2022 BRICS Skills Competition

(BRICS Future Skills Challenge)

TECHNICAL DESCRIPTION

Aircraft Maintenance (Offline)

Contents

1. Introduction

1.1. Name and Description of the Skill Competition

1.1.1 Name

Aircraft Maintenance

1.1.2 Description of the Skill Competition

The 2022 BRICS Skills Competition (BRICS Future Skills Challenge) - Aircraft Maintenance (Online) is a team skill with two Competitors per team. The Skill incorporates the demands for skilled personnel of the air transport industry and the emerging technologies of the industry, and is aimed to advance the teaching reforms of aeronautics colleges and college-enterprise cooperation, improve the talents cultivation mode of the maintenance major of aeronautics colleges, enhance teaching quality, and help the colleges further explore the comprehensive talent cultivation mode of integrating jobs, curriculum system, vocational skill competitions and vocational skill level certificates, and further improve students' competence and professionalism. The Skill focuses on the cultivation of aircraft maintenance occupational competence and, based on equipment comprising helicopter, turboshaft engine and aircraft hydraulic system, shows the full workflow of helicopter daily inspection, aircraft engine components removal and installation, and aircraft hydraulic system troubleshooting. It checks teaching achievements and assesses Competitors' capabilities for aircraft maintenance manual consultation, aircraft parts removal and installation, soft/hard tube operations, standard wiring practices, fault diagnosis and troubleshooting, etc.

1.2. The Relevance and Significance of This Document

This document contains information about the standards required to compete in this Skill Competition, and the assessment principles, methods and procedures that govern the competition. Every Expert and Competitor must know and understand this Technical Description.

In the event of any conflict within the different languages of the Technical Descriptions, the English version takes precedence.

2. Skill Specification

2.1. General Notes on the Skill Specification

The Skill Specification specifies the knowledge, understanding, and specific skills that underpin international best practice in technical and vocational performance. It should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business.

The Skill Competition is intended to reflect international best practice as described by the Skill Specification, and to the extent that it is able to. The Skill Specification is therefore a guide to the required training and preparation for the Skill Competition.

In the Skill Competition the assessment of knowledge and understanding will take place through the assessment of performance. There will only be separate tests of knowledge and understanding where there is an overwhelming reason for these.

The Skill Specification is divided into distinct sections with headings and reference numbers added.

Each section is assigned a percentage of the total marks to indicate its relative importance within the Skill Specification. This is often referred to as the “weighting”. The sum of all the percentage marks is 100. The weightings determine the distribution of marks within the Marking Scheme.

Through the Test Project, the Marking Scheme will assess only those skills that are set out in the Skill Specification. They will reflect the Skill Specification as comprehensively as possible within the constraints of the Skill Competition.

The Marking Scheme will follow the allocation of marks within the Skill Specification to the extent practically possible. A variation of up to five percent is allowed, provided that this does not distort the weightings assigned by the Skill Specification.

2.2. Skill Specification

Section		Relative Importance (%)
1	Work organization and management	5
	The Competitors need to know and understand: • Aircraft Maintenance Manual • Laws, regulations and normative documents for civil aviation • Approved manuals from manufacturers • Situations when personal protective equipment (PPE) must be used • Workshop safety protection measures • The uses and storage of aviation materials • Sustainability measures with respect to the use of environmentally friendly materials and minimization of waste • Workflow and time management • The importance of analysis, planning, checking, and attention to detail • The importance of time and costs to teamwork • The importance of working as teams • Individual roles and responsibilities within team settings • The strengths and weaknesses of team members • How to reasonably allocate resources within the team	

	Section	Relative Importance (%)
	The Competitors shall be able to: • Comply with health and safety standards, rules, and regulations • Correctly use personal protective equipment provided at the Workshop • Take precautionary measures to ensure a safe working environment • Apply professional skills to various tasks • Select, use, maintain and store all tools and equipment correctly • Select, use, and store all auxiliary materials and consumables correctly • Plan work areas reasonably to maximize efficiency • Keep work areas clean and tidy • Use the latest revision of technical materials and follow regulated processes and procedures of aircraft maintenance • Establish and maintain high quality standards and working processes under pressure • Reasonably allocate the resources available to the team and complete competition tasks in a safe and efficient manner	

