2025

BRICS SKILLS COMPETITION

(BRICS+ FUTURE SKILLS & TECH CHALLENGE)

Intelligent Manufacturing Equipment Integration Technology (CNC Multi-Axis)

BRICS-FS-52

Technical Description

(International Final)

October, 2025

Content

I. Introduction

1.1 Name and Description of the Skills Competition

1.1.1 Name of the Skills Competition

2025 BRICS Skills Competition (BRICS+ Future Skills and Technology Challenge) – Intelligent Manufacturing Equipment Integration Technology (Multi-Axis CNC). Competition Item Code: BRICS-FS-52-RU.

1.1.2 Description of the Skills Competition

The "Intelligent Manufacturing Equipment Integration Technology (Multi-Axis CNC)" competition item of the 2025 BRICS Skills Competition (BRICS Future Skills and Technology Challenge) focuses on the core operation and maintenance capabilities as well as practical operation skills of machine tool equipment. Through seven core task modules (Modules A-G) – namely Electrical Design and Connection of Intelligent Equipment, Electrical Fault Diagnosis and Troubleshooting of Intelligent Equipment, Disassembly of Mechanical Components of Intelligent Equipment, Assembly of Mechanical Components of Intelligent Equipment, Repair of Mechanical Components of Intelligent Equipment, Construction and Programming of Intelligent Manufacturing Integration Environment, and Professional Literacy and Safety Norms – it comprehensively assesses contestants' practical capabilities in the full-process operation and maintenance of machine tool equipment.

Contestants are required to accurately complete the full-process tasks in an environment simulating real industrial production scenarios, ranging from the construction of machine tool electrical systems, precise fault location and troubleshooting, to the standardized disassembly and installation of machine tool mechanical components. The competition focuses on testing contestants' mastery of machine tool electrical principles, mechanical structures, fault diagnosis logic, and industrial robot programming technology, as well as their practical literacy in standardized operation and efficient collaboration. Finally, through the construction and programming of an intelligent manufacturing simulation environment, the professionalism and accuracy of intelligent manufacturing equipment integration are realized.

The "Intelligent Manufacturing Equipment Integration Technology (Multi-Axis CNC)" competition item is a two-person team competition. It adopts an automatic scoring system combined with manual scoring, and the scoring is based on a unified evaluation algorithm to eliminate manual subjective bias and complete the scoring in real time.

Professionals in the field of Intelligent Manufacturing Equipment Integration Technology (Multi-Axis CNC) need to possess composite skills in machine tool electrical systems and mechanical operation and maintenance, including:
Proficiency in completing standardized wiring of machine tool electrical circuits in accordance with electrical drawings, ensuring the accuracy and safety of circuit

connections;

Accurate mastery of diagnostic methods for common electrical faults of machine tools, and the ability to quickly locate fault points and efficiently eliminate faults through online detection methods;

Completion of the disassembly of mechanical components of machine tools in simulation software in strict accordance with operating procedures, avoiding component damage and potential safety hazards;

Realization of precise installation of machine tool components in accordance with mechanical assembly standards, ensuring assembly accuracy and stable equipment operation;

Proficiency in using industrial robot offline simulation software for path planning, program writing and debugging, ensuring the accuracy of collaborative operations between robots and machine tool equipment;

At the same time, they must always strictly implement industrial safety norms, possess the ability to respond to sudden problems and conduct fault review and analysis, as well as a strong awareness of efficient team collaboration.

These skill requirements mean that practitioners must have knowledge in multiple fields such as machine tool electrical principles, mechanical structures, and safety operation and maintenance. These are the core capabilities that ensure the stable operation of machine tool equipment in the manufacturing industry, promote the integration of intelligent manufacturing equipment, and support the improvement of production efficiency.

1.2 Relevance and Importance of This Document

This document contains the standards required for this skills competition, as well as information on the evaluation principles, methods, and procedures for managing the competition.

Every expert and contestant must understand and comprehend this technical specification.

In case of any conflict between the technical specifications in different languages, the Chinese version shall prevail.

II. Skill Standards

2.1 General Description of Skill Standards

Skill standards specify the knowledge, understanding, and specific skills that represent international best practices in technical and vocational performance. They reflect the global consensus on what relevant job roles or occupations stand for in industries and enterprises worldwide.

Skills competitions are designed to reflect the international best practices described in these skill standards, as well as the extent to which such practices can be

achieved. Therefore, this standard serves as a guide for the training and preparation required for the skills competition.

