr>
<tr>
<td>• Specific problems requiring application of fatigue theory and comment on their validity</td>
</tr>
<tr>
<td>• Fatigue measurement methods specific to composites</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fundamental of failure analysis must include but not limited to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Total quality management</td>
</tr>
<tr>
<td>• Failure mode and effects analysis</td>
</tr>
<tr>
<td>• Steps in failure analysis</td>
</tr>
<tr>
<td>• Brittle and ductile fractures</td>
</tr>
<tr>
<td>• Instruments in failure analysis</td>
</tr>
<tr>
<td>• Fracture surfaces and loading mode</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Advance NDT Methods for damage detection must include but not limited to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Types of damages in composites</td>
</tr>
<tr>
<td>• Measurands for online monitoring of composites</td>
</tr>
<tr>
<td>• Analysis parameters</td>
</tr>
<tr>
<td>• Detection to analysis applications (online)</td>
</tr>
<tr>
<td>• Requirements for Acoustic Emission (AE) sensor systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material characterisation methods must include but not limited to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tests of composites under moisture presence conditions</td>
</tr>
<tr>
<td>• Time and temperature dependence of the rate of diffusion and maximum moisture content</td>
</tr>
<tr>
<td>• Moisture kinetics data for use in performance predictions</td>
</tr>
</tbody>
</table>
| Application of composite material in wind turbine blades must include but not limited to:  
| - Working principle of a wind turbine  
| - Composites application in wind turbine blades  

Consideration for the selection of composite testing methods must include but not limited to:

- Current challenges and opportunities of composites in high pressure, impact and flexural stiffness and fatigue demanding conditions  
- Non-standard tests used in specific case studies to suit the applications of wind turbine blade and sports helmet  
- Types of failure modes related to moisture diffusion and under pure soaked conditions
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-SPR-5078-1.1</th>
<th>Skill Category</th>
<th>Specialised Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td>Composite</td>
<td>(where applicable)</td>
<td>Composite</td>
</tr>
<tr>
<td>Skill Description</td>
<td>Apply Design Technique for Advanced Composites</td>
<td>This skill describes the ability to design composite materials with the required mechanical properties such as strength and stiffness for a specific application and operating environment. It also includes the evaluation of suitable fibre orientations to optimise the mechanical behaviour of composites.</td>
<td></td>
</tr>
</tbody>
</table>

**Knowledge and Analysis**

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

The ability to understand:
- Composites design fundamentals
- Design and product development
- Macro-mechanical behaviour of laminates
- Materials selection and properties
- Environmental effects
- Failure modes and remedies
- Sandwich structure
- Design for green composites
- Design for manufacturing
- Calculation methods for the design of composites
- Basic simulation models for the design of composites
- Challenges and opportunities in designing with composites

**Application and Adaptation**

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

The ability to:
- Understand of fracture in composites
- Interpret ply properties
- Analyse laminate, failure criterion, sandwich structure
- Evaluate the effects of environment on composites
<table>
<thead>
<tr>
<th>SKILLS FRAMEWORK FOR AEROSPACE</th>
<th>SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Innovation and Value Creation</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><em>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</em></td>
<td></td>
</tr>
<tr>
<td><strong>Social Intelligence and Ethics</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><em>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</em></td>
<td></td>
</tr>
<tr>
<td><strong>Learning to Learn</strong></td>
<td>The ability to:</td>
</tr>
<tr>
<td><em>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</em></td>
<td>- Perform self-reflection on the challenges faced during the design of the composites and recommend feasible improvements to the design</td>
</tr>
</tbody>
</table>
**SKILLS FRAMEWORK FOR AEROSPACE**  
**SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE**

<table>
<thead>
<tr>
<th><strong>Range of Application</strong></th>
<th><strong>Composites design fundamentals may include but not limited to:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Design process and considerations</td>
</tr>
<tr>
<td></td>
<td>• Impact of key design considerations on final composite performance</td>
</tr>
<tr>
<td></td>
<td>• Composite design options and methods such as fibre proportion, fibre angle, types of fibres and matrix</td>
</tr>
</tbody>
</table>

Design and product development may include but not limited to:
- Processes involved in the design and development of composite products
- Interrelationship between the various processes involved in the design and development of composite products
- Considerations for design and product development

Macro-mechanical behaviour of lamina may include but not limited to:
- Mechanical behaviour of lamina
- Design considerations with respect to the mechanical behaviour of lamina
- Impact of lamina design on its mechanical properties

Materials selection and properties may include but not limited to:
- Various materials used in composites
- Importance of materials selection in composite design
- Considerations of materials selection

Environmental effects may include but not limited to:
- Impact of environment on the performance of composites
- Design considerations with respect to environment effects of composites
- Composite performance under the influence of environmental factors

Failure modes and remedies may include but not limited to:
- Concept of failure mode
- Failure modes of composite materials
- Design considerations with respect to the failure modes of composite materials

Sandwich structure may include but not limited to:
- Design of sandwich structure
- Types of damages to sandwich structures
- Fabrication and design problems associated with sandwich structures

Design for green composites may include but not limited to:
- Impact of composites on the environment
- Environment friendly materials in composites
- Need for green composites
- Advantages of green composites over traditional composites

Design for manufacturing may include but not limited to:
- Design for manufacturing
- Fundamentals of materials used in composite products
• Guidelines in design for manufacturing
• Importance of design for manufacturing in a successful product

Calculation methods for the design of composites may include but not limited to:
• Composite design calculations
• Assumptions associated with calculations in composite design
• Failure theories in various composite design scenarios

Basic simulation models for the design of composites may include but not limited to:
• Role of simulation in composite design
• Basic simulation for composite design
  • Static (linear and non-linear)
  • Buckling (linear and non-linear)
  • Transient dynamics
  • Linear dynamics
  • Explicit (bird strike, drop test, crash and impact, etc.)
• Limitations of simulation in composite design

Challenges and opportunities in designing with composites may include but not limited to:
• Current challenges and opportunities in composite design
• Approaches to overcome challenges in design
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-SPR-5079-1.1</th>
<th>Skill Category</th>
<th>Specialised Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>Manage Welding Operations</td>
<td>Skill Sub-Category (where applicable)</td>
<td>Welding</td>
</tr>
</tbody>
</table>

**Skill Description**

This skill describes the ability to plan and supervise welding operations. It also includes the review of weldment inspection reports to ensure compliance with welding specifications and undertaking appropriate corrective actions for defective welds.

**Knowledge and Analysis**

The ability to understand:
- Requirements of material and consumable
- Organisational and manufacturers’ welding procedures
- Welding process, standards and specifications
- Safety data sheet
- Workplace Safety and Health
- Hierarchy of hazard control

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

**Application and Adaptation**

The ability to:
- Plan welding operations
- Supervise welding operations
- Perform quality control for welding operations
- Manage risks of welding processes
- Understand welding symbols
- Understand electrical principles
- Interpret engineering blueprints

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

**Innovation and Value Creation**

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

N/A
### Social Intelligence and Ethics
*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

| N/A |

### Learning to Learn
*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Assess the risks associated with the identified hazards</td>
</tr>
<tr>
<td>• Review control measures</td>
</tr>
</tbody>
</table>

### Range of Application
*It refers to the critical circumstances that the skill may be demonstrated.*

<table>
<thead>
<tr>
<th>Welding process, standards and specifications may include but not limited to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Shielded Metal Arc Welding (SMAW) technique</td>
</tr>
<tr>
<td>• Gas Metal Arc Welding (GMAW) technique</td>
</tr>
<tr>
<td>• Flux Core and/or Metal Core Wire (FCAW) technique</td>
</tr>
<tr>
<td>• Submerged Arc Welding (SAW) process</td>
</tr>
<tr>
<td>• Electron Beam Welding System</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• General airworthiness requirements</td>
</tr>
<tr>
<td>• Workplace Safety and Health Act</td>
</tr>
<tr>
<td>• Confined space safety requirements (MOM)</td>
</tr>
<tr>
<td>• Environmental regulations</td>
</tr>
<tr>
<td>• Safety data sheet (SDS)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Industry Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>• AWS D17.1/D17.1M:2010 - Specification for fusion welding for aerospace applications</td>
</tr>
<tr>
<td>• AWS D17.2/D17.2M:2007 - Specification for resistance welding for aerospace applications</td>
</tr>
<tr>
<td>• AWS D17.3/D17.3M:2010 - Specification for friction stir welding of aluminium alloys for aerospace applications</td>
</tr>
<tr>
<td>• American Society of Mechanical Engineers (ASME) Codes</td>
</tr>
<tr>
<td>• American Welding Society (AWS) Standards</td>
</tr>
<tr>
<td>• British Standards (BS)</td>
</tr>
<tr>
<td>• International Organization for Standardization (ISO) Standards</td>
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<tr>
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<tr>
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<table>
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<tr>
<th>The ability to:</th>
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<tbody>
<tr>
<td>Evaluate the effects of welding</td>
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</tbody>
</table>

### Range of Application

It refers to the critical circumstances that the skill may be demonstrated.

<table>
<thead>
<tr>
<th>Welding and cutting processes must include but not limited to:</th>
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<td>------------------</td>
</tr>
<tr>
<td>Skill Sub-Category (where applicable)</td>
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</tbody>
</table>

### Skill
Apply Principles of Turbine Aeroplane Aerodynamics, Structure and Systems (Advanced)

### Skill Description
This skill describes the ability to apply in-depth knowledge of aerodynamics, airframe structures, mechanical systems and electrical systems as well as an awareness of avionic systems. It also includes the scope covered in the CAAS SAR-66 Cat B examination.

### Knowledge and Analysis
The ability to understand:
- Theory of high speed flight
- General concepts of aircraft structure
- Components and fundamentals of aeroplane structures
- Principles of air conditioning and cabin pressurisation system
- Components and fundamentals of instrument and avionics systems
- Principles of electrical power
- Installation and handling requirements of aircraft equipment and furnishings
- Types of fire protection and their applications
- Types of flight controls and their functions
- Types of fuel systems and their functions
- Hydraulic power systems and their application
- Ice and rain protection systems
- Construction and application of landing gear systems
- Types of aircraft lightings
- Layout and operation of oxygen systems
- Layout and operation of pneumatic and vacuum system
- Layout and operation of water and waste
- On Board Maintenance systems
- Types of modules in an Integrated Modular Avionics system
- Cabin systems and their functions
- Information systems and their functions

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*
### Application and Adaptation

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

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<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Explain the operation and effects of various flight control surfaces</td>
</tr>
<tr>
<td>- Describe the construction of various airframe structures</td>
</tr>
<tr>
<td>- Demonstrate understanding of the pneumatic system to the air conditioning and cabin pressurisation systems</td>
</tr>
<tr>
<td>- Discuss the lay-out and operation of various electro-mechanical airframe systems</td>
</tr>
<tr>
<td>- Discuss the lay-out and operation of various electro-mechanical powerplant systems</td>
</tr>
<tr>
<td>- Analyse the DC and AC power system used on an aircraft</td>
</tr>
<tr>
<td>- Describe the operation of various electro-avionic systems</td>
</tr>
<tr>
<td>- Define the function of various Integrated Modular Avionic (IMA) modules</td>
</tr>
</tbody>
</table>

### Innovation and Value Creation

*N/A*

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

### Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

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<tr>
<th>The ability to:</th>
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<tbody>
<tr>
<td>- Apply safe work practices during maintenance work</td>
</tr>
</tbody>
</table>

### Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

*N/A*
### Range of Application

*It refers to the critical circumstances that the skill may be demonstrated.*

<table>
<thead>
<tr>
<th>Aeroplane aerodynamics and flight controls may include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Control using elevons, ruddervators</td>
</tr>
<tr>
<td>• High lift devices, slots, slats, flaps, flaperons</td>
</tr>
<tr>
<td>• Drag inducing devices, spoilers, lift dumpers, speed brakes</td>
</tr>
<tr>
<td>• Effects of wing fences, saw tooth leading edges</td>
</tr>
<tr>
<td>• Boundary layer control using, vortex generators, stall wedges or leading edge devices</td>
</tr>
<tr>
<td>• Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels</td>
</tr>
</tbody>
</table>

Operation and effect of aeroplane aerodynamics and flight controls may include:

- Roll control: ailerons and spoilers
- Pitch control: elevators, stabilisers, variable incidence stabilisers and canards
- Yaw control, rudder limiters

High speed flight must include:

- Speed of sound
- Subsonic flight
- Transonic flight
- Supersonic flight
- Mach number
- Critical Mach number
- Compressibility buffet
- Shock wave
- Aerodynamic heating
- Area rule
- Factors affecting airflow in engine intakes of high speed aircraft
- Effects of sweepback on critical Mach number

General concepts on airframe structures must include:

- Airworthiness requirements for structural strength
- Structural classification, primary, secondary and tertiary
- Fail safe, safe life, damage tolerance concepts
- Zonal and station identification systems
- Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue
- Drains and ventilation provisions
- System installation provisions
- Lightning strike protection provision
- Aircraft bonding
- Construction methods of stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor
structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments

- Structure assembly techniques such as riveting, bolting, bonding
- Methods of surface protection, such as chromating, anodising, painting
- Surface cleaning
- Methods of alignment and symmetry checks for airframe symmetry

Topics on general concepts of aerospace airframe structures may include:

Fuselage (ATA 52/53/56) must include:

- Construction and pressurisation sealing
- Wing, stabiliser, pylon and undercarriage attachments
- Seat installation and cargo loading system
- Doors and emergency exits:
- Construction, mechanisms, operation and safety devices
- Windows and windscreen construction and mechanisms

Wings (ATA 57) must include:

- Wing construction
- Fuel storage
- Landing gear, pylon, control surface and high lift/drag attachments

Stabilisers (ATA 55) must include:

- Stabilisers construction
- Control surface attachment

Flight control surfaces (ATA 55/57) must include:

- Construction and attachment of Flight control surfaces
- Mass and aerodynamic balancing

Nacelles and/or pylons (ATA 54) must include:

- Construction of Nacelles and/or pylons
- Firewalls
- Engine mounts

Topics on air conditioning and cabin pressurisation may include:

- Sources of air supply including engine bleed, APU and ground cart

Air conditioning must include:

- Air conditioning systems
- Air cycle and vapour cycle machines
- Distribution systems
- Flow, temperature and humidity control system

Pressurisation must include:

- Pressurisation systems
- Control and indication including control and safety valves
<table>
<thead>
<tr>
<th>Safety and warning devices must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection and warning devices</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instrument systems (ATA 31) must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitot static: altimeter, air speed indicator, vertical speed indicator</td>
</tr>
<tr>
<td>Gyroscopic: artificial horizon, attitude director, direction indicator</td>
</tr>
<tr>
<td>Horizontal situation indicator, turn and slip indicator, turn coordinator</td>
</tr>
<tr>
<td>Compasses: direct reading, remote reading</td>
</tr>
<tr>
<td>Angle of attack indication, stall warning systems</td>
</tr>
<tr>
<td>Glass cockpit</td>
</tr>
<tr>
<td>Other aircraft system indication</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fundamentals of system lay-outs and operation of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Flight (ATA 22)</td>
</tr>
<tr>
<td>Communications (ATA 23)</td>
</tr>
<tr>
<td>Navigation Systems (ATA 34)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topics on electrical power (ATA 24) must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries installation and operation</td>
</tr>
<tr>
<td>DC power generation</td>
</tr>
<tr>
<td>AC power generation</td>
</tr>
<tr>
<td>Emergency power generation</td>
</tr>
<tr>
<td>Voltage regulation</td>
</tr>
<tr>
<td>Power distribution</td>
</tr>
<tr>
<td>Inverters, transformers, rectifiers</td>
</tr>
<tr>
<td>Circuit protection</td>
</tr>
<tr>
<td>External and/or Ground power</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment and furnishings (ATA 25) must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency equipment requirements</td>
</tr>
<tr>
<td>Seats, harnesses and belts</td>
</tr>
<tr>
<td>Cabin lay-out</td>
</tr>
<tr>
<td>Equipment lay-out</td>
</tr>
<tr>
<td>Cabin Furnishing Installation</td>
</tr>
<tr>
<td>Cabin entertainment equipment</td>
</tr>
<tr>
<td>Galley installation</td>
</tr>
<tr>
<td>Cargo handling and retention equipment</td>
</tr>
<tr>
<td>Airstairs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fire protection (ATA 26) must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire and smoke detection and warning systems</td>
</tr>
<tr>
<td>Fire extinguishing systems</td>
</tr>
<tr>
<td>System tests</td>
</tr>
</tbody>
</table>
Topics on flight controls (ATA 27) must include:
- Primary controls: aileron, elevator, rudder, spoiler
- Trim control
- Active load control
- High lift devices
- Lift dump, speed brakes
- System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire
- Artificial feel, yaw damper, Mach trim, rudder limiter, gust lock systems
- Balancing and rigging
- Stall protection system

Topics on fuel systems (ATA 28) may include:
- System lay-out
- Fuel tanks
- Supply systems
- Dumping, venting and draining
- Cross-feed and transfer
- Indications and warnings
- Refuelling and defueling
- Longitudinal balance fuel systems

Topics on hydraulic power (ATA 29) must include:
- System lay-out
- Hydraulic fluids
- Hydraulic reservoirs and accumulators
- Pressure generation: electric, mechanical, pneumatic
- Emergency pressure generation
- Filters
- Pressure control
- Power distribution
- Indication and warning systems
- Interface with other systems

Topics on ice and rain protection (ATA 30) must include:
- Ice formation, classification and detection
- Anti-icing systems: electrical, hot air and chemical
- De-icing systems: electrical, hot air, pneumatic and chemical
- Rain repellent and removal
- Probe and drain heating
- Wiper systems

Topics on landing gear (ATA 32) must include:
- Construction, shock absorbing
- Extension and retraction systems: normal and emergency
• Indications and warning
• Wheels, brakes, antiskid and autobraking
• Tyres
• Steering
• Air-ground sensing

Topics on lights (ATA 33) must include:
• External: navigation, anti-collision, landing, taxiing, ice
• Internal: cabin, cockpit, cargo
• Emergency

Topics on oxygen (ATA 35) must include:
• System lay-out: cockpit, cabin
• Sources, storage, charging and distribution
• Supply regulation
• Indications and warnings

Topics on pneumatic and/or vacuum (ATA 36) must include:
• System lay-out
• Sources: engine and/or APU, compressors, reservoirs, ground supply
• Pressure control
• Distribution
• Indications and warnings
• Interfaces with other systems

Topics on water and/or waste (ATA 38) must include:
• Water system lay-out, supply, distribution, servicing and draining
• Toilet system lay-out, flushing and servicing
• Corrosion aspects

Topics on On-Board Maintenance Systems (ATA 45) must include:
• Central maintenance computers
• Data loading system
• Electronic library system
• Printing
• Structure monitoring (damage tolerance monitoring)

Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others:
• Bleed management
• Air pressure control
• Air ventilation and control
• Avionics and cockpit ventilation control
• Temperature control
• Air traffic communication
• Avionics communication Router
• Electrical load management
• Circuit breaker monitoring
• Electrical system BITE
• Fuel management, braking control, steering control
• Landing gear extension and retraction
• Tyre pressure indication
• Oleo pressure indication
• Brake temperature monitoring
• Core system
• Network components

Topics on cabin systems (ATA 44) must include:
• Units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). These include voice, data, music and video transmissions.
• Cabin Intercommunication Data System which provides an interface between cockpit and/or cabin crew and cabin systems. These systems support data exchange of the different related LRUs and they are typically operated via flight attendant panels.