Section		Relative Importance (%)
2	Communication and interpersonal skills	5
	The Competitors need to know and understand: • The significance of establishing and maintaining competitor confidence • The roles and requirements of related colleagues • The value of building and maintaining productive working relationships • The importance of adopting and maintaining an industry accepted attitude • Interpersonal techniques of effective teamwork • The importance of swiftly resolving misunderstandings and conflicting demands • Human factors related to work environment and standards	
	The Competitors shall be able to: • Actively contribute to the team, showing concern and consideration for the welfare of others and the performance of the team • Conduct investigative discussions, e.g., resolving technical problems • Regularly update colleagues about planned maintenance procedures • Negotiate schedules to minimize negative impact on work • Correctly respond to other organizations, such as logistics and engineering management departments	

Section		Relative Importance (%)
3	Problem solving, innovation, and creativity	5
	The Competitors need to know and understand: • The common types of problem which can occur within the work process • Differences between regional standards, national standards and international standards • The application of the latest revisions of manufacturers' technical materials during the problem-solving processes • Development of safe and effective plans through team cooperation • Trends and developments in the industry including new materials, methods, and technology	
	The Competitors shall be able to: • Check work regularly to identify problems in time • Challenge incorrect guidance and rules to prevent accidents • Analyse questions fast based on the latest revisions of technical materials and documents • Persist in resolving complex problems • Come up with independent ideas to enhance product level and customer satisfaction • Put forward suggestions to improve competition equipment • Try new technologies within approved practices • Analyse and use aircraft maintenance technical materials • After the completion of work, check the work of other team members to make the aircraft meets international airworthiness standards.	

Section		Relative Importance (%)
4	Helicopter daily inspection	20
	The Competitors need to know and understand: • Visual inspection techniques • Aircraft maintenance technical materials, including ATA chapters, maintenance manuals, flight manuals, troubleshooting manuals, Preflight Checklist, etc. • The use of aircraft maintenance specifications, troubleshooting reports, etc. including journey logs, maintenance records and Job Cards • Scheduled and unscheduled inspection procedures • Division of responsibilities among technicians and engineers • Hazardous elements in operation and corresponding safety precautions	
	The Competitors shall be able to: • Use visual inspection techniques reasonably, such as watching, touching, hearing and tapping • Carry out scheduled and unscheduled inspections • Record any defects found • Take personal and site safety protection according to operation environment • Understand and operate as per Aircraft Maintenance Manual • Complete work tasks according to Job Cards • Select auxiliary tools to help complete work tasks • Fill out work reports correctly	

Section		Relative Importance (%)
5	Aircraft engine components removal and installation	32
	The Competitors need to know and understand: • Aircraft maintenance technical materials, including ATA chapters, maintenance manuals, troubleshooting manuals, minimum infrastructure list, etc. • The use of aircraft maintenance specifications, troubleshooting reports, etc. including journey logs, maintenance records and job cards • Division of responsibilities among technicians and engineers • Troubleshooting techniques • Expert technical guidance • Parts and system construction and operation • Troubleshooting recording • Use of general and special tools	
	The Competitors shall be able to: • Take personal and site safety protection according to the work situation • Understand and use the technical materials provided at the Workshop • Correctly apply troubleshooting techniques • Take proper measures to deal with defects, such as parts replacement, system or parts commissioning, system or parts cleaning, parts lubrication, and parts repair • Complete operation tasks including Job Cards and engine maintenance records according to the latest revision of maintenance manuals • Fill out work reports correctly	

Section		Relative Importance (%)
6	Aircraft hydraulic system troubleshooting	33
	The Competitors need to know and understand: • Aircraft maintenance technical materials, such as ATA chapters, aircraft maintenance manuals, troubleshooting manuals, Standard Wiring Practices Manual, etc. • Correct use of the Boeing Maintenance Manual • Hydraulic system working principles • Hydraulic system faults and countermeasures • Troubleshooting techniques • Proper personal and site safety protection according to site operation environments	
	The Competitors shall be able to: • Access and use troubleshooting manuals • Carry out aircraft power-on tests • Understand wire harness operation key points • Replace aircraft parts • Bind and arrange wire harnesses • Understand the key points of pin and wire replacement • Correctly record faults and fault handling process	
	Total	**100**

3. Marking Scheme

3.1. Marking Method

Marking for the Skill Competition will be made by the Judge Group on site. If a Competitor cheats on the Skill Competition or otherwise violates the rules during the Skill Competition, the Judges will deal with the violations, or cancel the scores of the Competitor if the violation is serious.

