BRICS 2022 CHINA

2022 BRICS Skills Competition

(BRICS Future Skills Challenge)

TECHNICAL DESCRIPTION

Aircraft Maintenance (Online)

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) will be held on an Internet-based platform that features an aircraft maintenance environment realized by the 3D virtual simulation technology. Competitors need to conduct online operations via 3D software installed on a computer. The contents of the Skill Competition are from the technical documents for the Aircraft Maintenance skill of major skills competitions. Aircraft Maintenance is a team skill with two Competitors per team.

1.1.3. Competition System

The Skill Competition will be carried out through the Aircraft Maintenance Online Training and Competition System reviewed and approved by the Competition Organizers.

The System consists of the Online Training and Competition Platform and the Aircraft Maintenance 3D client (named OnlineSystem Client). The Platform provides reference documents and operation videos for the Skill, training and competition arrangements, score inquiry, rankings and the 3D software download access. The Aircraft Maintenance 3D Client allows the daily training of Competitors and the launch of the Skill Competition.

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.

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	Weighting (%)
Work organization and management	**5**
The Competitors need to know and understand: • The supplementary Maintenance Policy Manual (MPM) developed by Competitors' units; • ATA chapters or equivalent; • Health and safety legislation, obligations and documentation; • Approved manuals, and data from manufacturers and government; • Situations when a range of personal protective equipment (PPE) including protective shoes, eye and hearing protection, gloves and respirators must be used; • Situations when electro-static dissipative equipment must be utilized to prevent system damage; • Safety protection measures for the on-site working environment; • The purposes, uses, care, and safe storage of materials; • Sustainability measures relating to the use of environmentally friendly materials, minimization of waste, disposal of waste and recycling of materials; • Principles of workflow, time management, measurement, and cost analysis; • The importance of researching, planning, accuracy, checking, and attention to detail in all working practices; • The importance of working within a team to accomplish tasks in a timely and economical manner; • The importance of teamwork; • Individual roles and responsibilities within team settings; • Strengths and limitations of team members and how to organize teams to optimize the available resources.	
The Competitors shall be able to: • Consistently and diligently follow health and safety standards, rules and regulations; • Identify and use the appropriate personal protective equipment; • Organize site protection measures and ensure the safety of the work environment; • Apply professional skills to each assignment;	

• Select, use, clean, maintain, and store all tools and equipment safely; • Select, use, and store all materials safely; • Plan work areas to maximize efficiency; • Maintain the discipline of keeping work areas clean and tidy; • Make accurate measurements and regular inspections; • Use the latest versions of approved manuals and data, following defined processes and procedures for aircraft maintenance; • Have a clear understanding of the abilities of oneself; • Apply the principles of "Human Factors in aircraft maintenance"; • Establish and consistently maintain high quality standards and working processes when under pressure.	
Communication and interpersonal skills	**5**
The Competitors need to know and understand: • The significance of establishing and maintaining customer confidence; • The roles and responsibilities of related colleagues; • The value of building and maintaining productive working relationships; • The importance of developing and maintaining an industry-accepted attitude; • Interpersonal techniques for effective teamwork; • The importance of swiftly resolving misunderstandings and conflicting demands; • Human factors as they relate to work environments and standards.	
The Competitors shall be able to: • Undertake investigative discussions, for example, to resolve technical problems; • Reflect positively and respond constructively to feedback on own performance; • Interpret customer requirements and manage customer expectations positively; • Make recommendations which exceed the customers' requirements, within budget; • Produce cost and time estimates for customers; • Contribute positively to teams, showing care and concern for others' welfare, and for team performance; • Keep colleagues regularly informed/updated on planned maintenance procedures; • Negotiate timings to minimize negative impacts on work/productivity levels; • Reflect positively and respond constructively to feedback on own performance, and the performance of other team members;	