The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems:
• Data and/or radio communication
• In-flight entertainment system

The Cabin Network Service may host functions such as:
• Access to pre-departure and/or departure reports
• E-mail and/or intranet and/or internet access
• Passenger database
• Cabin core system must include:
  • In-flight entertainment system
  • External communication system
  • Cabin mass memory system
  • Cabin monitoring system
  • Miscellaneous cabin system

Topics on information systems (ATA 46) must include:
• Units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche.
• Units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller

Units and components may include:
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<td>• Air Traffic and Information Management Systems and Network Server Systems</td>
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<tr>
<td>• Aircraft General Information System</td>
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<td>• Flight Deck Information System</td>
</tr>
<tr>
<td>• Maintenance Information System</td>
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<td><strong>Application and Adaptation</strong></td>
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<tr>
<td>Skill Standard</td>
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<tr>
<td>Innovation and Value Creation</td>
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<tr>
<td>Social Intelligence and Ethics</td>
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<tr>
<td>Learning to Learn</td>
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<tr>
<td>Range of Application</td>
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<tr>
<td>Coordinate the on ground engine test procedures must include:</td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>• Safety procedures prior to and during engine ground run</td>
</tr>
<tr>
<td>• Types of ground operation</td>
</tr>
<tr>
<td>• Types of unsatisfactory start</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State the requirement of engine preservation and storage must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Essential storage and preservation procedures for both on-wing and off-wing condition</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topics on fundamentals of gas turbine engine must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Potential energy</td>
</tr>
<tr>
<td>• Kinetic energy</td>
</tr>
<tr>
<td>• Newton's laws of motion</td>
</tr>
<tr>
<td>• Brayton cycle</td>
</tr>
<tr>
<td>• The relationship between force, work, power, energy, velocity, acceleration</td>
</tr>
<tr>
<td>• Constructional arrangement and operation of turbojet, turbofan, turboshaft, turboprop</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topics on general concepts of engine performance must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Thrust</td>
</tr>
<tr>
<td>• Gross thrust</td>
</tr>
<tr>
<td>• Net thrust</td>
</tr>
<tr>
<td>• Choked nozzle thrust</td>
</tr>
<tr>
<td>• Thrust distribution</td>
</tr>
<tr>
<td>• Resultant thrust</td>
</tr>
<tr>
<td>• Thrust horsepower</td>
</tr>
<tr>
<td>• Equivalent shaft horsepower</td>
</tr>
<tr>
<td>• Specific fuel consumption</td>
</tr>
<tr>
<td>• Engine efficiencies</td>
</tr>
<tr>
<td>• By-pass ratio and engine pressure ratio</td>
</tr>
<tr>
<td>• Pressure, temperature and velocity of the gas flow</td>
</tr>
<tr>
<td>• Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topics on engine inlet must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Compressor inlet ducts</td>
</tr>
<tr>
<td>• Effects of various inlet configurations</td>
</tr>
<tr>
<td>• Ice protection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topics on engine compressors must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Types of compressors</td>
</tr>
<tr>
<td>• Axial</td>
</tr>
<tr>
<td>• Centrifugal</td>
</tr>
<tr>
<td>• Constructional features and operating principles and applications of different types of compressors</td>
</tr>
<tr>
<td>Topics</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Fan balancing</td>
</tr>
<tr>
<td>Methods of air flow control</td>
</tr>
<tr>
<td>o Bleed valves</td>
</tr>
<tr>
<td>o Variable stator vanes</td>
</tr>
<tr>
<td>Compressor ratio</td>
</tr>
</tbody>
</table>

Topics on combustion section must include:
- Constructional features and principles of operation

Topics on turbine section must include:
- Operation and characteristics of different turbine blade types
- Blade to disk attachment
- Nozzle guide vanes
- Causes and effects of turbine blade stress and creep

Topics on exhaust section must include:
- Constructional features and principles of operation
- Convergent, divergent and variable area nozzles
- Engine noise reduction
- Thrust reversers

Topics on bearings and seals must include:
- Constructional features and principles of operation
- Lubricants and Fuels

Topics on lubricants and fuels must include:
- Properties and specifications
- Fuel additives
- Safety precautions

Topics on lubrication systems must include:
- System operation/lay-out and components

Topics on operation of engine control and fuel metering systems must include:
- Electronic engine control (FADEC)
- Systems lay-out and components

Topics on air systems must include:
- Operation of engine air distribution and anti-ice control systems, including:
  - Internal cooling
  - Sealing
Topics on starting and ignition systems must include:
- Operation of engine start systems and components
- Ignition systems and components
- Maintenance safety requirements

Topics on engine indication systems must include:
- Exhaust gas temperature/inter-stage turbine temperature
- Engine thrust indication
  - Engine pressure ratio
  - Engine turbine
  - Discharge pressure or jet pipe pressure systems
- Oil pressure and temperature
- Fuel pressure and flow
- Engine speed
- Vibration measurement and indication
- Torque
- Power

Topics on power augmentation systems must include:
- Operation and applications
- Water injection, water methanol
- Afterburner systems

Topics on turbo-prop engines must include:
- Gas coupled/free turbine and gear coupled turbines
- Reduction gears
- Integrated engine and propeller controls
- Over-speed safety devices

Topics on turbo-shaft engines must include:
- Arrangements
- Drive systems
- Reduction gearing
- Couplings
- Control systems

Topics on Auxiliary Power Units (APUs) must include:
- Purpose of APU
- Operation of APU
- Protective systems

Topics on power plant installation must include:
- Configuration of:
  - Firewalls
  - Cowlings
Topics on fire protection systems must include:
- Operation of detection and extinguishing systems

Topics on engine monitoring and ground operation must include:
- Procedures for starting and ground run-up
- Interpretation of engine power output and parameters
- Trend (including oil analysis, vibration and boroscope) monitoring
- Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer
- Compressor washing/cleaning
- Foreign object damage

Topics on engine storage and preservation must include:
- Preservation and de-preservation for the engine and accessories/systems
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-TEF-5042-1.1</th>
<th>Skill Category</th>
<th>Technical and Engineering Fundamentals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td>N/A</td>
<td>(where applicable)</td>
<td></td>
</tr>
</tbody>
</table>

### Skill

**Skill Code**: AER-TEF-5042-1.1  
**Skill Category**: Technical and Engineering Fundamentals  
**Skill Sub-Category**: N/A  

**Skill**: Apply Principles of Aircraft Aerodynamics, Structures and Systems (Advanced)

**Skill Description**: This skill describes the ability to apply in-depth knowledge of aerodynamic, structure and systems fundamentals towards maintenance, repair and/or overhaul of various aircraft systems. It also includes the scope covered in the CAAS SAR-66 Cat B examination.

---

### Knowledge and Analysis

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

The ability to understand:

- Theory of flight
- General concepts of aircraft structure
- Fundamentals and working principles of automatic flight control
- Fundamentals and working principles for different types of communication and navigation system
- Different types of electrical power system and their functions
- Requirement of aircraft equipment and furnishing
- Types of flights controls and their operation
- Fundamentals and working principles for different types of instrument systems
- Types of aircraft lightings and their applications
- Fundamentals and working principles of on board maintenance systems
- Operating principles of air conditioning and cabin pressurisation system
- Types of fire protection and their applications
- Types of fuel systems and their functions
- Components of hydraulic power systems and their application
- Components of ice and rain protection systems and their function
- Construction and application of landing gear systems
- Layout and operation of oxygen systems
- Layout and operation of pneumatic and vacuum system
- Layout and operation of water and waste system
- Types of modules in Integrated Modular Avionics system and their application
- Components of cabin systems and their functions
- Components of Information Systems and their functions
## Application and Adaptation

**It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.**

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Describes the electrical and avionics systems found in the aircraft mechanical and structures concepts.</td>
</tr>
<tr>
<td>- Outline the fundamentals and working principles of automatic flight control.</td>
</tr>
<tr>
<td>- Outline the fundamentals and working principles for different types of electrical, communication and navigation system.</td>
</tr>
<tr>
<td>- Outline the fundamentals and working principles for different types of Instrument and on board maintenance systems.</td>
</tr>
<tr>
<td>- Classify the types of modules in Integrated Modular Avionics system and their application.</td>
</tr>
<tr>
<td>- Classify the components of information systems, cabin systems and their functions.</td>
</tr>
</tbody>
</table>

## Innovation and Value Creation

**It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.**

<table>
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## Social Intelligence and Ethics

**It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.**

<table>
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<td>- Apply safe work practices during maintenance work</td>
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## Learning to Learn

**It refers to the ability to develop and improve one’s self within and outside of one’s area of work.**

<table>
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<th>The ability to:</th>
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<tbody>
<tr>
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</tbody>
</table>
Topics on Theory of Flight must include:
- Aeroplane Aerodynamics and Flight Controls
- Operation and effect of:
  - roll control: ailerons and spoilers;
  - pitch control: elevators, stabilisers, variable incidence stabilisers and canards;
  - yaw control, rudder limiters;
- Control using elevons, ruddervators;
- High lift devices, slots, slats, flaps, flaperons;
- Drag inducing devices, spoilers, lift dumpers, speed brakes;
- Effects of wing fences, saw tooth leading edges;
- Boundary layer control using, vortex generators, stall wedges or leading edge devices;
- Operation and effect of trim tabs, balance and ant balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;
- High Speed Flight
  - Speed of sound, subsonic flight, transonic flight, supersonic flight;
  - Mach number, critical Mach number.
- Rotary Wing Aerodynamics
  - Terminology;
  - Operation and effect of cyclic, collective and anti-torque controls.

Topics on Structures – General Concepts must include:
- Fundamentals of structural systems
- Zonal and station identification systems;
- Electrical bonding;
- Lightning strike protection provision.

Topics on Autoflight (ATA 22) must include:
- Fundamentals of automatic flight control including working principles and current terminology;
- Command signal processing;
- Modes of operation: roll, pitch and yaw channels;
- Yaw dampers;
- Stability Augmentation System in helicopters;
- Automatic trim control;
- Autopilot navigation aids interface;
- Auto throttle systems;
- Automatic Landing Systems: principles and categories, modes of operation, approach, glideslope, land, go-around, system monitors and failure conditions.

Topics on Communication and/or Navigation (ATA 23/34) must include:
- Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter;
- Working principles of following systems:
- Very High Frequency (VHF) communication;
- High Frequency (HF) communication;
- Audio;
- Emergency Locator Transmitters;
- Cockpit Voice Recorder;
- Very High Frequency omnidirectional range (VOR);
- Automatic Direction Finding (ADF);
- Instrument Landing System (ILS);
- Microwave Landing System (MLS);
- Flight Director systems;
- Distance Measuring Equipment (DME);
- Very Low Frequency and hyperbolic navigation (VLF/Omega);
- Doppler navigation;
- Area navigation, RNAV systems;
- Flight Management Systems;
- Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS);
- Inertial Navigation System;
- Air Traffic Control transponder, secondary surveillance radar;
- Traffic Alert and Collision Avoidance System (TCAS);
- Weather avoidance radar;
- Radio altimeter;
- ARINC communication and reporting.

Topics on Electrical Power (ATA 24) must include:
- Batteries Installation and Operation;
- DC power generation;
- AC power generation;
- Emergency power generation;
- Voltage regulation;
- Power distribution;
- Inverters, transformers, rectifiers;
- Circuit protection;
- External and/or Ground power.

Topics on Equipment and Furnishing (ATA 25) must include:
- Electronic emergency equipment requirements;
- Cabin entertainment equipment.

Topics on Flight Controls (ATA 27) must include:
- Primary controls: aileron, elevator, rudder, spoiler;
- Trim control;
- Active load control;
- High lift devices;
- Lift dump, speed brakes;
- System operation: manual, hydraulic, pneumatic;
SKILLS FRAMEWORK FOR AEROSPACE
SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE

- Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks;
- Stall protection systems.
- System operation: electrical, fly by wire.

Topics on Instrument Systems (ATA 31) must include:
- Classification;
- Atmosphere;
- Terminology;
- Pressure measuring devices and systems;
- Pitot static systems;
- Altimeters;
- Vertical speed indicators;
- Airspeed indicators;
- Machmeters;
- Altitude reporting and/or alerting systems;
- Air data computers;
- Instrument pneumatic systems;
- Direct reading pressure and temperature gauges;
- Temperature indicating systems;
- Fuel quantity indicating systems;
- Gyroscopic principles;
- Artificial horizons;
- Slip indicators;
- Directional gyros;
- Ground Proximity Warning Systems;
- Compass systems;
- Flight Data Recording systems;
- Electronic Flight Instrument Systems;
- Instrument warning systems including master warning systems and centralised warning panels;
- Stall warning systems and angle of attack indicating systems;
- Vibration measurement and indication;
- Glass cockpit.

Topics on Lights (ATA 33) must include:
- External: navigation, landing, taxiing, ice;
- Internal: cabin, cockpit, cargo;
- Emergency.

Topics on On-board Maintenance Systems (ATA 45) must include:
- Central maintenance computers;
- Data loading system;
- Electronic library system;
- Printing;
- Structure monitoring (damage tolerance monitoring).
### Topics on Air Conditioning and Cabin Pressurisation (ATA 21)
- Air supply
- Sources of air supply including engine bleed, APU and ground cart;
- Air Conditioning
- Air conditioning systems;
- Air cycle and vapour cycle machines;
- Distribution systems;
- Flow, temperature and humidity control system;
- Pressurisation
- Pressurisation systems;
- Control and indication including control and safety valves;
- Cabin pressure controllers;
- Safety and warning devices
- Protection and warning devices.

### Topics on Fire Protection (ATA 26)
- Fire and smoke detection and warning systems;
- Fire extinguishing systems;
- System tests.
- Portable fire extinguisher

### Topics on Fuel Systems (ATA 28)
- System lay-out;
- Fuel tanks;
- Supply systems;
- Dumping, venting and draining;
- Cross-feed and transfer;
- Indications and warnings;
- Refuelling and defuelling;
- Longitudinal balance fuel systems.

### Topics on Hydraulic Power (ATA 29)
- System lay-out;
- Hydraulic fluids;
- Hydraulic reservoirs and accumulators;
- Pressure generation: electrical, mechanical, pneumatic;
- Emergency pressure generation;
- Filters;
- Pressure control;
- Power distribution;
- Indication and warning systems;
- Interface with other systems.

### Topics on Ice and Rain Protection (ATA 30)
- Ice formation, classification and detection;
- Anti-icing systems: electrical, hot air and chemical;
| SKILLS FRAMEWORK FOR AEROSPACE  
<table>
<thead>
<tr>
<th>SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• De-icing systems: electrical, hot air, pneumatic, chemical;</td>
</tr>
<tr>
<td>• Rain repellent;</td>
</tr>
<tr>
<td>• Probe and drain heating;</td>
</tr>
<tr>
<td>• Wiper Systems.</td>
</tr>
<tr>
<td>Landing Gear (ATA 32) must include:</td>
</tr>
<tr>
<td>• Construction, shock absorbing;</td>
</tr>
<tr>
<td>• Extension and retraction systems: normal and emergency;</td>
</tr>
<tr>
<td>• Indications and warnings;</td>
</tr>
<tr>
<td>• Wheels, brakes, antiskid and autobraking;</td>
</tr>
<tr>
<td>• Tyres;</td>
</tr>
<tr>
<td>• Steering;</td>
</tr>
<tr>
<td>• Air-ground sensing.</td>
</tr>
<tr>
<td>Oxygen (ATA 35) must include:</td>
</tr>
<tr>
<td>• System lay-out: cockpit, cabin;</td>
</tr>
<tr>
<td>• Sources, storage, charging and distribution;</td>
</tr>
<tr>
<td>• Supply regulation;</td>
</tr>
<tr>
<td>• Indications and warnings.</td>
</tr>
<tr>
<td>Pneumatic and/or Vacuum (ATA 36) must include:</td>
</tr>
<tr>
<td>• System lay-out;</td>
</tr>
<tr>
<td>• Sources: engine and/or APU, compressors, reservoirs, ground supply;</td>
</tr>
<tr>
<td>• Pressure control;</td>
</tr>
<tr>
<td>• Distribution;</td>
</tr>
<tr>
<td>• Indications and warnings;</td>
</tr>
<tr>
<td>• Interfaces with other systems.</td>
</tr>
<tr>
<td>Water and/or Waste (ATA 38) must include:</td>
</tr>
<tr>
<td>• Water system lay-out, supply, distribution, servicing and draining;</td>
</tr>
<tr>
<td>• Toilet system lay-out, flushing and servicing.</td>
</tr>
<tr>
<td>Integrated Modular Avionics (ATA42) must include:</td>
</tr>
<tr>
<td>• Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others:</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Bleed Management, Air Pressure Control, Air Ventilation and Control,</td>
</tr>
<tr>
<td>Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic</td>
</tr>
<tr>
<td>Communication, Avionics Communication Router, Electrical Load</td>
</tr>
<tr>
<td>Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel</td>
</tr>
<tr>
<td>Management, Braking Control, Steering Control, Landing Gear Extension and</td>
</tr>
<tr>
<td>Retraction, Tyre Pressure Indication, Oleo Pressure Indication and Brake</td>
</tr>
<tr>
<td>Temperature Monitoring</td>
</tr>
<tr>
<td>• Core System</td>
</tr>
<tr>
<td>• Network Components</td>
</tr>
<tr>
<td>Cabin Systems (ATA44) must include:</td>
</tr>
</tbody>
</table>
• The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music and video transmissions
• The Cabin Intercommunication Data System provides an interface between cockpit and/or cabin crew and cabin systems. These systems support data exchange of the different related LRU’s and they are typically operated via Flight Attendant Panels
• The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems:
  (a) Data and/or Radio Communication; and
  (b) In-Flight Entertainment System.
• The Cabin Network Service may host functions such as:
  (a) Access to pre-departure and/or departure reports;
  (b) E-mail and/or intranet and/or internet access; and
  (c) Passenger database.
• Cabin Core System;
• In-flight Entertainment System;
• External Communication System;
• Cabin Mass Memory System;
• Cabin Monitoring System;
• Miscellaneous Cabin System.