3.2. Marking Rules

1. The Competitor with the highest total scores will be ranked first;
2. For Competitors with the same total scores, they will be ranked in order of score for Module C, Module B and Module A.

If a ranking cannot be made according to the above two rules, the Competitors will be ranked according to the time they spend on the Skill Competition, and the Competitor who spends less time wins.

3.3. Assessment Terms

During the competition design process, the standard and assessment method chosen are determined by the Marking Scheme and Test Project.

The assessment terms include but are not limited to:

- The integrity and standardization of the working process
- The integrity and standardization of the job cards filling
- Application proficiency of the platforms of the 3 modules
- The process, integrity and accuracy of parts assembly
- Fault handling results
- Ability to consult the aircraft maintenance manuals
- Aircraft parts removal and installation proficiency
- Team labor division and cooperation abilities
- Team maintenance style
- Personal protection

4. Test Project

4.1. General Notes

Whether it is a single module or a series of stand-alone or connected modules, the Test Project will enable the assessment of the application of the knowledge, skills, and behaviours set out in each section of the Skill Specification.

The purpose of the Test Project is to provide full, balanced, and authentic opportunities for assessment and marking across the Skill Specification, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme, and Skill Specification will be a key indicator of quality, as will be its relationship with actual work performance.

The Test Project will not cover areas outside the Skill Specification, or affect the balance of marks within the Skill Specification.

The Test Project will enable knowledge and understanding to be assessed solely through their applications within practical work.

4.2. Format/Structure of the Test Project

The Test Project is a series of three (3) standalone modules.

- Module A: Helicopter Daily Inspection
- Module B: Aircraft Engine Components Removal and Installation
- Module C: Aircraft Hydraulic System Troubleshooting

4.3. Test Project Time Allocation and Mark Weighting

Module	Time (min)	Mark Weighting (%)
Module A: Helicopter Daily Inspection	45	25
Module B: Aircraft Engine Components Removal and Installation	90	37
Module C: Aircraft Hydraulic System Troubleshooting	90	38
Total	225	100

4.4. Operation Contents and Requirements of the Modules

The Aircraft Maintenance skill comprises three (3) modules: Helicopter Daily Inspection, Aircraft Engine Components Removal and Installation, and Aircraft Hydraulic System Troubleshooting. Operation contents cover aircraft maintenance technical material consultation, aircraft components removal and installation, soft/hard tube operations, standard wiring practices, aircraft power-on test, fault finding and handling, etc. and assess Competitors' basic level of aircraft maintenance skills.

Module A requires Competitors to complete the contents indicated on the Preflight Checklist based on the helicopter inspection procedures, inspection rules for civil aircraft maintenance personnel and civil aircraft airworthiness requirements.

Module B requires Competitors to remove and install the combustion chamber of a typical turboshaft engine. This module mainly assesses operations of soft/hard tubes, removal and installation of parts, use of tools and gauges, application of torques and lockwires to fasteners, etc.

Module C, which is based on the B737NG aircraft, assesses Competitors' capacity to find and handle faults through the combination of software and hardware and the use of emulated aircraft components and parts. Main assessment contents include aircraft power-on test, hydraulic system panel function identification and test, standard wiring practices, aircraft parts removal and installation and aircraft parts sealing and lubrication, etc.

Module	Module Name	Operation Scope
A	Helicopter Daily Inspection	1. Reading and understanding the Maintenance Manual 2. Understanding basic knowledge on the aircraft system, layout, etc. 3. Correct routes of helicopter daily inspection 4. Observation of ambient environment and hanging up warning sings 5. Identification of the helicopter sub-systems 6. Identification and description of common faults of the helicopter 7. Professionalism and teamwork 8. Safety protection and maintenance style
B	Module B: Aircraft Engine	1. Job card reading and tool preparation 2. Preparations for the removal of engine components

	Components Removal and Installation	3. Removal of lines 4. Removal and installation of engine components 5. Application of torques and lockwires to fasteners at designated positions 6. Visual inspection of the defects of designated components 7. Post-installation inspection of components 8. Professionalism and work efficiency
C	Aircraft Hydraulic System Troubleshooting	1. Reading the Maintenance Manual and implementing the procedures set out in the Job Card 2. Aircraft power-on test 3. Cockpit panel identification and relevant functions testing 4. Opening and closing aircraft circuit breakers 5. Standard wiring practices 6. Replacement of the overheat switch 7. Checking if the case drain filter gets clogged 8. Replacement of the electric motor-driven pump (EMDP) of the hydraulic system 9. Hydraulic fluid standard operations 10. Safety protection and maintenance style

4.5. Test Project Circulation

The Test Project will be circulated via the Competition website.