This standard is divided into different sections with titles and reference numbers. Each section is assigned a percentage of the total score to indicate its relative importance within the standard. This is usually referred to as "weight". The sum of all percentages equals 100. The weights determine the distribution of scores in the grading criteria.

Through the competition tasks, the scoring scheme will only assess the skills listed in the standard. These tasks will reflect the standard as comprehensively as possible under the constraints of the skills competition.

The scoring scheme will adhere to the score distribution specified in the standard to the greatest extent practically possible. A variation of up to 5% is allowed, but the weights assigned by the standard specifications shall not be changed.

2.2 Skill Standards

1	Electrical Design and Connection of Intelligent Equipment	25
	Contestants are required to know and understand: - National standards related to electrical wiring; - Interpretation of electrical drawings; - Selection technology of electrical components for machine tools; - Overall composition system of machine tool electrical systems; - Machine tool safety protection system;	
	Contestants should be able to: - Select machine tool electrical components according to electrical schematic diagrams; - Plan the layout of components in the machine tool electrical cabinet and wiring paths based on electrical schematic diagrams; - Complete circuit wiring operations in accordance with wiring specifications to ensure correct circuits; - Use a multimeter to test the continuity and insulation resistance of electrical wiring; - Troubleshoot faults such as short circuits, open circuits, and loose connections during wiring; - Complete the wiring of the machine tool grounding device; - Verify the correspondence between electrical wiring and PLC input/output signals to ensure normal signal feedback; - Conduct no-load test runs and load tests after electrical wiring to ensure the normal operation of the machine tool electrical system.	
2	Electrical Fault Diagnosis and Troubleshooting of Intelligent	15

	Equipment	
	Contestants are required to know and understand: - Basic theories of machine tool electrical systems; - General standards for electrical safety; - Basic methods and logic for fault troubleshooting; - Standards for maintenance and testing of electrical equipment; - Ability to interpret electrical drawings and technical documents; - Standardized procedures for machine tool electrical fault troubleshooting;	
	Contestants should be able to: - Correctly use a multimeter to measure resistance and voltage; - Use a multimeter to detect conditions such as open circuits (note: duplicate "open circuits" in the original text, retained as is) of the machine tool; - Locate faults using electrical schematic diagrams; - Master fault detection and identification technologies for electrical components; - Verify the effect of circuit fault repair to ensure it meets the operational requirements of the machine tool; - Record the fault troubleshooting process and form a standardized fault troubleshooting report;	
3	Disassembly of Mechanical Components of Intelligent Equipment	5
	Contestants are required to know and understand: - Structure and principle of machine tool mechanical components; - Principles and safety specifications for disassembly of intelligent equipment mechanical components; - Precision characteristics of components and the impact of disassembly on precision; - Specifications for cleaning, inspection, and marking of disassembled components; - Standards for classified placement of parts and components;	
	Contestants should be able to: - Select appropriate disassembly tools based on the assembly form; - Choose suitable disassembly methods according to the type of parts and components; - Reasonably arrange the disassembly process in accordance with task requirements; - Complete the disassembly of machine tool mechanical components;	
4	Assembly of Mechanical Components of Intelligent Equipment	20
	Contestants are required to know and understand:	

	- Structure and principle of machine tool mechanical components; - Assembly relationships and installation datum requirements of machine tool mechanical components; - Principles and safety specifications for assembly of machine tool mechanical components; - Standards for component installation precision and the impact of out-of-tolerance; - Inspection of components before installation;	
	Contestants should be able to: - Select appropriate installation tools based on the assembly form; - Choose suitable assembly methods according to the type of parts and components; - Reasonably arrange the assembly process in accordance with task requirements; - Complete the assembly of machine tool mechanical components;	
5	Repair of Mechanical Components of Intelligent Equipment	10
	Contestants are required to know and understand: - Repair principles of machine tool mechanical components; - Failure analysis of machine tool mechanical components; - Knowledge of materials and heat treatment for machine tool mechanical components; - Testing technologies for repaired machine tool mechanical components;	
	Contestants should be able to: - Select appropriate repair tools based on the repair form; - Choose suitable repair methods according to the type of mechanical parts; - Reasonably arrange the repair process in accordance with task requirements;	
6	Construction and Programming of Intelligent Manufacturing Integration Environment	20
	Contestants are required to know and understand: - Basic knowledge of robot offline programming software; - Knowledge of using robot offline programming software; - Model creation methods for 3D modeling software; - Offline programming and simulation methods;	
	Contestants should be able to: - Import model files created by 3D modeling software into offline programming software; - Use offline programming software to compile robot motion trajectories; - Use offline programming software to create robot system operation	