Information Systems (ATA46) must include:
• The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display.
• Air Traffic and Information Management Systems and Network Server Systems;
• Aircraft General Information System;
• Flight Deck Information System;
• Maintenance Information System;
• Passenger Cabin Information System;
• Miscellaneous Information System.
### Skill Code

<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-TEF-5044-1.1</th>
</tr>
</thead>
</table>

### Skill Category

<table>
<thead>
<tr>
<th>Technical and Engineering Fundamentals</th>
</tr>
</thead>
</table>

### Skill Sub-Category

| (where applicable) | N/A |

### Skill

<table>
<thead>
<tr>
<th>Apply Principles of Propulsion (Advanced)</th>
</tr>
</thead>
</table>

### Skill Description

This skill describes the ability to apply in-depth knowledge of propulsion system, construction and operating principle of different types of gas turbine gas towards maintenance, repair and/or overhaul of various aircraft systems. It also includes the scope covered in the CAAS SAR-66 Cat B examination.

### Knowledge and Analysis

**It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.**

The ability to understand:

- Basic construction of the different types of gas turbine engine
- Operating principle of the different types of gas turbine engine
- Fundamental of fuel control unit
- Engine indicating systems
- Engine starting and ignition systems
- Safety precaution for starting and ignition systems maintenance

### Application and Adaptation

**It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.**

The ability to:

- Understand the basic construction of gas turbine engines
- Explain the operating principle of gas turbine engines
- Demonstrate the understanding of fundamentals and applications of the different types of the gas turbine engine components
- Perform aircraft components or systems removal and installation
- Select appropriate safety precautions and safe practices when working in or around aircraft and in workshop

### Innovation and Value Creation

**It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.**

N/A
# Social Intelligence and Ethics

It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.

<table>
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<th>The ability to:</th>
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<tr>
<td>• Apply safe work practices during maintenance work</td>
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</table>

| N/A |

# Learning to Learn

It refers to the ability to develop and improve one’s self within and outside of one’s area of work.

<table>
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<td>N/A</td>
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</table>

# Range of Application

It refers to the critical circumstances that the skill may be demonstrated.

<table>
<thead>
<tr>
<th>Range of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topics on turbine engines must include:</td>
</tr>
<tr>
<td>• Constructional arrangement and operation of turbojet, turbofan, turboshift and turbopropeller engines</td>
</tr>
<tr>
<td>• Electronic engine control and fuel metering systems (FADEC)</td>
</tr>
<tr>
<td>Topics on engine indicating systems must include:</td>
</tr>
<tr>
<td>• Exhaust gas temperature/interstage turbine temperature systems</td>
</tr>
<tr>
<td>• Engine speed</td>
</tr>
<tr>
<td>• Engine thrust indication: engine pressure ratio, engine turbine discharge pressure or jet pipe pressure systems</td>
</tr>
<tr>
<td>• Oil pressure and temperature</td>
</tr>
<tr>
<td>• Fuel pressure, temperature and flow</td>
</tr>
<tr>
<td>• Manifold pressure</td>
</tr>
<tr>
<td>• Engine torque</td>
</tr>
<tr>
<td>• Propeller speed</td>
</tr>
<tr>
<td>Topics on starting and ignition systems must include:</td>
</tr>
<tr>
<td>• Operation of engine start systems and components</td>
</tr>
<tr>
<td>• Ignition systems and components</td>
</tr>
<tr>
<td>• Maintenance safety requirements</td>
</tr>
<tr>
<td>Skill Code</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>Skill Sub-Category</td>
</tr>
<tr>
<td>Skill</td>
</tr>
<tr>
<td>Skill Description</td>
</tr>
<tr>
<td>Knowledge and Analysis</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
### Application and Adaptation

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Demonstrate understanding of the principle of electricity in aircraft electrical system</td>
</tr>
<tr>
<td>• Apply Direct Current (DC) and Alternating Current (AC) generation principles on aircraft electrical system</td>
</tr>
<tr>
<td>• Explain the DC and AC circuit characteristic of aircraft electrical system</td>
</tr>
<tr>
<td>• Apply principle of power on aircraft electrical systems</td>
</tr>
<tr>
<td>• Demonstrate understanding of the principle of motor and generator used in aircraft electrical systems</td>
</tr>
</tbody>
</table>

### Innovation and Value Creation

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

| N/A |

### Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Apply safe work practices during maintenance work</td>
</tr>
<tr>
<td>• Reinstate work area in accordance with organisational housekeeping requirements</td>
</tr>
</tbody>
</table>

### Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Analyse the properties and behaviours of electrostatic charges</td>
</tr>
<tr>
<td>• Apply principle of power on aircraft electrical systems</td>
</tr>
</tbody>
</table>
### Range of Application
It refers to the critical circumstances that the skill may be demonstrated.

<table>
<thead>
<tr>
<th>Electron theory must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Structure and distribution of electrical charges within atoms, molecules, ions, compounds</td>
</tr>
<tr>
<td>- Molecular structure of conductors, semiconductors and insulators</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Static electricity and conduction must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Static electricity and distribution of electrostatic charges</td>
</tr>
<tr>
<td>- Electrostatic laws of attraction and repulsion</td>
</tr>
<tr>
<td>- Units of charge, Coulomb's Law</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical Terminology must include the following terms, their units and factors affecting them:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Potential difference</td>
</tr>
<tr>
<td>- Electromotive force</td>
</tr>
<tr>
<td>- Voltage</td>
</tr>
<tr>
<td>- Current</td>
</tr>
<tr>
<td>- Resistance</td>
</tr>
<tr>
<td>- Conductance</td>
</tr>
<tr>
<td>- Charge</td>
</tr>
<tr>
<td>- Conventional current flow</td>
</tr>
<tr>
<td>- Electron flow</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Generation of electricity must include the production of electricity by the following methods:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Light</td>
</tr>
<tr>
<td>- Heat</td>
</tr>
<tr>
<td>- Friction</td>
</tr>
<tr>
<td>- Pressure</td>
</tr>
<tr>
<td>- Chemical Action</td>
</tr>
<tr>
<td>- Magnetism</td>
</tr>
<tr>
<td>- Motion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DC sources of electricity must include the construction and basic chemical action of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Primary cells</td>
</tr>
<tr>
<td>- Secondary cells</td>
</tr>
<tr>
<td>- Nickel Cadmium (Ni-Cd) batteries</td>
</tr>
<tr>
<td>- Lithium-Ion batteries</td>
</tr>
<tr>
<td>- Cells connections</td>
</tr>
<tr>
<td>- Construction, materials and operation of thermocouples</td>
</tr>
<tr>
<td>- Operation of photocell</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DC circuits must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Ohm's Law</td>
</tr>
<tr>
<td>- Kirchoff's voltage and current laws</td>
</tr>
<tr>
<td>- Significance of the internal resistance of a supply</td>
</tr>
<tr>
<td>Resistance and/or resistor must include:</td>
</tr>
<tr>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>• Specific resistance</td>
</tr>
<tr>
<td>• Resistance identification and specification</td>
</tr>
<tr>
<td>• Resistors connections</td>
</tr>
<tr>
<td>• Operation and use of potentiometers and rheostats</td>
</tr>
<tr>
<td>• Operation of Wheatstone bridge</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Power, work and energy (kinetic and potential)</td>
</tr>
<tr>
<td>• PE due to position</td>
</tr>
<tr>
<td>• PE due to distortion of an elastic body</td>
</tr>
<tr>
<td>• PE that produce work through chemical action</td>
</tr>
<tr>
<td>• Power</td>
</tr>
<tr>
<td>• Dissipation of power by a resistor</td>
</tr>
<tr>
<td>• Power formula</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacitance and/or capacitor must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Operation and function of a capacitor</td>
</tr>
<tr>
<td>• Factors affecting capacitance</td>
</tr>
<tr>
<td>• Capacitor types, construction and function</td>
</tr>
<tr>
<td>• Capacitor colour coding</td>
</tr>
<tr>
<td>• Calculations of capacitance and voltage in series and parallel circuits</td>
</tr>
<tr>
<td>• Exponential charge and discharge of a capacitor, time constants</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Magnetism must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Theory of magnetism</td>
</tr>
<tr>
<td>• Properties of a magnet</td>
</tr>
<tr>
<td>• Earth’s magnetic Field</td>
</tr>
<tr>
<td>• Types of magnets</td>
</tr>
<tr>
<td>• Magnetisation and demagnetisation</td>
</tr>
<tr>
<td>• Magnetic shielding</td>
</tr>
<tr>
<td>• Various types of magnetic material</td>
</tr>
<tr>
<td>• Electromagnets construction and principles of operation</td>
</tr>
<tr>
<td>• Hand clasp rules to determine magnetic field around current carrying conductor</td>
</tr>
<tr>
<td>• Magnetomotive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents</td>
</tr>
<tr>
<td>• Precautions for care and storage of magnets</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inductance and/or inductor must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Faraday's law</td>
</tr>
<tr>
<td>• Action of inducing a voltage in a conductor moving in a magnetic field</td>
</tr>
<tr>
<td>• Induction principles</td>
</tr>
<tr>
<td>• Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns</td>
</tr>
</tbody>
</table>
SKILLS FRAMEWORK FOR AEROSPACE
SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutual induction</td>
<td>The effect the rate of change of primary current and mutual inductance has on induced voltage</td>
</tr>
<tr>
<td>Factors affecting mutual inductance</td>
<td>Number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other</td>
</tr>
<tr>
<td>Lenz’s law and polarity determining rules</td>
<td>Back EMF, self-induction</td>
</tr>
<tr>
<td>Saturation point</td>
<td>Principal uses of inductors</td>
</tr>
</tbody>
</table>

DC motor and/or generator theory must include:
- Basic motor and generator theory
- Construction and purpose of components in DC generator
- Operation of, and factors affecting output and direction of current flow in DC generators
- Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors

Topics on inductance and/or inductor must include:
- Sinusoidal Waveform
- Phase
- Period (Time)
- Cycle
- Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power
- Square waves
- Odd harmonics
- Even harmonics
- Triangular waves
- Single phase and three phase principles

Resistive (R), capacitive (C) and inductive (L) circuits must include:
- Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel
- Power dissipation in L, C and R circuits
- Impedance, phase angle, power factor and current calculations
- True power, apparent power and reactive power calculations

Transformers must include:
- Transformer construction principles and operation
- Transformer losses
- Methods Of overcoming transformer losses
- Transformer action under no-load conditions
- Transformer action under load conditions
- Power transfer, efficiency, polarity markings
### SKILLS FRAMEWORK FOR AEROSPACE
### SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE

- Calculation of line and phase voltages and currents
- Calculation of power in a three phase system
- Primary and secondary current, voltage, turns ratio, power, efficiency
- Autotransformers

Filters must include:
- Low pass
- High pass
- Band pass
- Band stop

AC generators must include:
- Rotation of loop in a magnetic field and waveform produced
- Operation and construction of revolving armature and revolving field type AC generators
- Single phase, two phase and three phase alternators
- Three phase star and delta connections advantages and uses
- Permanent magnet generators

Construction, principles of operation and characteristics of AC motors must include:
- AC synchronous and induction motors both single and polyphase
- Methods of speed control and direction of rotation
- Methods of producing a rotating field
## SKILLS FRAMEWORK FOR AEROSPACE

### SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE

<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-TEF-5039-1.1</th>
<th>Skill Category</th>
<th>Technical and Engineering Fundamentals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Skill</th>
<th>Apply Principles of Electronic Fundamentals (Advanced)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Skill Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>This skill describes the ability to apply in-depth knowledge of electronic concepts towards maintenance, repair and/or overhaul of aircraft electronic and related systems. It also includes the scope covered in the CAAS SAR-66 Cat B examination.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge and Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The ability to understand:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Principles of diodes</td>
</tr>
<tr>
<td>• Principles of transistor</td>
</tr>
<tr>
<td>• Terminology and functions of integrated circuits</td>
</tr>
<tr>
<td>• Terminology and functions of printed circuit board</td>
</tr>
<tr>
<td>• Concepts and principles of servomechanism</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application and Adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Apply diodes theory and principles for electronic circuits</td>
</tr>
<tr>
<td>• Apply transistors theory and principles for electronic circuits</td>
</tr>
<tr>
<td>• Describe the components and their functions on printed circuit board assembly used in avionics system</td>
</tr>
<tr>
<td>• Demonstrate the understanding and applications of integrated circuits used in avionics system</td>
</tr>
<tr>
<td>• Demonstrate the understanding and applications of servomechanism used on aircraft system</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Innovation and Value Creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</td>
</tr>
</tbody>
</table>

| N/A |

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### Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

<table>
<thead>
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<th>The ability to:</th>
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<tbody>
<tr>
<td>• Apply safe work practices during maintenance work</td>
</tr>
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</table>

### Learning to Learn

*It refers to the ability to develop and improve one's self within and outside of one's area of work.*

<table>
<thead>
<tr>
<th>The ability to:</th>
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<tbody>
<tr>
<td>• Differentiate NPN and PNP transistor and its properties</td>
</tr>
</tbody>
</table>

### Range of Application

*It refers to the critical circumstances that the skill may be demonstrated.*

<table>
<thead>
<tr>
<th>Topics on semiconductors must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Diodes</td>
</tr>
<tr>
<td>• Transistors</td>
</tr>
<tr>
<td>• Integrated circuits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topics on diodes must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Diode symbols</td>
</tr>
<tr>
<td>• Diode characteristics and properties</td>
</tr>
<tr>
<td>• Diodes in series and parallel</td>
</tr>
<tr>
<td>• Main characteristics and use of silicon controlled rectifiers (thyristors) light emitting diode, photo conductive diode, varistor, rectifier diodes</td>
</tr>
<tr>
<td>• Functional testing of diodes</td>
</tr>
<tr>
<td>• Materials, electron configuration, electrical properties</td>
</tr>
<tr>
<td>• P and N type materials: effects of impurities on conduction, majority and minority characters</td>
</tr>
<tr>
<td>• PN junction in a semiconductor, development of a potential across a PN junction in unbiased, forward biased and reverse biased conditions</td>
</tr>
<tr>
<td>• Diode parameters: peak inverse voltage, maximum forward current, temperature, frequency, leakage current, power dissipation</td>
</tr>
<tr>
<td>• Operation and function of diodes in the following circuits: clippers, clamps, full and half wave rectifiers, bridge rectifiers, voltage doublers and triplers</td>
</tr>
<tr>
<td>• Detailed operation and characteristics of the following devices: silicon controlled rectifier (thyristor), light emitting diode, Schottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topics on transistor must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Transistor symbols</td>
</tr>
<tr>
<td>• Component description and orientation</td>
</tr>
<tr>
<td>• Transistor characteristics and properties</td>
</tr>
<tr>
<td>• Construction and operation of PNP and NPN transistors</td>
</tr>
</tbody>
</table>
- Base, collector and emitter configurations
- Testing of transistors
- Basic appreciation of other transistor types and their uses
- Application of transistors: classes of amplifier (A, B, C)
- Simple circuits including: bias, decoupling, feedback and stabilisation
- Multistage circuit principles: cascades, push-pull, oscillators
- Multivibrators, flip-flop circuits

Topics on integrated circuits must include:
- Description and operation of logic circuits and linear circuits and/or operational amplifiers
- Introduction to operation and function of an operational amplifier used as: integrator, differentiator, voltage follower, comparator
- Operation and amplifier stages connecting methods: resistive capacitive, inductive (transformer), inductive resistive (IR), direct
- Advantages and disadvantages of positive and negative feedback

Topics on printed circuit boards (PCB) must include:

Types of printed circuit boards must include:
- Single-sided printed circuit boards
- Double-sided printed circuit boards
- Multi-layered printed circuit boards
- Composition of a printed circuit board

Fabrication of printed circuit boards must include:
- Subtractive process
- Additive process
- Advantages and disadvantages of PCB
- Uses of PCB

Topics on servomechanisms may include:
- Understanding of the following terms: open and closed loop systems, feedback, follow up, analogue transducers
- Principles of operation and use of the following synchro system components and/or features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters
- Understanding of the following terms: open and closed loop, follow up, servomechanism, analogue, transducer, null, damping, feedback, deadband
- Construction operation and use of the following synchro system components: resolvers, differential, control and torque, E and I transformers, inductance transmitters, capacitance transmitters, synchronous transmitters
- Servomechanism defects, reversal of synchro leads, hunting
## Skill Code
AER-TEF-5040-1.1

## Skill Category
Technical and Engineering Fundamentals

## Skill Sub-Category
(when applicable) N/A

### Skill
Apply Principles of Digital Techniques (Advanced)

### Skill Description
This skill describes the ability to apply in-depth knowledge of digital techniques and electronic instrument systems towards maintenance, repair and/or overhaul of various aircraft systems. It also includes the scope covered in the CAAS SAR-66 Cat B examination.