4.6. Test Project Change

The Test Project will have a 30% change before the Competition.

5. Skill Management and Communication

5.1. Expert Group

The Expert Group of the skill is composed of the Chief Expert, Deputy Chief Expert and Experts. They are jointly responsible for the further revision of the Technical Description of the Skill and daily skill management.

5.2. Discussion Forum

Participants who have questions about the hardware and software preparations, Skill Competition environment layout, etc. ahead of the Skill Competition can give their feedback at the Forum section of the Online Training and Competition Platform. Training communication as well as pre- and post-Competition communication for the Skill can also be carried out through the Forum.

6. Safety Requirements

Refer to the Health, Safety, and Environment Policy and Regulations provided by the BRICS Skills Competition Organizing Committee.

7. Materials and Equipment

7.1. Infrastructure List

The Infrastructure List details all equipment, materials, and facilities provided by the Competition Organizers. See 2022 BRICS Skills Competition- Aircraft Maintenance-Infrastructure List.

7.2. Competitor Toolbox

Competitors are not allowed to send a toolbox to the Competition. All tools are provided by the Competition Organizers.

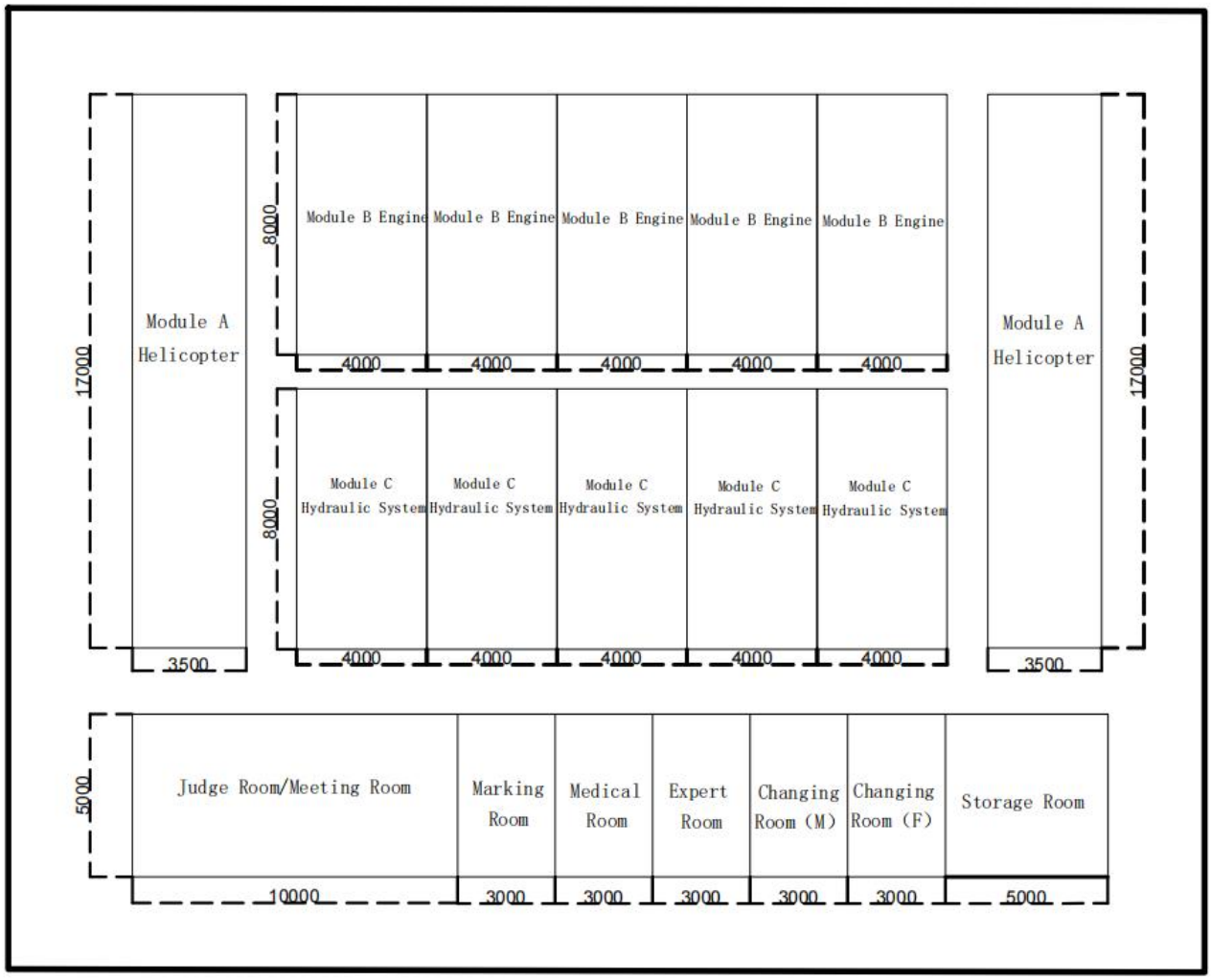
7.3. Materials, Equipment and Tools Supplied by Competitors