	scenarios;	
7	Professional Literacy and Safety Norms	5
	Contestants are required to know and understand: - Standards, specifications, and core requirements related to operations throughout the competition; - Core criteria for "independent and undisturbed space"; - Valid standards for time watermarks in monitoring screens and specific requirements for full coverage; - Scope of complete recording of monitoring videos and criteria for determining original records; - Key elements of clear monitoring screens and the importance of avoiding screen issues; - Forms of manifestation of professional literacy throughout the competition operation process and the logical connection between safety awareness and the implementation of operating specifications; - The impact mechanism of the integrity and accuracy of monitoring content on the fairness and objectivity of competition evaluation; - Specific manifestations of professional literacy and safety awareness throughout the competition, such as the logical connection between behaviors (compliance with norms, environmental control, monitoring cooperation, etc.) and evaluation results;	
	Contestants should be able to: - Strictly comply with corresponding standards and specifications throughout the competition operations to ensure that operational behaviors meet the requirements of professional literacy; - Check the environment of the operation area in advance to ensure that the room meets the condition of being unoccupied throughout the process; no other personnel are allowed to enter, stay, or interact during the operation, and at the same time cooperate with the monitoring to verify the coverage of door and window areas; - Check the validity of the time watermark in the monitoring screen to ensure that the time information is continuous, accurate, and untampered, with no occlusion or disappearance throughout the process; - Ensure the integrity of the monitoring video, guaranteeing an unedited, uninterrupted, and non-fast-forwarded/non-slowed-down record of the entire process from entering the operation area, preparation stage, to the full operation process and final departure; - Cooperate in adjusting the monitoring environment to ensure that the monitoring screen can clearly capture hand movements, operation objects, and key areas of the operation environment, avoiding issues such as blurriness, backlighting, and occlusion; - Integrate professional literacy and safety awareness into the entire	

	operation process, and ensure the implementation of various evaluation requirements through standardized behaviors, environmental control, monitoring cooperation, and other actions;	

III. Scoring Scheme

3.1 Scoring Methods

For this competition, the scoring of Modules A to E shall be completed by the automatic scoring system, while the scoring of Modules F and G shall be based on the submitted monitoring videos and works. If contestants engage in cheating or other violations during the competition, the referees shall handle the matter according to the severity of the violations; contestants who commit serious violations shall have their scores cancelled.

3.2 Scoring Rules

1. Contestants with higher total scores shall be ranked higher.

2. If contestants have the same total score, their rankings shall be determined by the scores of the modules in the following order: Module F, Module E, Module C, Module A, Module B, Module D, and Module G. Contestants with higher scores in the corresponding module shall be ranked higher. For details of each module, please refer to Section 4.2 of this document.

If the rankings still cannot be determined based on the above two rules, contestants with shorter total competition time shall be ranked higher.

3.3 Evaluation Basis

During the design of the competition event, the selection of standards and evaluation methods shall be determined through the scoring scheme and competition tasks.

The evaluation basis includes but is not limited to the following:

- Correctness and completeness of machine tool circuit connections
- Rationality of the selection of electrical components for machine tool circuits
- Accuracy of machine tool electrical fault location and efficiency of fault elimination
- Compliance of the test run function of machine tool circuits after fault elimination

- Completeness of the disassembly of machine tool mechanical components and standardization of the disassembly sequence
- Accuracy of the assembly of machine tool mechanical components and standardization of the assembly sequence
- Rationality of the sorting of machine tool mechanical component repair steps and the repair results
- Completeness of the construction of the intelligent manufacturing integration environment
- Completeness of the industrial robot handling task
- Degree of compliance with standards and norms during operations
- Compliance of the monitoring video in presenting an independent and undisturbed operation space
- Integrity of the monitoring video's valid time watermark with full coverage throughout the process
- Originality of the monitoring video (unedited and uninterrupted)
- Clarity of the monitoring video in presenting distinguishable operation details
- Completion time of each competition module
- Completeness of the abnormal situation handling mechanism
- Completeness and standardization of system documents

IV. Competition Tasks

4.1 Common Notes

Whether it is a single module or a series of independent or interrelated modules, the competition tasks can assess the application of knowledge, skills, and behaviors defined in the Skill Specification.