### Knowledge and Analysis

The ability to understand:

- Electronic instrumentation systems
- Numbering systems
- Data conversion
- Operation of data buses in aircraft systems
- Identification and Application of Common Logic Circuits on Aircraft Systems
- Computer Terminology
- Computers and Hardware in Aircraft Systems
- Fibre Optics
- Operation of Common Displays used on Modern Aircraft
- Handling and Protection of Electrostatic Discharge Sensitive Devices
- Concept of Software Management Control
- Influence of Electromagnetic Environment on Maintenance Practices for Aircraft Electronic Systems
- General Arrangement of Typical Electronic and/or Digital Aircraft Systems and Associated Built In Test Equipment (BITE)
## Application and Adaptation

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identify various electronic instrument systems</td>
</tr>
<tr>
<td>• Interpret the information presented on various electronic instrument systems</td>
</tr>
<tr>
<td>• Perform conversion between different numbering systems</td>
</tr>
<tr>
<td>• Compare the advantages and disadvantages of digital data over analogue data</td>
</tr>
<tr>
<td>• Explain the operation of data buses used in aircraft systems</td>
</tr>
<tr>
<td>• Identify common logic gates and interpret logic diagrams</td>
</tr>
<tr>
<td>• Explain various computer terminology</td>
</tr>
<tr>
<td>• Explain the function of various components used in modern computer based aircraft systems</td>
</tr>
<tr>
<td>• Explain the function of various electronic devices and electronic and/or digital aircraft systems used on aircraft</td>
</tr>
<tr>
<td>• Apply protection and prevention measures for electronic systems and components used on aircraft</td>
</tr>
</tbody>
</table>

## Innovation and Value Creation

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

| N/A |

## Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

<table>
<thead>
<tr>
<th>The ability to:</th>
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</thead>
<tbody>
<tr>
<td>• Apply safe work practices during maintenance work</td>
</tr>
</tbody>
</table>

## Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Elaborate on the information presented on electronic instrument systems</td>
</tr>
<tr>
<td>• Relate the computer technology (as applied in aircraft systems)</td>
</tr>
</tbody>
</table>
## Skills Framework for Aerospace

### Skill Standard for Maintenance Controller/Technical Operations Representative

<table>
<thead>
<tr>
<th>Range of Application</th>
<th>Typical systems arrangements and cockpit layout of electronic instrument systems may include:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Basics of electronic instrumentation system (EIS)</td>
</tr>
<tr>
<td></td>
<td>- Typical cockpit layout</td>
</tr>
<tr>
<td></td>
<td>- Instrument grouping in cockpit</td>
</tr>
<tr>
<td></td>
<td>- Typical systems arrangements for cockpit instrument</td>
</tr>
<tr>
<td></td>
<td>- Cockpit display units and control panels for EICAS</td>
</tr>
<tr>
<td></td>
<td>- System testing relating EIS</td>
</tr>
<tr>
<td></td>
<td>- Engine data on ECAM</td>
</tr>
<tr>
<td></td>
<td>- Electronic Flight Instrument System (EFIS)</td>
</tr>
<tr>
<td></td>
<td>- Electronic Attitude Director Indicator(EADI)</td>
</tr>
<tr>
<td></td>
<td>- Electronic Horizontal Situation Indicator (EHSI)</td>
</tr>
<tr>
<td></td>
<td>- Light sensors</td>
</tr>
<tr>
<td></td>
<td>- Failure annunciations</td>
</tr>
<tr>
<td></td>
<td>- Advantages of Electronic Instrument Systems</td>
</tr>
</tbody>
</table>

### Range of Application

*It refers to the critical circumstances that the skill may be demonstrated.*

Numbering systems used for aircraft electronic instrumentation system must include:

- Decimal, binary, octal and hexadecimal systems
- Conversions between the various numbering systems above

Topics on data conversion operations must include:

- Comparison between analogue and digital data
- Operation and application of analogue to digital and digital to analogue converters
- Types of inputs
- Types of outputs
- Limitations of data conditions

Knowledge of ARINC and other specifications may include:

- Data transmission on data buses
- ARINC specifications including ARINC and ARINC 629
- Aircraft network and/or ethernet

Identification of common logic gate symbols, tables and equivalent circuits must include:

- Identification of common logic gates like AND, OR, INVERTER, NAND, NOR, EX-OR
- NAND NOR equivalents
- Variations of basic gates
- Positive and/or negative logic
- Common logic circuit functions
- Applications used for aircraft systems, schematic diagrams.
- Interpretation of logic diagrams

Computer terminology may include:

- RAM (Random Access Memory)
SKILLS FRAMEWORK FOR AEROSPACE
SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE

- Read Only Memory (ROM)
- Programmable Read- Only Memory (PROM)
- Erasable Programmable Read- Only Memory (EPROM)

Computer technology (as applied in aircraft systems) may include:
- Usage of various types of computers in aircraft system
- Dedicated airplane computers
- Typical airplane computer systems
- Types of computers
- Program configuration control
- Computer related terminology
- Operation, layout and interface of the major components in a microcomputer including their associated bus systems
- Information contained in single and multi-address instruction words
- Memory associated terms
- Operation of typical memory devices
- Operation, advantages and disadvantages of the various data storage systems

Topics on microprocessors may include:
- Functions performed and overall operation of a microprocessor
- Basic operation of each of the following microprocessor elements: control and processing unit, clock, register, arithmetic logic unit

Topics on integrated circuits may include:
- Operation and use of encoders and decoders
- Function of encoder types
- Uses of medium, large and very large scale integration

Topics on multiplexing may include:
- Operation, application and identification in logic diagrams of multiplexers and demultiplexers.

Topics on fibre optics in aircraft systems must include:
- Advantages and disadvantages of fibre optic data transmission over electrical wire propagation
- Fibre optic data bus
- Fibre optic related terms
- Termination
- Couplers, control terminals, remote terminals
- Handling of Fibre Optic cables
- Application of fibre optics in aircraft systems

Principles of operation of common types of displays used in modern aircraft may include:
- Forms of data displays
- Cathode ray tubes
- Alphanumeric displays
- Display configurations
- Light emitting diodes
- Liquid crystal display

Special handling of components sensitive to electrostatic discharges may include:
- Procedures for removal and installation of ESDS metal encased units
- Procedures for removal and installation of ESDS electronic cards
- Basic rules for static protection

Awareness of risks and possible damage, component and personnel anti-static protection devices may include:
- Causes of electrostatics
- Electrostatic discharge sensitive devices (ESDS)
- ESDS device damage and/or failure

Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes may include:
- Fault tolerant software
- Software certification
- Software management
- Software revision
- Software as a part
- Loadable software
- Operational Program Software
- Operational Program Configuration
- Airline Modifiable Information (AMI)

Effect of electromagnetic environment on maintenance for electronic system must include:
- EMC – Electromagnetic Compatibility
- EMI – Electromagnetic Interference
- HIRF – High Intensity Radiated Field
- Lightning and/or lightning protection

General arrangement of typical electronic and/or digital aircraft systems and associated BITE (Built In Test Equipment) testing which may include:
- ACARS – ARINC Communication and Addressing
- Reporting System
- ECAM – Electronic Centralised Aircraft Monitoring
- EFIS – Electronic Flight Instrument System
- EICAS – Engine Indication and Crew Alerting System
- FBW – Fly by Wire
- FMS – Flight Management System
| • GPS – Global Positioning System      |
| • IRS – Inertial Reference System     |
| • TCAS – Traffic Alert Collision Avoidance System |
| • Integrated Modular Avionics         |
| • Cabin Systems                      |
| • Information Systems                |
### Skill Code
AER-TEF-5041-1.1

### Skill Category
Technical and Engineering Fundamentals

### Skill Sub-Category
N/A

### Skill
Select Aerospace Materials and Hardware (Advanced)

### Skill Description
This skill describes the ability to select advanced aerospace materials and hardware used for aircraft maintenance, repair and overhaul in accordance with applicable OEMs’ maintenance manuals and organisational procedures.

### Knowledge and Analysis

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

<table>
<thead>
<tr>
<th>The ability to understand:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Characteristics, properties and identification of aircraft materials</td>
</tr>
<tr>
<td>- Chemical fundamental and characteristics of corrosion</td>
</tr>
<tr>
<td>- Types of fasteners and their application</td>
</tr>
<tr>
<td>- Types of pipes and unions and their application</td>
</tr>
<tr>
<td>- Characteristics and usage of springs on aircraft</td>
</tr>
<tr>
<td>- Characteristics and usage of bearings</td>
</tr>
<tr>
<td>- Characteristics and usage of mechanical transmission devices used on aircraft</td>
</tr>
<tr>
<td>- Characteristics and usage of control cables and cable systems used on aircraft</td>
</tr>
<tr>
<td>- Characteristics and construction of various types of electrical cables and connectors used on aircraft</td>
</tr>
</tbody>
</table>

### Application and Adaptation

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

<table>
<thead>
<tr>
<th>The ability to:</th>
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</thead>
<tbody>
<tr>
<td>- Identify the different types of material used in aircraft construction</td>
</tr>
<tr>
<td>- Determine appropriate heat treatment methods and mechanical tests for metals</td>
</tr>
<tr>
<td>- Apply general composite and non-metallic structure repair procedures</td>
</tr>
<tr>
<td>- Analyse the use of appropriate corrosion preventive control methods</td>
</tr>
<tr>
<td>- Determine appropriate components and systems used on aircraft</td>
</tr>
</tbody>
</table>
### Innovation and Value Creation

**It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.**

| **N/A** |

### Social Intelligence and Ethics

**It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.**

| **The ability to:** |
| --- | --- |
| • Collaborate with co-workers for on time completion of all maintenance, repair and overhaul tasks as appropriate. |
| • Report to supervisor on completion of each stage of inspection in accordance with organisational requirements. |
| • Reinstate work area in accordance with organisational housekeeping requirements. |

### Learning to Learn

**It refers to the ability to develop and improve one’s self within and outside of one’s area of work.**

| **N/A** |

### Range of Application

**It refers to the critical circumstances that the skill must be demonstrated.**

<table>
<thead>
<tr>
<th><strong>Characteristics, properties and identification of common alloy steels used in aircraft must include:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Metals and their properties</td>
</tr>
<tr>
<td>• Metal working processes</td>
</tr>
<tr>
<td>• Alloying agents in steel</td>
</tr>
</tbody>
</table>

**Heat treatment and application of alloys steels must include:**

<table>
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</thead>
<tbody>
<tr>
<td>• Heat treatment of steel</td>
</tr>
<tr>
<td>• Case hardening</td>
</tr>
<tr>
<td>• Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance</td>
</tr>
</tbody>
</table>

**Characteristics, properties and identification of common non-ferrous materials used in aircraft must include:**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>• Non-ferrous metals and their usage</td>
</tr>
<tr>
<td>• Alloying agents in aluminium</td>
</tr>
</tbody>
</table>

**Heat treatment and application of non-ferrous materials must include:**

<table>
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</thead>
<tbody>
<tr>
<td>• Heat treatment of aluminium alloys</td>
</tr>
<tr>
<td>• Identification of heat treated alloys</td>
</tr>
<tr>
<td>• Strain hardening</td>
</tr>
<tr>
<td>• Non heat treatable alloys</td>
</tr>
</tbody>
</table>
- Heat treatable alloys
- Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance

Repair of composite and non-metallic material must include:
- Glass fibre reinforced composite repairs (GFRP)
- Storage of GFRP
- Preparation for repair
- Typical composite repair procedures
- Composite and non-metallic materials

Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft must include:
- Composite elements
- Fibre science
- Fibre orientation
- Fabric styles
- Fabric weaves
- Matrix systems
- Pre impregnated materials
- Fillers
- Metal matrix composites
- Core materials
- Types of fibre reinforced composites
- Factors affecting mechanical properties of reinforced plastics
- Transparent plastic panels
- Wood
- Fabric

Sealant and bonding agents must include:
- Adhesives
- Seals and gaskets
- Sealing compounds
- Bonding agents
- Detection of defects and/or deterioration in composite and non-metallic material (Cat B1) must include:
- Assessment and repair of defects in composite and non-metallic materials
- Inspection methodology
- Types of damages

Determine appropriate heat treatment methods and mechanical tests for metals which must include:
- Mechanical test for hardness, tensile strength, fatigue strength and impact resistance

Apply general composite and non-metallic structure repair procedures which must include:
- Characteristics of composite and other non-metallic materials
- Appropriate defects detection methods
- Extent of defects and determine if they are within manual’s limits
- Appropriate repair methods

Analyse the use of appropriate corrosion preventive control methods which must include:
- Types of corrosion formation and their characteristics
- Corrosion defects assessment
- Appropriate corrosion preventive control

Chemical fundamentals must include:
- Causes of corrosion
- Indications of corrosion
- Corrosion and structural strength
- Forms of corrosion

Formation by, galvanic action process, microbiological, stress must include:
- Types of corrosion

Types of corrosion and their identification must include:
- Identification of corrosion
- Types of corrosion

Causes of corrosion must include:
- Contributing causes of corrosion

Material types, susceptibility to corrosion must include:
- Corrosion prevention
- Maintenance procedures for corrosion control
- Detection of corrosion
- Corrective action for corrosion

Aircraft fasteners and springs for aircraft must include:
- Different types of fasteners and springs
- Nomenclature and applications of fasteners and springs
- Features of common screw thread found in aircraft fasteners
- Appropriate fasteners and springs based on their characteristics and applications

Common international thread standards must include:
- Screw nomenclature
- Thread forms, dimensions and tolerances for standard threads used in aircraft
- Measuring screw threads

Bolts, studs and screws must include:
- Bolt types: specification, identification and marking of aircraft bolts, international standards
- Nuts: self-locking, anchor, standard types
- Screws: machine screws, structural screws, self-tapping screws
- Studs: types and uses, insertion and removal
- Dowels and pins

Locking devices must include:
- Tab and spring washers, locking plates, split pins, pal-nuts, wire locking, quick release fasteners, keys, circlips, cotter pins
- Aircraft rivets must include types of solid and blind rivets, their specifications, identification, heat treatment and storage

Types of springs, materials, characteristics and applications must include:
- Spring characteristics
- Spring types
- Typical uses and application of springs
- Inspection and testing of springs

Pipes and unions used on aircraft must include:
- Different types of pipes and their connectors used
- Application of standard unions
- Appropriate pipes and unions fasteners based on their applications
- Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes

Identification of, and types of rigid and flexible pipes and their connectors used in aircraft must include:
- Identification of fluid lines
- Hoses (flexible fluid lines)
- Synthetic materials and their uses
- Fluid lines and fittings
- Protective sleeves for hoses
- Standard practices for hoses
- Plumbing connectors
- Flexible connectors
- Installation practices

Bearings, transmissions and control cables used on aircraft must include:
- Different types of bearing, transmissions and control cables
- Construction, material and accessories of bearings, transmission system and control cables
- Gear systems and its sub-components
- Flight control systems and its sub-components
- Appropriate bearings, transmissions and control cables based on their applications
## Handling, installation and maintenance of bearings must include:
- Purpose of bearings, loads, material and construction
- Types of bearings and their application must include:
  - Types of bearings
  - Advantages and/or disadvantages of ball and roller anti-friction bearings
  - Typical applications of ball and roller bearings
  - Bearing seals
  - Handling, installation and maintenance

## Topics on transmissions used in aircraft must include gear types and their application must include:
- Terms used in gearings
  - Types of gears
  - Inspection of gears

## Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns must include:
- Gear train and their classification
- Gear ratio

## Belts and pulleys, chains and sprockets must include:
- Belt materials
- Pulleys for flat belts
- V belt pulleys
- Timing belt pulleys
- Chains and their specifications
- Chain assemblies and installation
- Inspection and preventive maintenance of chain assemblies

## Pulleys and cable system components must include:
- Cable system maintenance
- Cable inspection and check
- Bowden cables
- Aircraft flexible control systems must include:
  - Telefex control systems

## Electrical cables and connectors for use on aircraft electrical systems must include:
- Different types of cables and their identification codes
- Construction and characteristics of cables
- Appropriate connectors, pins, plugs, sockets, insulators based on the current and voltage rating
- Correct crimping procedure

## Types of cables must include:
- Cable material
• Cable construction

Proper use of right type of connectors and cables are essential and must include:
• 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
### Skill Code
AER-TEF-5043-1.1

### Skill Category
Technical and Engineering Fundamentals

### Skill Sub-Category
(Where applicable) N/A

### Skill
Perform Aerospace Maintenance Practices (Advanced)

### Skill Description
This skill describes the ability to perform aircraft maintenance practices using appropriate tools, equipment and methods in accordance with applicable technical manuals and organisational procedures.