Competitors are not allowed to bring materials, equipment, and tools to the Workshop. However, Competitors should bring their protective shoes.

7.4. Materials and Equipment Prohibited in the Skill Area

Competitors should report/show any materials and equipment they carry to Experts, and the Experts may prohibit the use of any items that are irrelevant to the execution of tasks or may bring unfair advantages to Competitors.

7.5. Proposed Workshop and Workstation Layout



8. Skill-specific Rules

Skill-specific rules cannot contradict or take priority over the Competition Rules. They do provide specific details and clarity in areas that may vary from skill competition to skill competition. This includes but is not limited to personal IT equipment, data storage devices, Internet access, procedures and workflow, and documentation management and distribution.

Topic/Task	Skill-specific Rules
Use of technology – USB and memory sticks	1) Competitors are only allowed to use memory sticks provided by the Competition Organizers. 2) It is prohibited to take memory cards or any other portable storage devices outside of the Workshop. 3) Memory cards or other portable memory devices must be handed over to the Chief Expert or Deputy Chief Expert at the end of each day for safe storage.
Use of technology – personal laptops, tablets and mobile phones	1) The Experts and Interpreters are allowed to use personal laptops, tablets, and mobile phones. 2) Competitors are not allowed to bring personal laptops, tablets, or mobile phones into the Workshop.
Use of technology – personal cameras	The Competitors, Experts, and Interpreters are allowed to use personal photo- and video-taking devices in the Workshop only after the Test Project has finished or upon consent of the Chief Expert.
Assessment of Test Project	1) For each workstation (module), the Expert in charge is assigned by the Chief Expert, with the highest professionalism in this area. During the fulfillment of the Test Project by participants, this Expert controls the OHS compliance, fulfillment or non-fulfillment of Test Project points that can be assessed only during the fulfillment of the task by the participant. The assigned Expert is fully responsible for the fairness of the Competitors assessment. 2) If at the workstation, the Competitor and the Expert are from the same organization, the one-time replacement of Experts for the duration of the module takes place.
Making 30 % changes in the Test Projects	Experts, during the introduction of 30% of changes (on Day C-2), must carry out the following work: Depending on the equipment provided by sponsors of the Competition (in all modules):

	• update assembling drawings (or photographs) for the mounting; • update schematic electrical and pneumatic diagrams; • update descriptions of task points, with regard for software and hardware peculiarities of the equipment, provided by sponsors of the Competition.
Technical problems during completion of the tasks by the Competitors	1) If during the fulfillment of the Test Project, a technical problem occurs (through no fault of the Competitors), the Competitors will receive additional time equal to the period from the defect identification to its full elimination. 2) The Competitors do not receive additional time if it is found out that the technical problem occurred through the participants' fault.
Personal protective equipment (PPE)	Personal protective equipment such as working clothes and gloves will be provided by the Workshop, but Competitor should bring their protective shoes.