In conjunction with the scoring scheme, the purpose of the competition tasks is to provide comprehensive, balanced, and realistic opportunities for the assessment and scoring of the Skill Specification. The relationship between the competition tasks, the scoring scheme, and the Skill Specification will be a key indicator of quality, just as the relationship between the Skill Specification and actual work performance.

The competition tasks do not cover aspects beyond the Skill Specification, nor do they affect the scoring balance within the Skill Specification.

The assessment of knowledge and understanding through the competition tasks is only conducted based on their application in practical work scenarios.

4.2 Format/Framework of Competition Tasks

The competition tasks consist of seven relatively independent yet interrelated modules:

Module A: Electrical Design and Connection of Intelligent Equipment

Module B: Electrical Fault Diagnosis and Troubleshooting of Intelligent Equipment

Module C: Disassembly of Mechanical Components of Intelligent Equipment

Module D: Assembly of Mechanical Components of Intelligent Equipment

Module E: Repair of Mechanical Components of Intelligent Equipment

Module F: Construction and Programming of Intelligent Manufacturing Integration Environment

Module G: Professional Literacy and Safety Norms

4.3 Time Allocation and Score Weight of Competition Tasks

Module	Duration (min)	Score Weight (%)
Module A: Electrical Design and Connection of Intelligent Equipment	360	25
Module B: Electrical Fault Diagnosis and Troubleshooting of Intelligent Equipment		15
Module C: Disassembly of Mechanical Components of Intelligent Equipment		5
Module D: Assembly of Mechanical Components of		20

Module	Duration (min)	Score Weight (%)
Intelligent Equipment		
Module E: Repair of Mechanical Components of Intelligent Equipment		10
Module F: Construction and Programming of Intelligent Manufacturing Integration Environment		20
Module G: Professional Literacy and Safety Norms		5
Total	**360**	**100**

4.4 Content and Requirements of Each Module

The competition content covers Electrical Design and Connection of Intelligent Equipment, Electrical Fault Diagnosis and Troubleshooting of Intelligent Equipment, Disassembly of Mechanical Components of Intelligent Equipment, Assembly of Mechanical Components of Intelligent Equipment, Repair of Mechanical Components of Intelligent Equipment, Construction and Programming of Intelligent Manufacturing Integration Environment, and Professional Literacy and Safety Awareness. It comprehensively assesses contestants' practical abilities in machine tool electrical assembly, fault diagnosis, mechanical disassembly/assembly, and compliance with industry safety norms.

Module A: Electrical Design and Connection of Intelligent Equipment: Focuses on assessing the selection and installation of simulated machine tool electrical components, circuit connection, and other related content.

Module B: Electrical Fault Diagnosis and Troubleshooting of Intelligent Equipment: Focuses on assessing the fault detection of simulated machine tool circuits, test run verification after fault elimination, and other related content.

Module C: Disassembly of Mechanical Components of Intelligent Equipment: Focuses on assessing the disassembly of the X-axis and Y-axis in the simulated machine tool, and other related content.

Module D: Assembly of Mechanical Components of Intelligent Equipment: Focuses on assessing the installation of the X-axis and Y-axis in the simulated machine tool, and other related content.

Module E: Repair of Mechanical Components of Intelligent Equipment: Focuses on assessing the sorting of mechanical component repair steps and the repair of mechanical components, and other related content.

Module F: Construction and Programming of Intelligent Manufacturing Integration Environment: Focuses on assessing the construction of industrial robot and simulation environment, program writing, handling teaching, and other related content.

Module G: Professional Literacy and Safety Awareness: Focuses on assessing compliance with operation standards and norms during the operation process, the independence and non-interference of the operation space (verified via monitoring

video), the validity of the time watermark in the monitoring video, the integrity of the monitoring video, and the clarity of the monitoring video pictures， and other related content.

Module No.	Module Name	Main Competition Scope/Content
A	Electrical Design and Connection of Intelligent Equipment	1. Complete the selection and installation of machine tool circuit protection devices; 2. Complete the selection and installation of machine tool circuit control devices; 3. Complete the selection and installation of machine tool circuit power supply devices; 4. Complete the wiring of the tool magazine circuit according to the electrical schematic diagram.
B	Electrical Fault Diagnosis and Troubleshooting of Intelligent Equipment	1. Use a multimeter to detect circuit continuity, locate electrical faults, and submit the accurate fault location; 2. Complete the test run verification after circuit fault elimination.
C	Disassembly of Mechanical Components of Intelligent Equipment	1. Complete the disassembly of the X-axis worktable; 2. Complete the disassembly of the X-axis ball screw and related components; 3. Complete the disassembly of the X-axis guide rail and limit stop; 4. Complete the disassembly of the X-axis base; 5. Complete the disassembly of the Y-axis ball screw and related components; 6. Complete the disassembly of the Y-axis guide rail and limit stop.
D	Assembly of Mechanical Components of Intelligent Equipment	1. Complete the installation of the Y-axis guide rail and limit stop; 2. Complete the installation of the Y-axis ball screw and related components; 3. Complete the installation of the X-axis base; 4. Complete the installation of the X-axis guide rail and limit stop; 5. Complete the installation of the X-axis ball screw and related components; 6. Complete the installation of the X-axis worktable.