#### Knowledge and Analysis

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

The ability to understand:
- Safety precautions and working practices when working on aircraft and related work areas
- Policies and procedures for proper tool usage
- Types of tools and equipment used for aircraft maintenance
- Types of engineering drawings, diagrams and standards
- Definition for fits and clearance
- Installation and testing techniques involving electrical cables and connectors
- Guidelines and techniques for maintenance, handling, joining and fusing for aircraft material
- Aircraft weight and balance procedures
- Aircraft handling and storage procedures
- Aircraft defects and rectification methods
- Inspection techniques after abnormal events
- Production planning control for aircraft maintenance

#### Application and Adaptation

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

The ability to:
- Select appropriate safety precautions and safe practices when working in or around aircraft and in workshop
- Select appropriate workshop practices and utilize common tools and equipment for maintenance work
- Interpret engineering drawings, diagrams and standards
- Perform aircraft components or systems removal and installation
- Apply appropriate aircraft maintenance procedures during rectification work
## Innovation and Value Creation

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

| N/A |

## Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

| The ability to:  
| Interact with co-workers and clear doubts while performing aircraft maintenance task.  
| Cooperate with co-workers when performing maintenance tasks involving work teams.  
| Report to relevant authorities according to organisational procedures on identifying faulty or damaged tools and equipment.  
| Report to relevant authorities according to organisational procedures on identifying damage to aircraft.  
| Report to supervisor on completion of component removal from or installation to aircraft in accordance with organisational requirements.  
| Reinstate work area in accordance with organisational housekeeping requirements. |

## Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

| N/A |

## Range of Application

*It refers to the critical circumstances that the skill may be demonstrated.*

| Select appropriate safety precautions and safe practices when working in or around aircraft and in workshop must include:  
| Procedures and precautions to be taken for a particular work process, including the choice of tools and equipment required.  
| Safety precautions against maintenance manual or organisational procedure.  
| Select appropriate workshop practices and utilize common maintenance tools and equipment when working on aircraft and in workshop must include:  
| Workshop practices for flight line or workshop environment.  
| Appropriate maintenance tools and equipment for a particular maintenance work (hand, power and precision measuring tools; electrical and/or avionic general test equipment).  
<p>| Functions and usage of electrical and/or avionic general test equipment. |</p>
<table>
<thead>
<tr>
<th>Interpret engineering drawings, diagrams and standards must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Nature and purpose of the various types of aircraft drawings and diagrams</td>
</tr>
<tr>
<td>• Details of engineering drawings</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perform aircraft components or systems removal and installation must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Maintain appropriate fits and clearances must include:</td>
</tr>
<tr>
<td>o Interference, transition and clearance fits and its applications</td>
</tr>
<tr>
<td>o Methods for checking shafts, bearing and other parts</td>
</tr>
<tr>
<td>• Apply correct maintenance techniques on electrical cables and connectors must include:</td>
</tr>
<tr>
<td>o Types of techniques and testing used for continuity, insulation and bonding.</td>
</tr>
<tr>
<td>o Procedure for the usage of crimping tools</td>
</tr>
<tr>
<td>o Methods for the connection pins replacement and crimping joint testing</td>
</tr>
<tr>
<td>o Wiring protection techniques</td>
</tr>
<tr>
<td>• Apply proper riveting practices must include:</td>
</tr>
<tr>
<td>o Various riveting techniques</td>
</tr>
<tr>
<td>o General riveting criteria and common riveting defects</td>
</tr>
<tr>
<td>• Perform maintenance on pipes, hoses, springs, bearings, transmission devices and control cables must include:</td>
</tr>
<tr>
<td>o Installation techniques and criteria for pipes and hoses, including commonly found defects</td>
</tr>
<tr>
<td>o Types of end fittings and cable</td>
</tr>
<tr>
<td>o Defects and maintenance requirements for springs, bearing and transmission devices</td>
</tr>
<tr>
<td>• Perform aircraft material handling must include:</td>
</tr>
<tr>
<td>o Techniques and steps required for inspection and manufacturing of sheet metal, non-metallic and composite material</td>
</tr>
<tr>
<td>o Inspection methods</td>
</tr>
<tr>
<td>• Apply appropriate type of welding, brazing, soldering and metal bonding techniques must include:</td>
</tr>
<tr>
<td>o Welding, brazing, soldering and metal bonding process and equipment used</td>
</tr>
<tr>
<td>o Correct welding, brazing, soldering and bonding practices</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Apply appropriate aircraft maintenance procedures during rectification work must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plan aircraft weighing and balancing procedures must include:</td>
</tr>
<tr>
<td>o Weighing and balancing procedures and practices</td>
</tr>
<tr>
<td>• Identifying the steps required for aircraft ground handling, e.g. towing, jacking, refuelling etc., and storage, e.g. preservation of aircraft and engine, including the necessary precautions, personnel, tooling and equipment requirements</td>
</tr>
<tr>
<td>• Identifying the nature of various abnormal events and the associated phases and areas of inspection</td>
</tr>
</tbody>
</table>
• Determining production planning control measures needed to support proper maintenance, including documentation, store procedures for spares, quality checks, etc.
• Determining maintenance process in accordance with aircraft maintenance manual which include:
  o Disassembly, inspection, repair and assembly techniques
  o Verifying certifications and/or release procedures for aircraft maintenance in respective maintenance stations.

Safety precautions while working on aircraft and in workshop must include:
• Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. must include:
  o Electrical safety
  o Radiation hazards
  o Hazard communication programme
  o Material safety data sheet (MSDS)
  o Safety around compressed gases
  o Safety around machine tools
  o Welding safety
  o Fire safety
• Prevention of fire on the ground
• Precautions prior to fuelling
• Precautions during fuel transfer
• Precautions after fuelling
• Work on aircraft during fuelling
• Work in hangar
• Maintenance and fire prevention
• Engine running precautions
• Fire protection and safety
• Types of fires and fire extinguishers
• Instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards must include:
  o Emergency response procedure

Good workshop practice must include:
• Care of tools, control of tools, use of workshop materials
• Dimensions, allowances and tolerances, standards of workmanship
• Calibration of tools and equipment, calibration standards must include:
  o Test equipment and tool calibration schedule
  o Calibration labels
  o Environmental control

Topics on tools must include:
• Common hand tool types
• Common power tool types
• Operation and use of precision measuring tools
• Lubrication equipment and methods
• Operation, function and use of electrical general test equipment which must include:
  o Ratings and terms
  o Various electrical measuring instruments

Avionic general test equipment must include:
• Operation, function and use of avionic general test equipment

Engineering drawings, diagrams and standards must include:
• Drawing types and diagrams, their symbols, dimensions, tolerances and projections must include:
  o Types of engineering drawings
  o Logical flow charts
  o Pictorial and schematic diagrams
  o Electrical wiring diagram
  o Types of illustration projection drawings
  o Geometric tolerance
  o Dimensioning
  o Lines and their meanings
  o Standards and specifications
• Identifying title block information must include:
  o Scale of drawing
  o Material used
  o Part Number
  o Number of part
  o Drawing Number
• Microfilm, microfiche and computerised presentations
• Specification 100 of the Air Transport Association (ATA) of America must include:
  o Various manuals used for aircraft maintenance purposes
• Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL must include:
  o Standards organisation and regulatory organisation
• Wiring diagrams and schematic diagrams must include:
  o Purpose and features of electrical wiring diagram
  o Standard Wiring Practices Manual (SWPM)
  o Electrical Standards Practices Manual (ESPM)

Fits and Clearances must include:
• Drill sizes for bolt holes, classes of fits
• Common system of fits and clearances
• Schedule of fits and clearances for aircraft and engines
• Limits for bow, twist and wear
• Standard methods for checking shafts, bearings and other parts

Electrical Wiring Interconnection System (EWIS) must include:
### SKILLS FRAMEWORK FOR AEROSPACE

#### SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE

<table>
<thead>
<tr>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Continuity, insulation and bonding techniques and testing</td>
</tr>
<tr>
<td>- Use of crimp tools: hand and hydraulic operated</td>
</tr>
<tr>
<td>- Testing of crimp joints</td>
</tr>
<tr>
<td>- Connector pin removal and insertion</td>
</tr>
<tr>
<td>- Co-axial cables: testing and installation precautions</td>
</tr>
<tr>
<td>- Identification of wire types, their inspection criteria and damage tolerance</td>
</tr>
<tr>
<td>- Wiring protection techniques: cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding</td>
</tr>
<tr>
<td>- EWIS installations, inspection, repair, maintenance and cleanliness standards</td>
</tr>
</tbody>
</table>

**Material and hardware (B1 only) must include:**

- **Riveting which must include:**
  - Riveted joints, rivet spacing and pitch
  - Tools used for riveting and dimpling
  - Inspection of riveted joints.

- **Pipes and hoses which must include:**
  - Bending and belling and/or flaring aircraft pipes must include:
    - Fluid lines and materials used
    - Size designations
    - Joining method of rigid tubing and tube flaring
    - Different types of fitting
  - Inspection and testing of aircraft pipes and hoses
  - Installation and clamping of pipes must include:
    - Installation of flexible hose and rigid tubing
    - Installation and maintenance of rigid pipes
  - Springs which must include:
    - Inspection and testing of springs
  - Bearings which must include:
    - Testing, cleaning and inspection of bearings
    - Lubrication requirements of bearings
    - Defects in bearings and their causes

- **Transmissions which must include:**
  - Inspection of gears and backlash which must include:
    - Inspection of gear wheel
    - Inspection of installed chain assembly
  - Inspection of belts and pulleys, chains and sprockets which must include:
    - Inspection of belt drive assembly
  - Inspection of screw jacks, lever devices, push-pull rod systems.
  - Control Cables which must include:
    - Swaging of end fittings
    - Inspection and testing of control cables
    - Bowden cables; aircraft flexible control systems
**Topics on Material Handling must include:**
- Sheet metal work which must include
  - Marking out and calculation of bend allowance
  - Sheet metal working, including bending and forming
    - *Inspection of sheet metal work*
- Composite and non-metallic which must include:
  - Bonding practices
  - Environmental conditions
  - Inspection methods
- Welding, brazing, soldering and bonding (Applicable to B1 and B2) must include:
  - Soldering methods; inspection of soldered joints
  - Welding and brazing methods
  - Inspection of welded and brazed joints
  - Bonding methods and inspection of bonded joints

**Centre of gravity and/or balance limits calculation must include:**
- Use of relevant documents which
- Recording data and calculations
- Preparation of aircraft for weighing

**Aircraft weighing which must include:**
- Rework and rebalancing
- Aircraft weighting procedures

**Aircraft handling and storage must include:**
- Aircraft towing and associated safety precautions
- Aircraft jacking, chocking, securing and associated safety precautions which must include:
  - Jacking of aircraft
  - Shoring of aircraft
- Aircraft storage methods
- Refuelling and/or de-fuelling procedures
- De-icing and/or anti-icing procedures
- Electrical, hydraulic and pneumatic ground supplies
- Effects of environmental conditions on aircraft handling and operation which must include:
  - Parking (high wind) maintenance practices
  - Parking (prolonged) maintenance practices
  - Tying down or mooring aircraft

**Disassembly, inspection, repair and assembly techniques must include:**
- Types of defects and visual inspection techniques; Corrosion removal, assessment and re-protection which must include:
  - Visual inspection for corrosion of aircraft components
  - Definitions of inspection levels
  - Basic corrosion removal techniques for various materials
Corrosion protection for various materials
  - Corrosion preventive maintenance
- General repair methods, structural repair manual;
- Ageing, fatigue and corrosion control programmes which must include:
  - Structural repair methods
  - Faring or blending of reworked areas
- Non-destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods
- Disassembly and re-assembly techniques.
- Troubleshooting techniques

Topics on abnormal events must include:
- Inspections following lightning strikes and High intensity radiated field (HIRF) penetration
- Inspections following abnormal events such as heavy landings and flight through turbulence

Topics on maintenance procedures must include:
- Maintenance planning
- Modification procedures
- Stores procedures which must include
  - Inventory management

Certification and/or release procedures which must include:
- Certification and/or release procedures in line maintenance station and hanger
- Interface with aircraft operation
- Maintenance Inspection and/or Quality Control and/or Quality Assurance
- Additional maintenance procedures which must include:
  - Common labels used in maintenance
  - Maintenance task documentation procedure
  - Maintenance records of aircraft and/or engines and/or components
  - Control of life limited components
### Skill Standard for Maintenance Controller/Technical Operations Representative

**Skill Code**  
AER-TEF-5045-1.1

**Skill Category**  
Technical and Engineering Fundamentals

**Skill Sub-Category**  
(where applicable) N/A

<table>
<thead>
<tr>
<th>Skill</th>
<th>Skill Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply Principles of Aerodynamics (Advanced)</td>
<td>Apply principles of aerodynamics to understand the effects of atmospheric factors, aerofoil and structural characteristics on aircraft flight performance from take-off to climb, cruise, manoeuvres, descend and landing.</td>
</tr>
</tbody>
</table>

#### Knowledge and Analysis

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

The ability to understand:
- Atmospheric factors affecting flight performance
- Aerodynamic concepts and aerofoil characteristics
- Types of ground anti-icing and de-icing on aerofoil
- Theory of flight at various flight phase and manoeuvre
- Conditions that will impact flight stability and dynamics

#### Application and Adaptation

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

The ability to:
- Identify the relationship between atmospheric factors and how they affect flight performance
- Determine the concepts of aerodynamic affecting aerofoil development and selection
- Differentiate the aerodynamics forces experienced by an aeroplane experience during a flight
- Review the performance improvement methods to an aeroplane affected by aerodynamics during a flight

#### Innovation and Value Creation

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

The ability to:
- Propose appropriate hardware and/or software to simulate flight conditions and aerodynamics forces acting on an aeroplane during various manoeuvres.
### Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

The ability to:
- Discuss with co-workers on the principles of flight to gain a better understanding of aircraft performance.
- Report to supervisor on completion of each stage of inspection in accordance with organisational requirements.
- Reinstate work area in accordance with organisational housekeeping requirements.

### Learning to Learn

*N/A*

### Range of Application

*It refers to the critical circumstances that the skill may be demonstrated.*

**Physics of the Atmosphere must include:**
- International Standard Atmosphere (ISA), application to aerodynamics

**Aerodynamics must include:**
- Airflow around a body may include:
  - Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, up-wash and downwash, vortices, stagnation
  - The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio
  - Thrust, weight, aerodynamic resultant
  - Generation of lift and drag: angle of attack, lift coefficient, drag coefficient, polar curve, stall
  - Aerofoil contamination including ice, snow, frost

**Theory of Flight must include:**
- Relationship between lift, weight, thrust and drag
- Glide ratio
- Steady state flights, performance must include:
- Steady, straight and level flight
- Theory of the turn
- Influence of load factor: stall, flight envelope and structural limitations
- Lift augmentation

**Flight Stability and Dynamics must include:**
- Longitudinal, lateral and directional stability (active and passive)
## SKILLS FRAMEWORK FOR AEROSPACE
**SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE**

<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-TEF-5047-1.1</th>
<th>Skill Category</th>
<th>Technical and Engineering Fundamentals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skill</strong></td>
<td>Apply Human Factors Principles</td>
<td><strong>Skill Sub-Category</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Skill Description</strong></td>
<td>Apply human factors principles namely; physical and mental performance abilities and limitations, social psychology and human behaviours, definition of human error and its implications, physical environment, performance shaping factors, effective communication, etc. to minimise errors in the workplace.</td>
<td><strong>Knowledge and Analysis</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge and Analysis</strong></td>
<td>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</td>
<td>The ability to understand:</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>• Human factors principles and its application in the aviation industry</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Pertinent physical and mental performance abilities and limitations</td>
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<tr>
<td></td>
<td></td>
<td>• Relationship between social psychology and human behaviours</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Effects of internal and external performance shaping factors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Influence of physical environment on human performance</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Characteristics of various maintenance tasks and their associated human factors consideration</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Essence of effective communication</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Definition of human error and its implications</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Nature of hazards in different work settings</td>
<td></td>
</tr>
<tr>
<td><strong>Application and Adaptation</strong></td>
<td>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</td>
<td>The ability to:</td>
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<tr>
<td></td>
<td></td>
<td>• Determine human factors contribution to aviation accidents</td>
<td></td>
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<td></td>
<td></td>
<td>• Illustrate how human factors (physiological, psychological, environmental and organizational parameters) can affect safety and performance</td>
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<tr>
<td></td>
<td></td>
<td>• Explain the nature of errors and violation</td>
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<td></td>
<td></td>
<td>• Propose countermeasures based on the error management principles</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Identify hazards in the workplace</td>
<td></td>
</tr>
<tr>
<td><strong>Innovation and Value Creation</strong></td>
<td>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</td>
<td>The ability to:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Propose a shift handover procedure to minimise commission of possible errors in the next shift.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Propose measures to improve fitness and health of aircraft maintenance personnel.</td>
<td></td>
</tr>
<tr>
<td><strong>Social Intelligence and Ethics</strong></td>
<td>The ability to:</td>
<td></td>
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<tr>
<td>---------------------------------</td>
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</tr>
<tr>
<td>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</td>
<td>• Interact with co-workers to clear doubts while performing aircraft maintenance activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Brief take-over shift personnel of maintenance, service and/or repair works in progress to minimise commission of possible errors during the next shift</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Report to supervisor on completion of the service and/or repair of aircraft electrical equipment and accessories in accordance with organisational requirements</td>
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<tr>
<td></td>
<td>• Reinstate work area in accordance with organisational housekeeping requirements</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Learning to Learn</strong></th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</td>
<td>In general the range may include:</td>
</tr>
<tr>
<td></td>
<td>• Relationship between human factors and accidents and/or incidents</td>
</tr>
<tr>
<td></td>
<td>• SHEL Model</td>
</tr>
<tr>
<td></td>
<td>• Examples of significant incidents and/or accidents</td>
</tr>
<tr>
<td></td>
<td>• Error chain</td>
</tr>
<tr>
<td></td>
<td>• Murphy’s law</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Range of Application</strong></th>
<th>Human performance and limitations may include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the critical circumstances that the skill may be demonstrated.</td>
<td>• Anatomy and functions of the eye and ear</td>
</tr>
<tr>
<td></td>
<td>• Factors affecting sight and hearing</td>
</tr>
<tr>
<td></td>
<td>• Information processing model encompassing capturing of sensory data, perception, decision making etc.</td>
</tr>
<tr>
<td></td>
<td>• Characteristics of long term and short term memory</td>
</tr>
<tr>
<td></td>
<td>• Claustrophobia and vertigo</td>
</tr>
</tbody>
</table>

Social psychology factors must include: |
• Underlying factors within a social system of work |
• Individual and group/team responsibilities |
• Maslow’s hierarchy of needs |
• Motivating and de-motivating factors |
• Peer pressure and conformity |
• Safety and social culture within the aviation maintenance industry |
• Concept and elements of teamwork |
• Advantages and disadvantages of teamwork |
• Roles, skills set and other characteristics of a team leader |
• Development of Maintenance Resource Management (MRM) |

Human factors affecting performance parameters in aviation maintenance may include:
• Measures to improve fitness and health of personnel
• Causes and symptom of domestic and work related stress
• Stress management techniques
• Effects of time pressure and deadlines
• Optimum level and complexity of workload
• Five stages of sleep
• Circadian rhythms influencing rest pattern
• Symptoms of fatigues
• Impacts of alcohol, medication and drugs
• Advantages and disadvantages of shift work

Physical environmental factors for consideration must include:
• Detrimental effects of excessive noise, fumes, poor illumination, unfavourable climatic and temperature conditions, distracting motion and prolonged vibration
• Importance of workplace layout, cleanliness and tidiness shop floor, PPE requirements and proper management of stores
• Constraints to consider for physically demanding and repetitive tasks as well as those involving visual inspection and complex system

Various means of communication may include:
• Verbal and Written Communication
• Non-verbal Communication
• Shift handover
• Group dynamics
• Various forms of communication problems
• Appropriate documenting of work
• Recurrent training

Human errors at work may include:
• Design versus operator-induced errors
• Variable versus constant errors
• Variances between slips, lapses and mistakes
• Differences between errors and violation
• Skill, Rule and Knowledge-Based Behaviours and related outcomes
• Latent failure versus active failure
• Defences barriers to break the chain of accidents
• Various forms of violations
• Errors due to individual practices and habits
• Errors associated with visual inspection
• Main causes of maintenance incidents
• Purposes of safety management system
• Reactive (e.g. maintenance error decision aid) and proactive (e.g. error reduction kit, self-reporting programme etc.) error management system

Hazards in the workplace must include:
Potential hazards associated with various maintenance environments and tasks
- Applicable rules and guidelines imposed by relevant approved regulatory bodies
- Individual health and safety responsibilities toward self and others

Rules and regulations must be followed as per the current directive includes:
- Workplace Safety and Health Act
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>Skill Category</th>
<th>Workplace Safety and Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-WSH-4005-1</td>
<td>Skill Sub-Category (where applicable)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Skill Title**
Supervise Manufacturing Work for Workplace Safety and Health

**Skill Description**
This skill describes the ability to identify common safety and health hazards and take appropriate control measures while working in the metal working or other manufacturing industry. It also includes the ability to identify WSH hazards, evaluate and control risks, carry out WSH inspections, implement WSH training and promotional programmes, conduct accident investigations and prepare reports.