• Recognize and respond to the needs of support organizations, such as logistical suppliers and engineering authorities; • Contribute positively to teams e.g. in order to maintain safety and airworthiness.	
Problem-solving, innovation, planning	**5**
The Competitors need to know and understand: • The common types of problem which can occur within work processes; • The distinctions between sector or national standards, and international best practice; • Diagnostic approaches to problem solving; • The importance of following manufacturers' most recent maintenance manuals and documents, for problem-solving processes; • Trends and developments in the industry including new materials, methods, and technologies.	
The Competitors shall be able to: • Check work regularly to minimize problems at later stages; • Challenge incorrect instructions and regulations to prevent problems; • Recognize and analyze problems swiftly, in order to follow a self-managed process for solving them, using manufacturers' latest maintenance manuals and documents; • Persist and show resilience in solving complex problems; • Recognize opportunities to contribute ideas to improve outcomes and overall levels of customer satisfaction; • Be bold to present different ideas; • Try new methods and embrace change within approved practices; • Exploit the potential of new technologies within approved practices; • Check one's own, and others' work to ensure it meets best practice, given the environment and available resources.	
Helicopter Daily Inspection	**20**
The Competitors need to know and understand: • Visual inspection techniques; • The purpose, structure, and contents of aeronautical maintenance publications i.e. ATA chapters, maintenance manuals, parts manuals, minimum equipment lists, company publications, inspection schedules, etc.; • The purpose and use of documents to initiate aircraft maintenance, record	

defects/actions, and certify aircraft maintenance. i.e. Journey log, technical log, work order, job card, etc.; • Certifying technicians'/engineers' responsibilities for documenting and certifying scheduled and unscheduled inspections; • How and when to inspect and update related material inventories; • Hazardous elements during work, and corresponding safety protection measures.	
The Competitors shall be able to: • Apply visual inspection techniques; • Make and maintain personal and site safety protection based on the working conditions; • Explain and implement scheduled and unscheduled inspection; • Identify and report any defects found; • Record and certify own work in accordance with relevant legislative, manufacturer and/or company requirements; • Select and use correct and efficient inspection measures, such as visual detection, tactile detection, measuring, and testing; • Maintain the helicopter and its parts as per the maintenance regulations; • Make and maintain accurate work reports.	
Aircraft Engine Maintenance	**32**
The Competitors need to know and understand: • The purpose, structure, and contents of aeronautical maintenance publications, i.e. ATA chapters, maintenance manuals, parts manuals, minimum equipment lists, company publications, inspection schedules etc.; • The purpose and use of documents to initiate aircraft maintenance, record defects/actions and certify aircraft maintenance. i.e. journey log, technical log, work order, job card, etc.; • Certifying technicians'/engineers' responsibilities for documenting and certifying defect rectification; • Troubleshooting techniques; • System and component construction and operation; • System and component publications; • Specialist assistance available; • Recording and certification processes for troubleshooting.	
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; • Working principles of the hydraulic system; • Structure of the parts of the hydraulic system; • 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 key points of wiring practices; • 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 automatically by computer. 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 Rule

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. Refer to 4.2 for details of each module.

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 accuracy and integrity of the operation record sheets filling
- The accuracy of the parts measurement
- Accuracy and appropriateness of tool selection and operation
- If the fastening of bolts is accord with the standards
- The integrity and accuracy of the parts assembly sequence and operational sequence
- Troubleshooting of the defects of equipment and components
- The accuracy of fault repair
- Wearing of personal protective equipment

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 Maintenance
- 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	50	25
Module B: Aircraft Engine Maintenance	100	37
Module C: Aircraft Hydraulic System Troubleshooting	45	38
Total	195	100

4.4. Operation Contents and Requirements of the Modules

The Skill consists of three modules: Helicopter Daily Inspection, Aircraft Engine Maintenance, and Aircraft Hydraulic System Troubleshooting. It assesses Competitors' aircraft maintenance skills, procedures and operational standardization.

Module A requires the Competitors to complete the pre-flight inspection of the helicopter as per the helicopter daily inspection requirements and airworthiness requirements, and at the same time record and submit the faults found during the inspection;

Module B requires the Competitors to complete the removal, installation and fault finding of the components of a typical aero turboshaft engine, and it mainly assesses whether the methods specified in the maintenance manual are strictly adhered to.