Module No.	Module Name	Main Competition Scope/Content
E	Repair of Mechanical Components of Intelligent Equipment	1. Complete the sorting of mechanical component repair steps; 2. Complete the repair of mechanical components.
F	Construction and Programming of Intelligent Manufacturing Integration Environment	1. Complete the construction of the industrial robot and simulation environment; 2. Complete the writing of the industrial robot program; 3. Complete the handling teaching of the industrial robot.
G	Professional Literacy and Safety Awareness	1. Comply with operation standards and norms; 2. Ensure the operation area is independent and undisturbed, and the monitoring video fully shows an unoccupied environment throughout the process; 3. Ensure the time watermark in the monitoring video is valid, continuous, accurate, and untampered; 4. Ensure the monitoring video is complete, unedited, and uninterrupted; 5. Ensure the monitoring video is clear enough to accurately judge operation details and safety behaviors.

4.5 Release of Competition Tasks

The competition tasks will be released approximately 1 month before the competition via the official competition website (http://www.brskills.com/jzzy/product.html).

4.6 Revision of Competition Tasks

Approximately 30% of the competition tasks will be revised before the official competition.

V. Skill Management and Communication

5.1 Expert Group

The skill expert group consists of a chief expert, deputy chief experts, and expert

members, who are jointly responsible for further revising the technical documents related to this competition event.

5.2 Communication and Discussion

Before the competition, for questions related to registration, software and hardware preparation, and examination environment deployment, participating teams may join the relevant communication group for the "Intelligent Manufacturing Equipment Integration Technology (Multi-Axis CNC)" competition event to conduct communication and discussions. Communication regarding training for this competition event, as well as exchanges before, during, and after the competition, can also be carried out through the official communication group.

Online communication will mainly be conducted using instant messaging tools (such as QQ/WeChat/Telegram).

Official QQ Group: 1003227507

VI. Safety Requirements

6.1 Organizational Structure

1. A competition safety support team shall be established, with the team leader serving as the director of the competition event working group. Members shall be the safety supervisors of each competition venue. Each venue shall designate one safety supervisor, who shall take full responsibility for the safety of the venue. In case of emergencies, the supervisor shall be responsible for deploying rescue teams and professional rescuers, and arranging the evacuation of personnel in the venue.

2. A coordination mechanism shall be established with relevant departments such as public security, fire protection, judicial administration, transportation, health, food, and quality inspection to ensure competition safety. Emergency plans shall be formulated to handle emergencies in a timely manner. Dedicated contact lines shall be set up for medical staff, firefighters, and security personnel, and corresponding contacts shall be confirmed, with the venue safety supervisor acting as the counterpart for communication. The layout of the competition venue and the use of equipment shall be carried out in strict accordance with safety construction regulations. The venue layout shall be divided into zones, evacuation routes shall be set in accordance with safety requirements, and diagrams of safety evacuation passages and routes shall be posted in prominent positions on the walls.

6.2 Competition Event Safety Management

1. During the online competition, the competition event safety management regulations and the online competition platform safety operation guidelines shall be strictly followed. Operations shall be completed in accordance with standardized requirements in the virtual simulation environment. Unauthorized operation of platform functions or tampering with simulation data is strictly prohibited.

2. Fire extinguishers shall be placed in accordance with fire safety requirements, and a responsible person shall be designated to use them in emergencies.

3. The competition event rules shall clearly specify the national (or industry) safety standards, regulations, and qualification certificate requirements for relevant professional positions.

4. The competition event working group shall provide safety training to all referees and staff of the competition event before the competition. In accordance with relevant regulations and requirements, a sound safety accident prevention system shall be established, and training shall be provided to contestants before the competition to avoid personal injury accidents.