**Knowledge and Analysis**
It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.

The ability to understand:
- Importance of Workplace Safety and Health (WSH)
- Consequences of unsafe work practices and workplace conditions
- Salient WSH legal and other requirements relevant to manufacturing industry
- Overview of WSH management system
- WSH duties and responsibilities of supervisor in the manufacturing industry
- Risk management process
- Typical hazards in manufacturing industry
- Methods for hazard identification
- WSH control measures
- 5S housekeeping
- Types of organisational WSH inspections
- WSH training and promotional programmes
- Incident investigation and reporting
- Permit-To-Work (PTW)

**Application and Adaptation**
It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.

The ability to:
- Identify WSH hazards, evaluate and control risks in manufacturing industry in accordance with risk management process
- Carry out WSH inspections in accordance with organisational inspection procedures
- Implement WSH training and promotional programmes in accordance with legal and other organisational requirements
- Conduct incident investigation and prepare report in accordance with legal and other organisational requirements
| **Innovation and Value Creation**  
*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.* | The ability to:  
- Provide constructive suggestions to evaluate WSH hazards at the workplace  
- Contribute ideas to improve desired outcomes of process, human and cultural factors and workplace or work-related factors in accordance to legal and organisational requirements |
| --- | --- |
| **Social Intelligence and Ethics**  
*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.* | The ability to:  
- Identify the unsafe acts or conditions present and recommend corrective actions to management |
| **Learning to Learn**  
*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.* | The ability to:  
- Reflect on possible errors in evaluating risks  
- Keep up-to-date on changes in the Workplace Safety and Health Act |
| **Range of Application**  
*(where applicable)*  
*It refers to the critical circumstances that the skill may be demonstrated.* | Tools and equipment must include:  
- Workplace Safety and Health signage  
- Personal protective equipment  
Procedures and supporting documents must include:  
- Appropriate work documents  
- Work instructions  
- Organisation work procedures and specifications  
Rules and regulations must include:  
- Workplace Safety and Health Act  
- Approved codes of practice |
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-QUA-3138-1.1</th>
<th>Skill Category</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td>Quality Management System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill</td>
<td>Implement Quality Procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill Description</td>
<td>This skill describes the ability to apply, maintain and supervise internal quality systems, external suppliers and quality control record systems, reviewing procedures to provide solutions to quality improvement, identifying and selecting quality suppliers and developing and maintaining quality control record systems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge and Analysis</td>
<td>The ability to understand:</td>
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</tr>
<tr>
<td></td>
<td>- Sources of quality assurance information and advice</td>
<td></td>
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<tr>
<td></td>
<td>- Application of quality concepts to problem solving and quality data collection and analysis and outcomes</td>
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<tr>
<td></td>
<td>- Processes required for quality and continuous improvement</td>
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<tr>
<td></td>
<td>- Quality non-conformities and issues</td>
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<td></td>
<td>- Customer specification for quality conditions and indication</td>
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<tr>
<td></td>
<td>- Relevant quality standards, regulations, and customer requirements</td>
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<tr>
<td></td>
<td>- Interview process for the selection of suppliers</td>
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<tr>
<td></td>
<td>- Quality goals and specifications to suppliers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Documentation requirements of quality</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Systems including the requirement for effective quality record keeping systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application and Adaptation</td>
<td>The ability to:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Supervise, monitor and improve quality procedures</td>
<td></td>
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<tr>
<td></td>
<td>- Develop quality assurance systems for external suppliers</td>
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<tr>
<td></td>
<td>- Maintain quality control record systems</td>
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<tr>
<td></td>
<td>- Record and analyse statistical data on production runs (if applicable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Record and analyse statistical data on defects</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*
## Innovation and Value Creation

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Review quality procedures systematically, to identify opportunities for improvement</td>
</tr>
</tbody>
</table>

## Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Document and communicate quality of materials to selected suppliers</td>
</tr>
<tr>
<td>• Agree and document complaints procedures</td>
</tr>
<tr>
<td>• Note any discrepancies found and report in accordance with organisational procedures</td>
</tr>
</tbody>
</table>

## Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

<table>
<thead>
<tr>
<th>N/A</th>
</tr>
</thead>
</table>

## Range of Application

*It refers to the critical circumstances that the skill may be demonstrated.*

<table>
<thead>
<tr>
<th>Regulations must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Workplace Safety and Health Act</td>
</tr>
<tr>
<td>• Industry codes of practice</td>
</tr>
<tr>
<td>• International quality standards</td>
</tr>
</tbody>
</table>
# SKILLS FRAMEWORK FOR AEROSPACE
## SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE

<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-PIN-5089-1.1</th>
<th>Skill Category</th>
<th>Productivity and Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td>(where applicable)</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

### Skill
Apply Eight Disciplines (8D) Methodology Problem Solving Approach

### Skill Description
This skill describes the ability to apply the Eight Disciplines (8D) methodology for a systematic problem solving including detailed root cause analysis, containment actions, corrective actions and preventive actions in accordance with organisational systems and processes.

### Knowledge and Analysis
It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.

The ability to understand:
- Main components of the “8 Disciplines” approach
- Definitions and process flow of key components
- Application of key components and some common root cause analysis tools
- Formatting the “8 Disciplines” reports
- Factors affecting the effectiveness of different corrective actions
- Implementation of controls and/or systems to sustain the solutions

### Application and Adaptation
It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.

The ability to:
- Identify team members and stakeholders to resolve the technical problems in accordance to organisational systems and processes
- Determine the technical problems with quantifiable terms in accordance to organisational systems and processes
- Implement and verify interim containment actions in accordance to organisational systems and processes
- Develop, choose and verify corrective actions in accordance to organisational systems and processes
- Validate corrective actions in accordance to organisational systems and processes
| **Innovation and Value Creation** | The ability to:  
- Innovate solutions to prevent the recurrence of problems in accordance to organisational systems and processes |
|----------------------------------|---------------------------------------------------------------|
| **Social Intelligence and Ethics** | The ability to:  
- Verify and congratulate the 8D project team |
| **Learning to Learn** | The ability to:  
- Perform self-reflection to identify and verify root causes according to organisational systems and processes |
| **Range of Application** | N/A |

**Innovation and Value Creation**  
It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.

**Social Intelligence and Ethics**  
It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.

**Learning to Learn**  
It refers to the ability to develop and improve one’s self within and outside of one’s area of work.
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>Skill Category</th>
<th>Quality</th>
<th>Skill Sub-Category (where applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-QUA-3009-1</td>
<td>Skill</td>
<td>Quality</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Skill

**Apply Failure Mode and Effect Analysis Techniques**

This skill describes the ability to apply the methods and tools used for identifying and assessing the actual and potential failures in product and process designs. It also includes developing a Design FMEA, gathering FMEA failure information and deciding the corrective actions for each identified failure.

### Knowledge and Analysis

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

The ability to understand:

- **FMEA implementation:** (a) cross functional cooperation, (b) proactive efforts
- **Failure mode, failure effect, cause and current control and prevention relating to the organisation product/design and process flow**
- **Risk Priority Number (RPN) and Severity, Occurrence and Detection (SOD) numbers relating to the industries standard**
- **Use of RPN and/or SOD and identifying major failure modes in accordance to organisation FMEA procedure rating**
- **Difference between Design FMEA and Process FMEA and their respective roles**
- **Steps to developing a Design FMEA:**
  - Role of Design FMEA
  - The 14 steps process towards Design FMEA implementation
  - Setting up a team
  - Analysing the system and define the scope
  - Identifying the customers
- **FMEA purpose and goals:**
  - Situations where FMEA can be applied
  - Common types of FMEA
  - Identifying and analysing failure modes
  - Assessing and prioritising the risks
- **Application of Software FMEA within the context of a Design FMEA**
- **Assumptions in Process FMEA in relation to Design FMEA**
- **Definition of terms for analysing the failure mode**
<table>
<thead>
<tr>
<th>Skill Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application and Adaptation</strong></td>
<td>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</td>
</tr>
<tr>
<td></td>
<td>The ability to:</td>
</tr>
<tr>
<td></td>
<td>• Prepare to apply the design and process of FMEA relating to the organisation FMEA procedure and related industries standard</td>
</tr>
<tr>
<td></td>
<td>• Apply the relevant steps of implementing the Design and Process FMEA techniques related to the industries standard</td>
</tr>
<tr>
<td></td>
<td>• Create relevant diagrams relating to the organisational product and process flow</td>
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<tr>
<td></td>
<td>• Develop the FMEA failure risk measurement for the organisation product/design and process flow activities in accordance with related industries standards</td>
</tr>
<tr>
<td></td>
<td>• Decide the corrective actions for each identified major failure mode and develop the execution plans based on group discussion and decision</td>
</tr>
<tr>
<td></td>
<td>• Perform follow-up and continual maintenance of FMEA document as determined in the organisation FMEA procedure</td>
</tr>
<tr>
<td></td>
<td>• Develop a control plan to manage the product and process risks as indicated in the industries standard</td>
</tr>
<tr>
<td><strong>Innovation and Value Creation</strong></td>
<td>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</td>
</tr>
<tr>
<td></td>
<td>The ability to:</td>
</tr>
<tr>
<td></td>
<td>• Select and apply appropriate Design and Process FMEA techniques related to the industries standard</td>
</tr>
<tr>
<td><strong>Social Intelligence and Ethics</strong></td>
<td>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</td>
</tr>
<tr>
<td></td>
<td>The ability to:</td>
</tr>
<tr>
<td></td>
<td>• Participate in discussion with team members to clarify and verify computation results that are fit for intended purpose</td>
</tr>
<tr>
<td></td>
<td>• Obtain advice when dealing with unknowns to achieve the desired outcome</td>
</tr>
<tr>
<td></td>
<td>• Record and report reviews according to organisational procedure</td>
</tr>
</tbody>
</table>

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### Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The ability to:</td>
</tr>
<tr>
<td></td>
<td>• Utilise appropriate opportunities to strive for betterment of own skills and knowledge</td>
</tr>
</tbody>
</table>

### Range of Application

*(where applicable)*  

*It refers to the critical circumstances and contexts that the skill may be demonstrated.*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Organisational management systems must include:</td>
</tr>
<tr>
<td></td>
<td>• Design FMEA for software</td>
</tr>
<tr>
<td></td>
<td>Procedures and supporting documents must include:</td>
</tr>
<tr>
<td></td>
<td>• FMEA worksheet</td>
</tr>
<tr>
<td></td>
<td>Rules and regulations must include:</td>
</tr>
<tr>
<td></td>
<td>• Workplace Safety and Health procedures</td>
</tr>
<tr>
<td>Skill Code</td>
<td>AER-PIN-4105-1.1</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Skill Sub-Category</td>
<td>(where applicable)</td>
</tr>
</tbody>
</table>

Skill | Implement Lean Six Sigma

Skill Description | This skill describes the ability to apply strategies, methods and tools used for developing and implementing lean six sigma project plans.

Knowledge and Analysis

It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.

The ability to understand:
- Principles of Lean
- Understanding and utilisation of Lean and Six Sigma tools
- Types of waste and means to correct them

Application and Adaptation

It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.

The ability to:
- Map the business process using Value Stream Mapping (VSM) tool
- Define and establish the value flow as pulled by the customer
- Identify non-value added activities using VSM tool

Innovation and Value Creation

It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.

The ability to:
- Design and implement improvements to the business process
- Implement a system of continuous-improvement process
### Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

The ability to:
- Define scope of Lean Six Sigma with business strategy and objectives in consultation with stakeholders

### Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

The ability to:
- Evaluate the improvement measures implemented

### Range of Application

*It refers to the critical circumstances that the skill may be demonstrated.*

Defining scope of Lean Six Sigma must include:
- Identify and analyse non-value added steps and activities in a process

Manage the role of productivity champions must include:
- Design and eliminate non-value added steps and activities in a process
- Design and reduce variation from the remaining value-added steps in the process

Analyse change management to support and/or manage expectations must include:
- Calculate the lead time
- Measure performance using lean accounting tools
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>Skill Category</th>
<th>Productivity and Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AER-PIN-4107-1.1</td>
<td>Skill Sub-Category (where applicable)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Skill**

**Skill Description**

This skill describes the ability to manage the enterprise productivity improvement methodology to achieve continuous improvement of processes in manufacturing, engineering, and business management.

**Knowledge and Analysis**

The ability to understand:
- Productivity improvement
- Performance measures of productivity
- Project identification and selection
- Value stream mapping (VSM)
- Value stream analysis
- Productivity assessment
- Project set up and implementation
- Productivity improvement tools and techniques
- Productivity performance management system
- Productivity implementation roadmap

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

**Application and Adaptation**

The ability to:
- Examine the productivity improvement opportunities
- Determine the current state of organisational processes
- Analyse the current state of organisational processes
- Evaluate productivity gains
- Implement productivity improvement implementation
- Sustain the performance from the improved process

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

**Innovation and Value Creation**

The ability to:
- Develop productivity improvement implementation plans

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*
| Social Intelligence and Ethics | The ability to:  
- Seek approval and/or sponsorship and/or support from management for productivity improvement implementation plans |
|-------------------------------|------------------------------------------------|
| Learning to Learn             | The ability to:  
- Reflect on new productivity improvement tools and techniques and |
| Range of Application          | N/A |

**Social Intelligence and Ethics**

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-PIN-4106-1.1</th>
<th>Skill Category</th>
<th>Productivity and Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>Manage Productivity Improvement to Achieve Business Objectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill Description</td>
<td>This skill describes the ability to manage productivity improvement strategies employing lean six sigma principles to achieve the business objectives of the organisation.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Knowledge and Analysis | The ability to understand:  
- Lean and Six Sigma principles  
- Means to integrate Lean and Six Sigma  
- Characteristics of Lean Six Sigma Management System  
- Workplace and organisational improvement goals  
- Define, Measure, Analyse, Improve and Control (DMAIC) approach on Lean Six Sigma methodology  
- Organisational development and behaviour  
- Workplace Safety and Health Act, subsidiary legislations and director's responsibility  
- Concept of bizSAFE and Risk Management  
- Cultivating good safety culture in workplace |
| Application and Adaptation | The ability to:  
- Define the scope of Lean Six Sigma with business strategy and objectives to be undertaken in consultation with stakeholders to meet the organisational needs and objectives  
- Manage the role of productivity champions in a productivity initiative |

*SKILLS FRAMEWORK FOR AEROSPACE SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE*

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<table>
<thead>
<tr>
<th>SKILLS FRAMEWORK FOR AEROSPACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Innovation and Value Creation</th>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</td>
<td>- Establish organisational value flow</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social Intelligence and Ethics</th>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</td>
<td>- Manage the expectations of various stakeholders in a productivity initiative</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning to Learn</th>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</td>
<td>- Analyse change management to support the productivity initiative</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range of Application</th>
<th>Characteristics of Lean Six-Sigma management system must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the critical circumstances that the skill may be demonstrated.</td>
<td>- Lean and Six Sigma Principles</td>
</tr>
<tr>
<td></td>
<td>- Integrating Lean and Six Sigma</td>
</tr>
</tbody>
</table>

Methods for determining workplace and organisational improvement opportunities must include:
- Types of internal stakeholders in the workplace and organisation
- Workplace and organisation improvement goals

The DMAIC process based on Lean Six Sigma methodology must include:
- Lean principles
- Lean Six Sigma tools

Organisational development and behaviour must include:
- Analysis
- Hypothesis Testing
- Change management

Regulations must include:
- Workplace Safety and Health Act
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-PIN-4108-1.1</th>
<th>Skill Category</th>
<th>Productivity and Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>Apply Guided Innovation and Improvement Method</td>
<td>Skill Sub-Category (where applicable)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Skill Description
This skill describes the ability to apply innovation and improvement methodologies to recognise inventive problems at the workplace, conduct situation analyses to define the problem and conduct situation analyses to define the problem using various concepts, technique and tools to solve the inventive problem.