Module C requires the Competitors to inspect and troubleshoot the electric motor-driven bump (EMDP) and case drain filter of the Boeing 737NG aircraft hydraulic system and covers standard wiring practices, mechanical components removal and installation, components power-on test, etc.

Module	Module Name	Operation Scope
A	Helicopter Daily Inspection	1. Maintenance manual reading and understanding 2. Basic knowledge of the aircraft system and layout, etc. 3. Right inspection route 4. Observation of surroundings and display of warnings 5. Fault finding and judgement 6. Proper description of faults

B	Aircraft Engine Maintenance	1. Job card reading and tools preparation 2. Preparations before engine components disassembly 3. Disassembly and assembly of pipeline 4. Disassembly and assembly of engine components 5. Torque measurement and lockwire installation for fasteners at specified positions 6. Visual inspection for faults of specified parts 7. Inspection of assembled parts 8. Professional quality and work efficiency
C	Aircraft Hydraulic System Troubleshooting	1. Maintenance manual reading and job card procedures implementation 2. Preparation of electrical and mechanical maintenance tools 3. Standard wiring practices 4. Cockpit panel identification and power-on tests 5. Personal protection and environment safety and protection 6. Removal and installation of mechanical equipment

4.5. Test Project Circulation

The Test Project will be circulated via the Competition website or in other manners recognized by the Competition Organizing Committee 15 days prior to the Competition.

4.6. Test Project Change

The Test Project will have a 30% change before the Competition. The change is kept confidential and will not be disclosed to any Expert or to any Competitor prior to C-2.

5. Skill Management and Communication

5.1. Expert Group

The Skill Expert Group 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. Competition Communications

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-, in- and post-Competition communication for the Skill can also be carried out through the Forum.

Use the instant communication tool WhatsApp (or WeChat) for online communications and Zoom (or VooV Meeting) for meetings.

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 and facilities that need to be prepared by the participating parties. Refer to the 2022 BRICS Skills Competition (BRICS Future Skills Challenge) - Aircraft Maintenance - Infrastructure List (Online).

7.2. Proposed Workstation and Its Layout

7.2.1. Workstation Layout Requirements

The Competitors' desk should be arranged in a quiet, well-lit, non-disturbing and unobstructed environment. The computer is placed at the middle of the Competitors' desk on which the national flag of the Competitors is put, and two seats for the Competitors should be arranged in front of the desk.

7.2.2. Mobile Monitoring Device Layout Requirements

The center line of the mobile monitoring device No. 1 is at a 45° angle with the plane of the computer monitor. The monitoring device should display the computer monitor and the Competitors' side faces, and an area of 1 meter around the workstation at a height about 1.5 meters above the ground.

The mobile monitoring device No. 2 is placed on the Competitors' Desk, and its center line is at an angle of around 45° with the plane of the computer monitor. The mobile monitoring device No. 2 is required to fully display the computer monitor (the image shown on the computer monitor fills in the screen of the mobile monitoring device No. 2 as much as possible).