5. The competition event expert group shall develop a special plan to ensure the safety of the competition question setting, storage, distribution, collection, and

evaluation processes.

6.3 Competition Environment Safety Management

1. The competition venue shall be arranged by the participating unit. It shall be ensured that the computers in the venue meet the competition requirements, and monitoring equipment shall be installed to fully cover the contestants' operation areas in the venue.

2. The monitoring screen shall cover the doors, windows, and workstations of the venue to prevent unauthorized personnel from entering and avoid emergencies. Contestants shall provide necessary labor protection equipment by themselves in the competition site in accordance with the requirements of relevant professional positions. For operation links with potential risks, referees shall check and confirm that the equipment is in normal condition before the competition, and strictly prevent contestants from making incorrect operations during the competition.

3. To ensure the smooth progress of this competition, contestants shall abide by the following safety guarantee system:

(1) During the competition, no one except the contestants shall be allowed to enter the competition venue.

(2) Before the competition starts, contestants shall carefully read the relevant precautions for the competition and the emergency evacuation map.

(3) Each competition equipment shall use an independent power supply to ensure safety. When conducting computer programming, contestants shall save their work in a timely manner to avoid data loss caused by sudden power outages.

(4) During the competition, contestants shall strictly abide by the safety operating procedures. In case of emergencies, they shall immediately cut off the power supply and evacuate in an orderly manner under the arrangement of the staff.

(5) All personnel shall strictly abide by the venue rules. Bringing prohibited items into the venue is strictly prohibited.

(6) Security personnel shall promptly report any potential safety hazards to the venue responsible personnel.

(7) Smoking is strictly prohibited in the competition venue, and security personnel shall not transfer their certificates to others.

(8) In case of safety problems, under the guidance of security personnel, evacuate the site quickly in accordance with the emergency evacuation route.

6.4 Living Conditions Guarantee

1. During the competition, the accommodation and meals for contestants and instructors shall be arranged uniformly by each participating unit. Participating units shall respect the religious beliefs and cultural customs of ethnic minority participants, and arrange the accommodation and meals for ethnic minority contestants and instructors in accordance with relevant national ethnic and religious policies.

2. The accommodation arranged during the competition shall have the qualification for hotel and accommodation operation.

3. Except for necessary safety isolation measures, relevant national laws and regulations shall be strictly followed to protect personal privacy and personal freedom.

6.5 Responsibilities of Participating Teams

1. When organizing participating teams, each participating unit shall arrange for the purchase of personal accident insurance for contestants during the competition.

2. After the formation of the participating team of each unit, relevant management systems shall be formulated, and safety education shall be provided to all contestants and instructors.

3. Each participating team shall strengthen the safety management of personnel participating in the competition and connect with the venue safety management.

6.6 Emergency Handling

In case of an accident during the competition, the discoverer shall report to the competition event working group at the first time, and take measures to prevent the situation from expanding. The competition event working group shall immediately activate the emergency plan to resolve the problem. For competition events with major safety problems, the competition area working group shall decide whether to suspend the competition. After the incident, the competition area working group shall issue a detailed report on the situation.

6.7 Penalty Measures

1. If a major safety accident occurs in a competition event, the hosting qualification of the undertaking unit for the competition event shall be suspended.

2. If a major safety accident is caused by a participating team, its qualification for award evaluation shall be revoked.

3. If a participating team has major safety accident hazards and fails to correct them after being reminded and warned by venue staff, its qualification to continue the

competition shall be revoked.

4. For staff who violate the rules during the competition, responsibilities shall be pursued in accordance with the corresponding system. Those who commit serious violations and cause major safety accidents shall be pursued for corresponding legal responsibilities by the judicial organs.

VII. Materials and Equipment

7.1 List of Infrastructure

The list of infrastructure details all the equipment and facilities that participants need to prepare, which can be found in the "Infrastructure List for Intelligent Manufacturing Equipment Integration Technology (CNC Multi-axis Direction) Offline Competition of the 2025 BRICS Skills Competition".