**Knowledge and Analysis**

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

- Creativity and innovation
- Idea generation
- Classifying Levels of Innovation
- Recognising Inventive Problems
- TRIZ (Russian acronym) or "Theory of inventive problem solving"
- Guided Innovation and improvement
- Concepts of Ideality, Final Result and Ideal Vision
- System Concept and Primary Function of a System
- Function Maps
- Concept of Inventive Principles
- Concept of Resources Innovation
- Concept of Contradiction in Innovation
- Ideas Evaluation and Consolidating Ideas
- Structure of Innovation Project Reports

The ability to understand:

**Application and Adaptation**

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

The ability to:

- Apply innovation and improvement methodology to recognise inventive problems at the workplace
- Analyse systems to identify the key opportunities to improve the system
- Generate innovation solution reports
### Innovation and Value Creation

**It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.**

| The ability to: | • Conduct situation analyses to define the problems |

### Social Intelligence and Ethics

**It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.**

| The ability to: | • Perform guided brainstorming to generate ideas around the identified opportunities |

### Learning to Learn

**It refers to the ability to develop and improve one’s self within and outside of one’s area of work.**

| The ability to: | • Evaluate ideas to develop solution concepts to select the most ideal solutions |

### Range of Application

**It refers to the critical circumstances that the skill may be demonstrated.**

<p>| N/A |</p>
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>PRE-MPI-3007-1</th>
<th>Skill Category</th>
<th>Manufacturing Productivity and Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td></td>
<td>Skill Sub-Category</td>
<td>N/A</td>
</tr>
<tr>
<td>(where applicable)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Skill Title</td>
<td>Supervise Work Improvement Processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill Description</td>
<td>This skill describes the ability to identify improvement goals for work teams, implement work improvement processes and standardise improved work processes at the workplace.</td>
<td>Knowledge and Analysis</td>
<td>The ability to understand:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Team’s key performance indicators and organisational goals</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Principles of continuous process improvement, communication modes and barriers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Roles and responsibilities of work teams and resource requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Importance and structure of an effective action plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Application of continuous process improvement techniques</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Purpose of control mechanisms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Ways to resolve issues in implementation of improvement activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Methods of evaluating the work team results</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Format of a report</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Purpose of documenting changes in work processes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Application and Adaptation</td>
<td>The ability to:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Identify key performance indicators in accordance to the types of work improvement activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Develop action plan in accordance to organisational requirements and work improvement activities at the workplace</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Train work teams to apply continuous process improvement techniques</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Apply control mechanisms to monitor the progress of work teams</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Facilitate work teams to complete improvement activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Evaluate results of work teams against the expected key performance indicators</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Prepare report on outcomes of improvement activities and document implemented changes in the work processes in accordance to organisational goals and procedures</td>
</tr>
</tbody>
</table>
## Innovation and Value Creation

It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Contribute ideas to improve work activities and key performance indicators</td>
</tr>
<tr>
<td>in accordance to organisational goals</td>
</tr>
</tbody>
</table>

## Social Intelligence and Ethics

It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Obtain approval from designated personnel to carry out work improvement</td>
</tr>
<tr>
<td>activities</td>
</tr>
<tr>
<td>• Report any abnormality and problems encountered in identifying and carrying</td>
</tr>
<tr>
<td>out work improvement activities</td>
</tr>
<tr>
<td>• Communicate to work team on the key performance indicators to be achieved</td>
</tr>
<tr>
<td>• Resolve any unmet goal with the work teams in accordance with organisational</td>
</tr>
<tr>
<td>procedures</td>
</tr>
</tbody>
</table>

## Learning to Learn

It refers to the ability to develop and improve one’s self within and outside of one’s area of work.

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Participate in reviewing work improvement activities</td>
</tr>
<tr>
<td>• Participate in enhancing key performance indicators</td>
</tr>
</tbody>
</table>

## Range of Application (where applicable)

It refers to the critical circumstances that the skill may be demonstrated.

<table>
<thead>
<tr>
<th>Work improvement activities must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Productivity improvement</td>
</tr>
<tr>
<td>• Cost reduction or saving</td>
</tr>
<tr>
<td>• Product quality improvement</td>
</tr>
<tr>
<td>• Customer service improvement</td>
</tr>
<tr>
<td>• Process or line improvement</td>
</tr>
<tr>
<td>• Production machine efficiency improvement</td>
</tr>
<tr>
<td>• Machine maintenance efficiency improvement</td>
</tr>
</tbody>
</table>
- Defect reduction
- Safety, health and environment improvement
- Facilities and security enhancement

**Key Performance Indicators (KPIs) must include:**

- Management indicators
- Operating profit
- Productivity of labour, machine or energy
- Cost reduction or saving
- Value of warranty claims
- Number of customer complaints
- Customer satisfaction index
- Quality indicators
  - Process defect ratio
  - Cost of process defects
  - Number of defects missed
  - Number of warranty claims
  - Overall process yield
- Safety, health and environment indicators
- Accident frequency
- Accident severity ratio
- Number of near-misses detected
- Number of danger points detected
- Number of improvements made to dangerous work
- Process or line improvement
- Overall equipment effectiveness
- Availability ratio
- Performance ratio
- Quality ratio
- Machine maintenance efficiency
- Mean time between failure (MTBF)
- Mean time to repair (MTTR)
- Mean time to failure (MTTF)

**Continuous process improvement techniques must include:**

- Plan-Do-Check-Act (PDCA) cycle
- Problem-solving cycle
- Expand-Focus Sequence
- Specific-Measurable-Achievable-Resources-Timely (SMART) Goals

**Data collection and analysis techniques must include:**

- Brainstorming
- Pareto diagram
- Cause-and-effect diagram
- Check sheet
- Data stratification
### SKILLS FRAMEWORK FOR AEROSPACE
### SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE

| • Flowchart |
| • Control/Run charts |
| • Workflow/process analysis |
| • 5W1H (who, what, where, when, why and how) |

Control mechanisms must include:

- Daily progress report
- Milestone chart
- Feedback meetings or sessions

Rules and regulations must include:

- Workplace Safety and Health procedures
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>BM-SPI-304E-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Category</td>
<td>Planning and Implementation</td>
</tr>
<tr>
<td>Skill Sub-Category</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Skill
Display Critical Thinking and Analytical skills

### Skill Description
This skill describes the ability to apply critical thinking and analytical skills for problem-solving. It also includes challenging and rethinking ideas, analysing business issues to put forth recommendations to stakeholders and enhancing creative thinking among team members.

### Knowledge and Analysis

**It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.**

The ability to understand:
- Methods to apply logical inquiry to issues
- Barriers to creativity
- Ways in which people may contribute to the critical thinking and analysis process

### Application and Adaptation

**It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.**

The ability to:
- Analyse business issues through the use of critical-thinking to make recommendations to relevant stakeholders

### Innovation and Value Creation

**It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.**

The ability to:
- Challenge and rethink ideas and provide insights to relevant stakeholders for continuous business improvement
### Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

The ability to:

- Make recommendations that are attuned to the needs of relevant stakeholders and aligned to organisational objectives by exercising empathy and organisational awareness to close the gaps.

### Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

The ability to:

- Develop a critical thinking mind-set when dealing with business issues to improve the organisation’s business practices.
- Demonstrate problem-solving skills within own scope of work to improve productivity and own work performance.
- Enhance creative thinking skills among team members to foster innovation and improve organisational performance.

### Range of Application

*(where applicable)*

*It refers to the critical circumstances and contexts that the skill may be demonstrated.*

Methods to apply logical inquiry to issues must include:

- Understand and identify relevant objectives and issues.
- Formulate and raise key questions in a clear and concise manner.
- Gather and assess relevant information pertaining to business situation.
- Use abstract ideas and interpret them appropriately.
- Recognise and assess implications and practical consequences.
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-PMA-4111-1.1</th>
<th>Skill Category</th>
<th>Project Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category (where applicable)</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill</td>
<td>Apply Project Management Skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill Description</td>
<td>This skill describes the ability to apply project management skills to achieve successful completion of specific project goals and objectives by a specific time, within budget and according to specifications.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge and Analysis</td>
<td>The ability to understand:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Purpose of project management</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Advantages and challenges of managing projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Project management processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Defining the scope of projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• How to conduct feasibility analysis of undertaking the projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Project selection methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Managing project risks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• How to manage the resources required to undertake the projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Project management tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Negotiation skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Types of stakeholders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application and Adaptation</td>
<td>The ability to:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Develop the project plans and provide estimates of the necessary human resources, time and cost using appropriate project management tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Execute the project implementation activities and control the resources to achieve the desired project goals or deliverables</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Review the milestones of the project and resolve any unmet goals or gaps when needed to meet the scope of the projects defined</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Conclude the projects in consultation with stakeholders and with complete project documentation in accordance with organisational procedures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| SKILLS FRAMEWORK FOR AEROSPACE  
<table>
<thead>
<tr>
<th>SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Innovation and Value Creation</strong></td>
</tr>
<tr>
<td>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td><strong>Social Intelligence and Ethics</strong></td>
</tr>
<tr>
<td>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</td>
</tr>
<tr>
<td>The ability to:</td>
</tr>
<tr>
<td>- Define the scope of the project to be undertaken in consultation with stakeholders to meet the organisational needs or objectives</td>
</tr>
<tr>
<td>- Conduct feasibility analysis of undertaking the projects and present to stakeholders for decision making in accordance with organisational procedures</td>
</tr>
<tr>
<td><strong>Learning to Learn</strong></td>
</tr>
<tr>
<td>It refers to the ability to develop and improve one's self within and outside of one's area of work.</td>
</tr>
<tr>
<td>The ability to:</td>
</tr>
<tr>
<td>- Review the milestones of the project and take corrective actions to resolve unmet project goals or gaps</td>
</tr>
<tr>
<td><strong>Range of Application</strong></td>
</tr>
<tr>
<td>It refers to the critical circumstances that the skill may be demonstrated.</td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td><strong>Skill Code</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td><strong>Skill Category</strong></td>
</tr>
<tr>
<td><strong>Skill Sub-Category</strong> (where applicable)</td>
</tr>
</tbody>
</table>

**Skill**

Lead Team Leaders to Develop Business Strategies and Governance Management

**Skill Description**

This skill describes the ability to lead team leaders in the development of business unit strategies, operational plans and corporate governance management to meet organisational needs. It also includes providing direction and guidance to team leaders through regular engagement, modelling of leadership and expected behaviours.

**Knowledge and Analysis**

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

The ability to understand:

- The relationship between high level strategy and the development and implementation of team plans and processes
- The relationship between high level strategy the development and implementation of business systems and processes to support corporate governance
- Organisational policies and procedures relating to the development of departmental or business unit strategies, and corporate governance compliance management
- Legal and ethical considerations relating to corporate governance
- Relevant professional or industry codes of practice and standards relating to corporate governance
- Implications and impact on employees and the organisation arising from team planning process and corporate governance management process

**Application and Adaptation**

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

The ability to:

- Facilitate team leaders’ involvement in the development of departmental or business unit strategies to achieve business objectives
- Lead team leaders to identify trends and issues impacting team performance and develop team operational plans to achieve team objectives
- Communicate organisational values and expectations of behaviour in the workplace to guide team leaders in their behaviour and performance
- Engage regularly with team leaders to provide the required support to achieve business unit goals
- Model leadership and behaviours to demonstrate application of organisational values, behaviours and governance priorities in all actions
### Innovation and Value Creation

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Develop and modify systems and processes to improve compliance management on corporate governance and social responsibilities requirements</td>
</tr>
</tbody>
</table>

### Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Communicate departmental or business unit strategic priorities to stakeholders to garner their support and buy-in</td>
</tr>
<tr>
<td>• Assess emotional states of team leaders and respond appropriately to emotional cues when leading team leaders to ensure individual needs are addressed</td>
</tr>
</tbody>
</table>

### Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Engage in regular self-reflection to identify own areas for improvement in leading strategy planning</td>
</tr>
<tr>
<td>• Improve own strategy planning skills by subscribing to diverse learning channels and participating in peer review platforms to enhance workplace performance</td>
</tr>
</tbody>
</table>

### Range of Application

*where applicable*

*It refers to the critical circumstances and contexts that the skill may be demonstrated.*

<table>
<thead>
<tr>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Code</td>
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<tr>
<td>Skill Sub-Category (where applicable)</td>
</tr>
<tr>
<td>Skill</td>
</tr>
<tr>
<td>Skill Description</td>
</tr>
<tr>
<td>Knowledge and Analysis</td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td>Application and Adaptation</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Innovation and Value Creation</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Social Intelligence and Ethics</td>
</tr>
<tr>
<td>------------------------------</td>
</tr>
<tr>
<td>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning to Learn</th>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</td>
<td>• Reflect on opportunities to learn and renew oneself to bolster resilience</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range of Application</th>
<th>Concept of resilience must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(where applicable)</td>
<td>• Definition of resilience from individual and/or organisation perspective</td>
</tr>
<tr>
<td>It refers to the critical circumstances and contexts that the skill may be demonstrated.</td>
<td>• Psychology of resilience includes:</td>
</tr>
<tr>
<td></td>
<td>- Cognitive</td>
</tr>
<tr>
<td></td>
<td>- Neurophysiology</td>
</tr>
<tr>
<td></td>
<td>- Psychoneuroimmunology</td>
</tr>
<tr>
<td></td>
<td>Domains of resilience must include:</td>
</tr>
<tr>
<td></td>
<td>- Individual’s perspective includes:</td>
</tr>
<tr>
<td></td>
<td>- Being in control to influence whatever happens next</td>
</tr>
<tr>
<td></td>
<td>- Assuming ownership to improve the situation, regardless of one’s formal responsibilities</td>
</tr>
<tr>
<td></td>
<td>- Being optimistic</td>
</tr>
<tr>
<td></td>
<td>- Able to surmount stressful situations and emerge stronger thereafter</td>
</tr>
<tr>
<td></td>
<td>- Able to adapt one’s thinking to the situation at hand e.g. taking another’s point of view, able to see things from a different perspective, able to see difficulties as challenges, etc.</td>
</tr>
<tr>
<td></td>
<td>- Able to use humour to get through difficult circumstances</td>
</tr>
<tr>
<td></td>
<td>- Able to accept that something has happened and moving on to deal with it</td>
</tr>
<tr>
<td></td>
<td>- Able to persevere and endure adverse situations</td>
</tr>
<tr>
<td></td>
<td>- Able maintain composure and a healthy level of physical and psychological wellness in the face of challenges.</td>
</tr>
<tr>
<td></td>
<td>- Able to contain setbacks in one aspect from spilling over to other professional or personal aspects</td>
</tr>
<tr>
<td></td>
<td>- Able to acquire resources to move on in challenges and reach one’s full potential</td>
</tr>
</tbody>
</table>
### SKILLS FRAMEWORK FOR AEROSPACE

**SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE**

<table>
<thead>
<tr>
<th>• Organisational perspective includes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>o Systems in place to ensure business continuity</td>
</tr>
<tr>
<td>o Diversification of business activities to mitigate risks</td>
</tr>
<tr>
<td>o Flexible systems and processes</td>
</tr>
<tr>
<td>o Strong leadership</td>
</tr>
<tr>
<td>o Responsiveness to operating environment</td>
</tr>
<tr>
<td>o Systems to generate and protect business resources e.g. supply chains, financial and human resources</td>
</tr>
<tr>
<td>o Systems and tools in place to train, maintain and track resilient individuals and teams</td>
</tr>
</tbody>
</table>

**Factors affecting the level of resilience must include:**

<table>
<thead>
<tr>
<th>• An individual's level of resilience must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>o Nature of occupation e.g. fast-paced, dynamic vs. stagnant, predictable &amp; routine</td>
</tr>
<tr>
<td>o Personality and traits</td>
</tr>
<tr>
<td>o Life experiences</td>
</tr>
<tr>
<td>o Wellness of one's mind, spirit, body, et cetera</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>• An organisation's level of resilience includes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>o Culture</td>
</tr>
<tr>
<td>o Leadership</td>
</tr>
<tr>
<td>o Systems and processes</td>
</tr>
<tr>
<td>o Investment in training and development of staff</td>
</tr>
</tbody>
</table>

**Resilience techniques must include:**

<table>
<thead>
<tr>
<th>• Practising/ internalizing resilient behaviours must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>o Not giving up and persisting in achieving goals despite the difficulties</td>
</tr>
<tr>
<td>o Being decisive and able to make sound decisions despite uncertainties and pressures</td>
</tr>
<tr>
<td>o Staying composed and positive in times of difficulty</td>
</tr>
<tr>
<td>o Thinking clearly and staying focused under pressure</td>
</tr>
<tr>
<td>o Recognising how your feelings affect performance and understanding how it affects your relationship with stakeholders, team members, customers, and in turn affects organisational performance</td>
</tr>
<tr>
<td>o Distinguishing personal and professional outcomes</td>
</tr>
<tr>
<td>o Responding to changes and situations with a positive and open mind</td>
</tr>
<tr>
<td>o Creating a supportive culture within an organisation</td>
</tr>
<tr>
<td>o Coaching others through difficulties</td>
</tr>
<tr>
<td>o Recognising stress symptoms before they become an issue</td>
</tr>
<tr>
<td>o Engaging in activities to maintain the well-being of one's mind, spirit and body</td>
</tr>
<tr>
<td>o Controlling unwanted thoughts and emotional reactions</td>
</tr>
</tbody>
</table>
Formulating an action plan to develop resilience at the individual and/or organisational level, with components of an action plan to develop resilience at:

- The individual level must include:
  o Measurement/ outcome indicators to track development in resilience
  o Areas for development in resilience
  o Methods/ tools for collecting feedback on level of resilience
  o Schedule of timelines
  o Resources e.g. physical, financial required
  o Possible methods to develop resilience, such as:
    • Using journals to list and challenge limiting beliefs
    • Attending courses
    • Building a strong support network through nurturing strong and positive relationships, getting involved in community and volunteer work, or joining a faith or spiritual community
    • Building long-term stress resilience and reduce situational stress throughout the day
    • Sharing and exchanging stories
    • Setting progressive and incremental goals to build self confidence in specific areas
    • Reflecting on past experiences and using them to positively reframe future experiences
    • Practising relaxation techniques that can include imagery and breathing techniques
    • Applying nutritional strategies for boosting vitality, motivation and productivity,
    • Applying learned optimism techniques
    • Applying problem-solving and decision-making techniques to make sound decisions despite uncertainties and pressures
    • Controlling unwanted thoughts and emotional reactions

- The organisational level must include:
  o Measurement/ outcome indicators to track development in resilience
  o Areas for development in resilience
  o Methods/ tools for collecting feedback on level of resilience
  o Schedule of timelines
  o Resources e.g. manpower, financial, logistics required
  o Plan to stakeholders
  o Possible methods to develop resilience, such as:
    • Encouraging innovation and experimentation
    • Implementing systems to ensure business continuity
    • Diversifying business activities to mitigate risks
| **SKILLS FRAMEWORK FOR AEROSPACE**  
**SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE** |
|---|
| • Introducing systems and processes to enhance organisation’s flexibility and adaptability and to generate and protect business resources e.g. supply chains, financial and human resources  
• Leadership development programmes  
• Implementing scenario analysis and planning to enhance organisation’s responsiveness to operating environment  
• Investment in training and development for staff at all levels  
• Introducing culture-building and awareness programmes  
• Implementing communication and engagement sessions with staff at all levels  
• Implementing alternative work practices e.g. flexible working arrangements, empowerment of decision-making, et cetera  
• Implementing staff welfare programmes such as exercise days, staff bonding events, et cetera |
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>ES-IP-401G-1</th>
<th>Skill Category</th>
<th>People and Relationship Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td>N/A</td>
<td>(where applicable)</td>
<td></td>
</tr>
</tbody>
</table>

### Skill
Lead Workplace Communication and Engagement

### Skill Description
This skill describes the ability to lead workplace communication through the implementation of communication strategies and mechanisms. It also includes using negotiation strategies to achieve organisational goals and win-win outcomes.