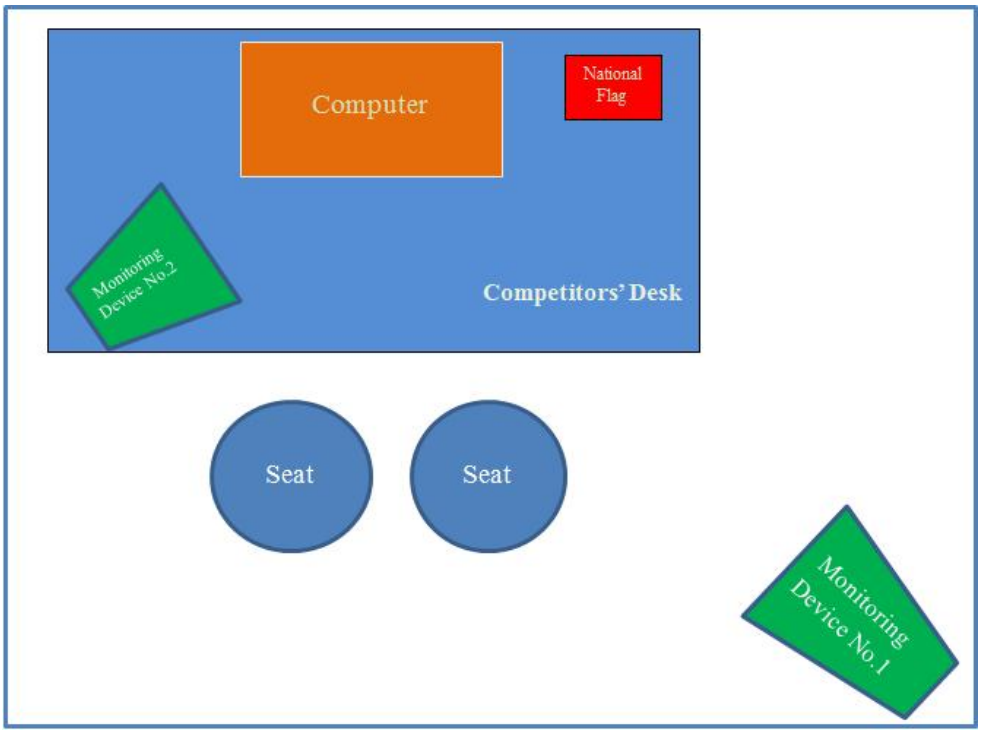

Figure 7.1 Workstation Overall Layout

Figure 7.2 Mobile Monitoring Device No. 1 Layout Example

Figure 7.3 Monitoring Example of Mobile Monitoring Device No. 1

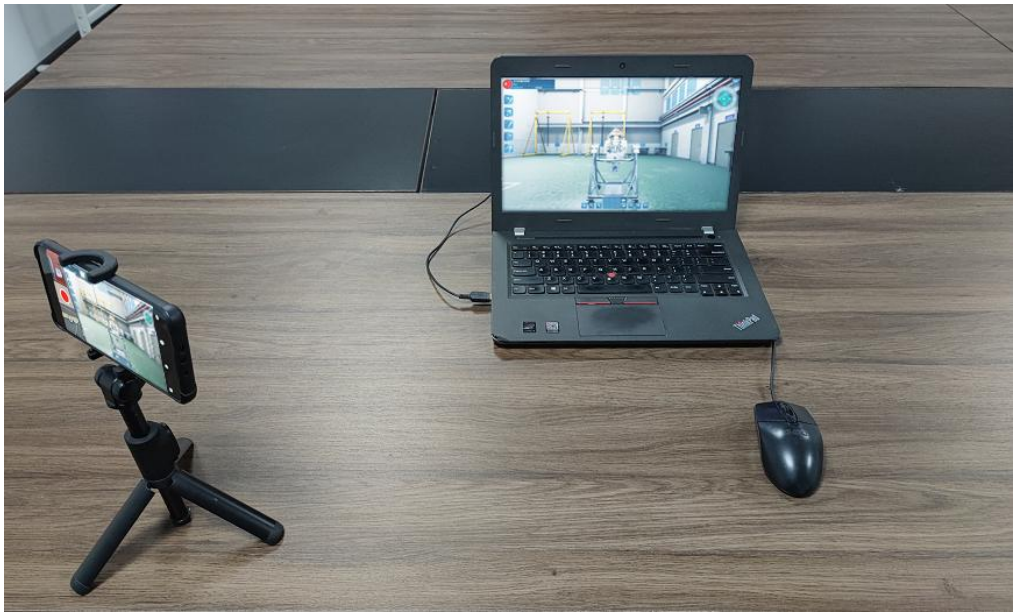

Figure 7.4 Mobile Monitoring Device No. 2 Layout Example

7.3. Materials and Devices Prohibited in the Workstations Area

Competitors should report/show any materials and devices 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.