7.2 List of Competition Equipment

7.2.1 Technical Platforms

Serial No.	Platform Name	Quantity	Remarks
1	Yalong YL-F10D Intelligent Manufacturing Equipment Integration Technology Assessment Platform	1	
2	Intelligent Manufacturing Integration Environment Construction Software	1	

7.2.2 Specifications and Parameters

Serial No.	Name	Content	Quantity	Remarks
1	Yalong YL-F10D Intelligent		1 set	(1) Selection and installation of

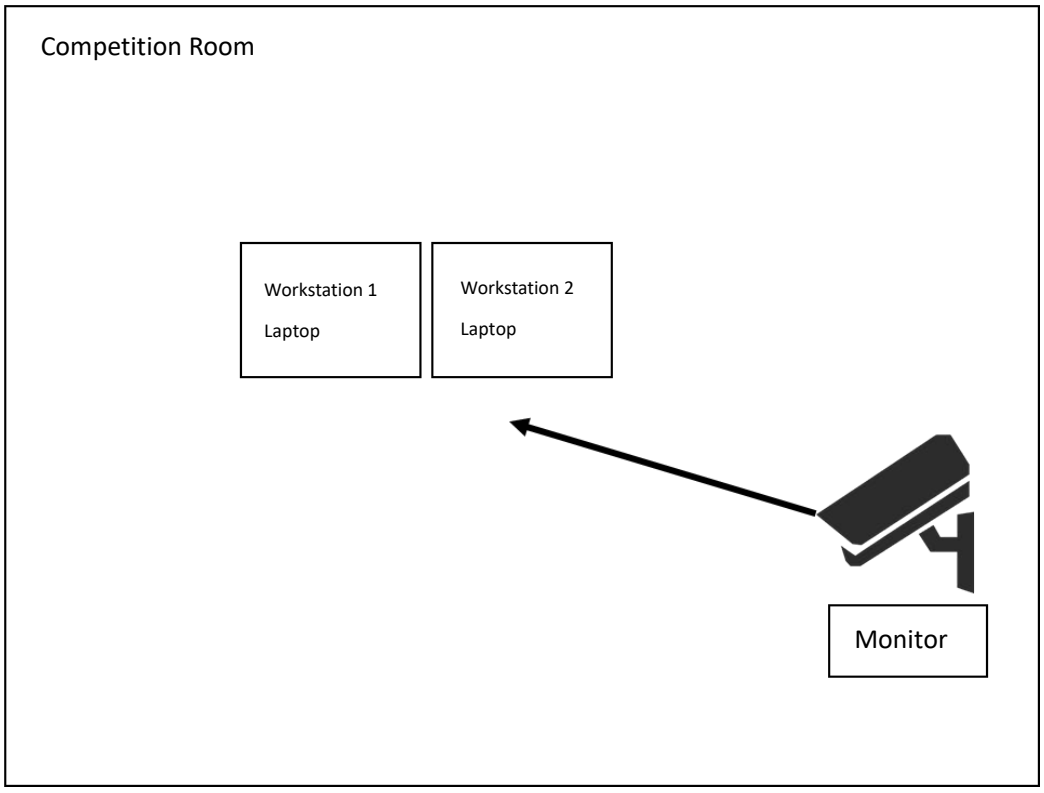
Serial No.	Name	Content	Quantity	Remarks
	Manufacturing Equipment Integration Technology Assessment Platform			machine tool circuit components; (2) Circuit connection of machine tool circuits; (3) Fault simulation and detection of machine tool circuits; (4) Trial operation of machine tool circuits; (5) Detachable mechanical components of the machine tool; (6) Installable mechanical components of the machine tool;
2	Intelligent Manufacturing Integration Environment Construction Software		1 set	(1) Offline environment construction for industrial robots (2) Programming of industrial robot programs (3) Teaching for industrial robot handling
3	Computer for Programming and Design Workstation	Including one workstation computer desk (to be provided by the participating unit itself)	1 set	21.5-inch monitor;Processor: Intel Core i5 or equivalent or higher; Memory: ≥8GB; Hard disk: ≥500GB available space; Graphics card: Independent graphics card with video memory

Serial No.	Name	Content	Quantity	Remarks
			≥2GB;	
			Operating system: Windows 10, 64-bit or higher version, capable of running relevant engineering software smoothly.	

7.3 Prohibited Materials and Equipment in the Skill Area

Any materials and equipment brought by participants shall be declared (and shown) to the experts. Experts may prohibit the use of any items that are irrelevant to the task execution or may bring unfair advantages to the competitors.

7.4 Recommended Layout of Competition Area and Workstations



VIII. Special Rules for Online Competition

8.1 Online Competition Venue Setup

The detailed rules for participants regarding online competition venue setup are listed in the "Venue Setup List for Online Competition of Intelligent Manufacturing Equipment Integration Technology (CNC Multi-axis) in the 2025 BRICS Skills Competition".