### Knowledge and Analysis

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

The ability to understand:

- Communication strategies, tools and methods associated with the various communication mechanisms to meet organisational goals and objectives and their features
- Types and dimensions of organisational culture and their characteristics
- Dimensions of conflict or dispute
- Desired goals to be achieved as a outcome of negotiation
- Motivations, priorities, interests and inclinations of stakeholders involved in a negotiation
- Importance of considering cultural factors and various diversity issues that affect the communication in a negotiation process
- Factors affecting the prioritising of goals and evaluation of possible trade-offs
- Steps to develop relevant details and supporting arguments for negotiation
- Negotiation styles and tactics for countering other party’s style and their characteristics
- Sources of power, conflict and obstacles to a successful negotiation and their implications in a negotiation
### Application and Adaptation

**It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.**

The ability to:
- Conduct research on best practices in workplace communication, evaluate their suitability for adoption and establish benchmarks for the organisation
- Develop communications plan to implement communication strategies and mechanisms to meet organisational goals and objectives
- Evaluate employees’ level of acceptance of organisation’s vision, mission and core values and take corrective actions where needed
- Evaluate effectiveness of communication strategies and mechanisms and implementation plan according to criteria set
- Establish the actual causes of conflict or dispute and plan for negotiation taking into account organisational goals and objectives
- Assess negotiation situation and develop negotiation strategies taking into consideration diversity issues
- Evaluate negotiation process and delegate appropriate follow-up actions in a timely manner based on accurate and objective analytical techniques

### Innovation and Value Creation

**It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.**

The ability to:
- Evaluate gaps and barriers in workplace communication based on determined benchmarks and establish communication strategies and mechanisms that meet organisational goals and objectives

### Social Intelligence and Ethics

**It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.**

The ability to:
- Use communication strategies to influence organisational culture and motivate employees to commit to the organisation’s vision, mission and core values
- Conduct negotiation to achieve organisational goals and win-win outcomes by applying negotiation strategies and effective communication skills
| **Learning to Learn** | The ability to:  
- Reflect on gaps in own communication and negotiation style to make adjustments for future interactions |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><em>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</em></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Range of Application</strong></th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>(where applicable)</em></td>
<td></td>
</tr>
<tr>
<td><em>It refers to the critical circumstances and contexts that the skill may be demonstrated.</em></td>
<td></td>
</tr>
<tr>
<td>Skill Code</td>
<td>ES-IP-402G-1</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Skill Category</td>
<td>People and Relationship Management</td>
</tr>
<tr>
<td>Skill Sub-Category</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Skill**
Develop a Work Team

**Skill Description**
This skill describes the ability to establish teams and allocate resources in achieving organisational goals. It also includes cultivating open communication for teamwork and evaluating the progress of the team.

**Knowledge and Analysis**

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

The ability to understand:
- Critical factors in building a high performance team
- Characteristics and impact of team synergy on team performance
- Techniques for team building and development
- Coaching process aligned to organisational vision and business goals
- Platforms and tools to create opportunities for team members to contribute ideas and skills
- Components of systems to recognise contributions of team members
- Implications of diversity issues on coaching
- Components of systems for development of staff
- Motivational theories related to rewards and recognition for staff
- Ways to determine trends in team performance
### Application and Adaptation

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Analyse the types of teams required and their value in achieving organisational goals</td>
</tr>
<tr>
<td>- Identify and elect work team members and align roles, responsibilities, objectives and expectations of the work team to organisational goals</td>
</tr>
<tr>
<td>- Delegate tasks and allocate resources to facilitate work team towards the achievement of goals and objectives, taking into consideration diversity issues</td>
</tr>
<tr>
<td>- Evaluate impact of task and role delegation among team members on team synergy and make adjustments where necessary in accordance to criteria set</td>
</tr>
<tr>
<td>- Encourage teamwork and foster commitment and sense of ownership among team members based on team building and development techniques</td>
</tr>
<tr>
<td>- Assess the barriers to group interaction and communication and establish infrastructure to facilitate knowledge management and work team coaching which is aligned to organisational vision and business goals</td>
</tr>
</tbody>
</table>

### Innovation and Value Creation

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Monitor and evaluate team progress and performance in achievement of goals and objectives</td>
</tr>
</tbody>
</table>

### Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Communicate the roles, responsibilities, objectives and expectations to the work team and empower team members to accomplish them</td>
</tr>
<tr>
<td>- Communicate feedback to team using the most suitable means and data and provide recommendations to improve performance</td>
</tr>
<tr>
<td>- Recognise and reward team work and performance taking into consideration implications of diversity issues</td>
</tr>
</tbody>
</table>
### Learning to Learn

*It refers to the ability to develop and improve one's self within and outside of one's area of work.*

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Seek feedback from peers and supervisors to improve own future performance</td>
</tr>
</tbody>
</table>

### Range of Application

*(where applicable)*

*It refers to the critical circumstances and contexts that the skill may be demonstrated.*

<p>| N/A |</p>
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-HRE-4140-1.1</th>
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<tr>
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<td>Human Resource</td>
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<tr>
<td>Sub-Category</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Skill

**Appraise and/or Evaluate Staff**

The ability to understand:
- Criteria by which performance will be assessed
- Methods to assess employee’s performance using criteria and information provided
- Link between compensation and performance UK 4 Importance of staff commitment to performance requirements
- Purpose of staff performance appraisals
- Factors that impact employee performance
- Methods to provide feedback in positive and constructive manner during review UK 8 Importance of staff development
- Ways to recognise potential for advancement or development in employee
- Career counselling and coaching
- Importance of implementing rewards or recognition systems
- Ways to reward staff effectively
- Methods of motivation

The ability to:
- Plan performance appraisals
- Conduct performance appraisal interviews
<table>
<thead>
<tr>
<th>Innovation and Value Creation</th>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</strong></td>
<td>• Use reward or recognition systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social Intelligence and Ethics</th>
<th>The ability to:</th>
</tr>
</thead>
</table>
| **It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.** | • Encourage staff development  
• Invite feedback from employee on his and/or her performance and factors that affect performance |

<table>
<thead>
<tr>
<th>Learning to Learn</th>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>It refers to the ability to develop and improve one's self within and outside of one's area of work.</strong></td>
<td>• Keep abreast with appraisal best practices in the industry</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Range of Application</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>It refers to the critical circumstances that the skill may be demonstrated.</strong></td>
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<tr>
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</tr>
<tr>
<td>Skill Sub-Category (where applicable)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Skill**

Develop On-the-job Training Programme

**Skill Description**

This skill describes the ability to plan and develop on-the-job training (OJT) programme and training material.

**Knowledge and Analysis**

*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

The ability to understand:
- On-the-job (OJT) training frameworks including structured and unstructured OJT
- Roles of relevant stakeholders
- Process of designing and developing OJT blueprints and materials
- Five-step coaching process
- Process for evaluating OJT programme designs
- Process for review and critique of quality of OJT blueprints

**Application and Adaptation**

*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

The ability to:
- Develop required OJT training materials on adult learning principles and sound instructional design concepts
- Evaluate effectiveness of OJT programme design to meet organisational needs
- Critique the quality of existing OJT blueprints

**Innovation and Value Creation**

*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

The ability to:
- Develop the OJT blueprints in accordance to the findings of the training needs analysis
| **Social Intelligence and Ethics** | The ability to:  
- Determine the parameters of OJT programmes based on relevant stakeholders’ requirements |

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

| **Learning to Learn** | The ability to:  
- Update self on new pedagogy as applicable |

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

| **Range of Application** | Parameters of an OJT programme must include:  
- Findings of the training need analysis  
- Programme goals and learning outcomes  
- Skills and knowledge to be acquired  
- Targeted work tasks, workers and workplace  
- Areas of contextualisation |

*It refers to the critical circumstances that the skill may be demonstrated.*
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-HRE-4143-1.1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skill Category</strong></td>
<td>Human Resource</td>
</tr>
<tr>
<td><strong>Skill Sub-Category</strong></td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Skill</th>
<th>Develop and Review Competency-based Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skill Description</strong></td>
<td>This skill describes the ability to develop and review a competency-based assessment plan.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge and Analysis</th>
<th>The ability to understand:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Norm-referenced and criterion-referenced assessments</td>
</tr>
<tr>
<td></td>
<td>• Characteristics of competency-based assessments</td>
</tr>
<tr>
<td></td>
<td>• Components of an assessment plan</td>
</tr>
<tr>
<td></td>
<td>• Process of developing assessment plans</td>
</tr>
<tr>
<td></td>
<td>• Principles of assessments</td>
</tr>
<tr>
<td></td>
<td>• Rules of evidence</td>
</tr>
<tr>
<td></td>
<td>• Process of validation</td>
</tr>
<tr>
<td></td>
<td>• Quality assurance strategies</td>
</tr>
<tr>
<td></td>
<td>• Trends and developments in assessments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application and Adaptation</th>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Develop assessment plans according to specified requirements</td>
</tr>
<tr>
<td></td>
<td>• Develop relevant assessment tools to support the assessment plans</td>
</tr>
<tr>
<td></td>
<td>• Identify quality assurance issues in an assessment system</td>
</tr>
<tr>
<td></td>
<td>• Prepare training frameworks for assessment implementation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Innovation and Value Creation</th>
<th>N/A</th>
</tr>
</thead>
</table>

**Description:**

- **Skill Code:** AER-HRE-4143-1.1
- **Skill Category:** Human Resource
- **Skill Sub-Category:** N/A
- **Skill:** Develop and Review Competency-based Assessment
- **Skill Description:** This skill describes the ability to develop and review a competency-based assessment plan.

**Knowledge and Analysis:**

- **Knowledge and Analysis:**
  - The ability to understand:
    - Norm-referenced and criterion-referenced assessments
    - Characteristics of competency-based assessments
    - Components of an assessment plan
    - Process of developing assessment plans
    - Principles of assessments
    - Rules of evidence
    - Process of validation
    - Quality assurance strategies
    - Trends and developments in assessments

**Application and Adaptation:**

- **Application and Adaptation:**
  - The ability to:
    - Develop assessment plans according to specified requirements
    - Develop relevant assessment tools to support the assessment plans
    - Identify quality assurance issues in an assessment system
    - Prepare training frameworks for assessment implementation

**Innovation and Value Creation:**

- **Innovation and Value Creation:**
  - N/A
## Social Intelligence and Ethics

*It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.*

- The ability to:
  - Engage key stakeholders for the development and review of assessment plans

## Learning to Learn

*It refers to the ability to develop and improve one’s self within and outside of one’s area of work.*

- The ability to:
  - Update self on new developments related to competency-based assessments

## Range of Application

*It refers to the critical circumstances that the skill may be demonstrated.*

- Principles of assessment must include:
  - Validity
  - Reliability
  - Flexibility
  - Fairness

- The training framework must include:
  - Purpose of assessments
  - Types of assessments
  - Implementation process
  - Principles of assessments
  - Types of evidence
  - Assessment methods
  - Assessment tools
  - Assessment criteria
  - Plan and records
<table>
<thead>
<tr>
<th>Skill Code</th>
<th>AER-HRE-3142-1.1</th>
<th>Skill Category</th>
<th>Human Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td>N/A</td>
<td>(where applicable)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Skill</th>
<th>Assess Competence</th>
</tr>
</thead>
</table>

**Skill Description**
This skill describes the ability to conduct competency-based assessment.

**Knowledge and Analysis**
*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*

- The ability to understand:
  - Competency-based assessments
  - Principles of assessments
  - Rules of evidence
  - Components of assessment plans
  - Relevant stakeholders
  - Preparation for conducting assessments
  - Communication and interpersonal skills during assessments
  - Review of assessment plans
  - Code of ethics for assessors

**Application and Adaptation**
*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*

- The ability to:
  - Interpret assessment plans and confirm assessment requirements, methods and tools with relevant stakeholders
  - Prepare assessment venues and resources in accordance with assessment plan and safety and health requirements
  - Record assessment evidence to support assessment decisions
  - Review assessment plans in assessing the required competencies
  - Apply code of ethics when conducting assessments

**Innovation and Value Creation**
*It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.*

- N/A
### Social Intelligence and Ethics

It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Prepare candidates for assessments</td>
</tr>
<tr>
<td>- Conduct assessments in accordance with assessment plan</td>
</tr>
<tr>
<td>- Apply effective communication and interpersonal skills during the conduct of assessment</td>
</tr>
<tr>
<td>- Justify assessment decisions in accordance with principles of assessment and rules of evidence</td>
</tr>
<tr>
<td>- Provide clear and constructive feedback to candidates regarding the assessment decisions</td>
</tr>
</tbody>
</table>

It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.

### Learning to Learn

It refers to the ability to develop and improve one's self within and outside of one's area of work.

<table>
<thead>
<tr>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Update self on new developments in competency assessments</td>
</tr>
</tbody>
</table>

It refers to the ability to develop and improve one's self within and outside of one's area of work.

### Range of Application

It refers to the critical circumstances that the skill may be demonstrated.

<table>
<thead>
<tr>
<th>Principles of assessment must include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Validity</td>
</tr>
<tr>
<td>- Reliability</td>
</tr>
<tr>
<td>- Flexibility</td>
</tr>
<tr>
<td>- Fairness</td>
</tr>
</tbody>
</table>

Effective communication and interpersonal skills in the context of conducting assessments must include:

| - Clear verbal communication |
| - Openness of stance |
| - Active listening |
| - Rephrasing questions |
| - Accurate observation of candidate's body language |
| - Expressing empathy |
| - Sharing constructive feedback |

Maintaining a professional demeanour in the context of conducting assessments must include:

| - Focused |
| - Objective |
| - Open |
| - Positive |
| - Composed |
| - Firm |
| - Patient |
| - Responsive |
| - Clear |
| - Consistent |
## SKILLS FRAMEWORK FOR AEROSPACE
### SKILL STANDARD FOR MAINTENANCE CONTROLLER/TECHNICAL OPERATIONS REPRESENTATIVE

<table>
<thead>
<tr>
<th>Skill Code</th>
<th>ES-PMD-301G-1</th>
<th>Skill Category</th>
<th>Personal Management and Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Sub-Category</td>
<td>N/A</td>
<td>(where applicable)</td>
<td></td>
</tr>
</tbody>
</table>

### Skill
- **Skill Code**: ES-PMD-301G-1
- **Skill**: Develop Personal Effectiveness at Supervisory Level

### Skill Description
This skill describes the ability to apply knowledge and life skills, relate them to roles and responsibilities in the workplace and contribute to their effectiveness as a team leader or supervisor. It also includes using time management techniques, maintaining a work-life balance, managing stress and personal finances.

### Knowledge and Analysis
*It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.*
- The ability to understand:
  - Types of motivational factors affecting personal goal setting and achievement
  - Factors that may affect the achievement of departmental goals
  - Benefits of organising and prioritising work activities according to goals set
  - Practices that promote personal well-being and aspects of personal management
  - Issues and problems related to personal and family responsibilities and their impact on work
  - Common sources of assistance available to support personal management
  - Various budgeting techniques and their features to manage personal expenses
  - Factors to consider when using and maintaining credit to ensure one's financial stability

### Application and Adaptation
*It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.*
- The ability to:
  - Analyse personal goals and align them to departmental goals
  - Examine personal role and responsibilities and their contribution to departmental success
  - Plan, organise and execute personal work activities to achieve departmental goals
  - Support the implementation of work-life balance programmes to achieve organisational effectiveness
<table>
<thead>
<tr>
<th>Skill Framework</th>
<th>Description</th>
<th>The ability to:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Innovation and Value</strong></td>
<td><em>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</em></td>
<td>- Identify causes of stress that affect self and team and apply stress management techniques to deal with them</td>
</tr>
<tr>
<td><strong>Creation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social Intelligence</strong></td>
<td><em>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</em></td>
<td>- Apply emotional intelligence and people-management techniques to get assistance from appropriate people such as managers, peers and subordinates</td>
</tr>
<tr>
<td><strong>and Ethics</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Learning to Learn**   | *It refers to the ability to develop and improve one's self within and outside of one's area of work.* | - Examine personal strengths and weaknesses, apply strategies to overcome weaknesses and use personal strengths to contribute towards the achievement of departmental goals  
- Establish own existing financial position using appropriate tools and explain how to manage such a position |
| **Range of Application**| *(where applicable)*                                                      | N/A                                                                                                              |
| **(where applicable)**  |                                                                             |                                                                                                                 |
| **(where applicable)**  |                                                                             |                                                                                                                 |
### Version Control

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Changes Made</th>
<th>Edited by</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>1-May-17</td>
<td>Initial Version</td>
<td>SSG and EDB</td>
</tr>
</tbody>
</table>

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Definitions of the Five (5) Domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge and Analysis</td>
<td>Knowledge includes the gathering of facts and information through traditional and digital forms. Analysis involves the cognitive processing, integration and inspection of single or multiple sources of facts and information required to perform work tasks and activities and takes into consideration, the work contexts in which the tasks and activities are carried out. The result of knowledge and analysis produce judgements on work tasks/activities/issues/areas, and the conceptualisation of solutions to solve problems at work.</td>
</tr>
<tr>
<td>Application and Adaptation</td>
<td>Application involves the ability to perform work tasks and activities defined by the requirements of the occupation. Adaptation involves the ability to react to and manage the changes in the work contexts. The result of application and adaptation leads to the production of psycho-motor actions and behavioural reactions to the work tasks/activities/issues/areas, and the execution of the planned solutions to solve problems at work.</td>
</tr>
<tr>
<td>Innovation and Value Creation</td>
<td>Innovation includes the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to the organisational goals. As a result of innovation, the organisation is able to reap the values from individual or team contributors to achieve organisational growth.</td>
</tr>
<tr>
<td>Social Intelligence and Ethics</td>
<td>Social intelligence includes the ability to appreciate and use affective factors in leadership, relationship and diversity management guided by professional codes of ethics as effective individuals or team contributors.</td>
</tr>
<tr>
<td>Learning to Learn</td>
<td>Learning-to-learn includes the ability to improve on self-development within and outside of one’s area of work. It involves the continual inspection of one’s knowledge, analytical, application, adaptive, innovative and social skills that are needed to perform the work optimally and/or solve problems effectively.</td>
</tr>
</tbody>
</table>