Serial No.	Name	Content	Remarks
1	Venue Standards	Priority shall be given to an independent, interference-free space (e.g., classroom, office). The space shall accommodate at least 2 sets of computer desks and chairs plus the operating distance for 2 people. There shall be no objects blocking monitoring in the venue. The door shall be closed during the competition, and no other persons are allowed to enter.	
2	Desk and Chair Layout	Two sets of desks and chairs shall be placed side by side, both facing the wall. Each desk shall be equipped with 1 computer, and the keyboard/mouse shall be placed on the desktop.	

Serial No.	Name	Content	Remarks
3	Monitoring Camera Setup	1 camera shall be configured (using a mobile phone is not recommended, as some mobile phones lack the function of recording time during video recording). The camera shall be placed at the right rear of the participant, with a height of at least 1.8 meters. For reference, refer to Section 7.4 of this document. The camera shall clearly cover "the participant's upper body + hand operations + computer screen", and the participant's face shall not be blocked. An example image is shown in the remarks.	
4	Venue Network	It is recommended that the competition computer be connected to a stable wired or wireless network. Using a mobile phone hotspot is not recommended, as it may cause disconnection from the server and affect the progress of the competition.	

8.2 Rules for the Online Competition Process

1. Screen recording shall be enabled for all computers used in the competition (full-screen recording shall be adopted; medium or low video quality is sufficient, with a resolution of 1080P and a frame rate of 24-30 FPS to avoid excessively large screen recording files). After the competition, the screen recording files shall be uploaded to the designated location. Failure to provide the screen recording files will result in invalid scores.

2. Monitoring and screen recording shall be started in advance before the competition. When submitting the video, only the video segment within the specified competition time range needs to be extracted (2 minutes before the competition starts and 2 minutes after the competition ends; the time outside the competition will not be included in the evaluation).

3. During the online competition, all team members are not allowed to use communication devices such as mobile phones. Interfaces of communication software (e.g., QQ, WeChat) are prohibited from appearing in the computer operation screen recording. Any violation found will be deemed as cheating, and the scores will be invalidated.

4. During the official competition, instructors are not allowed to enter the competition venue. Those who do not follow the advice will lead to the disqualification of the team they guide. In principle, teams are not allowed to leave the venue for any reason. If there is a special reason, the team must obtain the referee's approval and return to the online venue within the specified time.

5. After the competition starts, participants shall start the competition tasks on the software platform on time. Unless there are special circumstances, the software platform shall not be closed or the page refreshed. In case of accidental closure or network disconnection, the competition countdown on the software platform will pause when closed and resume timing when re-entering.

6. After participants start the competition tasks, the end time of the competition shall be subject to the remaining time displayed on the software platform. The monitoring and screen recording shall also be based on this time, and the competition will end automatically when the time is up.

8.3 Post-Competition Process for Online Competition

1. After the referee announces the end of the competition, participants shall stop answering questions, package the completed task materials (see the task document for specific requirements), and upload the package to the designated address. The files shall be compressed into a compressed package and named in accordance with the requirements (see the task document for naming rules; the format shall be ".zip", ".rar", or ".7z"). Cases such as non-compliant naming, unopenable damaged files, and failure to upload files will be deemed as invalid results, with a score of 0.

Upload URL for the compressed package: To be issued on the competition day

2.All team members shall strictly abide by these rules and obey the referees' work. Any violation will be recorded in the violation record form by the chief referee and handled in accordance with the violation penalty measures.

3. For other matters not covered herein, the chief referee, arbitrators, and scoring referees shall jointly negotiate and provide on-site solutions.

4. If there is any doubt about the referee's decision during the competition, the instructor may submit a formal arbitration application within 2 hours after the end of the competition. Applications submitted after the deadline will not be accepted.

8.4 Notes

1. Participants shall bring relevant identification documents when entering the venue and can only start the competition after completing the online check-in. If any impostor is found, the team's qualification will be disqualified.

2. Participants are not allowed to disclose their identities in any way during the competition. No documents submitted by the team shall contain or imply any identity information related to the team or its school, including but not limited to the school name, LOGO, names of instructors and team members, and team name.

3. The competition adheres to the principles of fairness, impartiality, democracy, and openness. To promote and cultivate the integrity and rigor of engineers' ethics, any act of using improper means to improve one's score or engaging in fraud shall be deemed a violation. Penalties ranging from score deduction to disqualification will be imposed based on the severity of the violation. The competition will arrange referees with professional and technical capabilities to rule on violations. The table below lists some violations and corresponding penalty measures:

Violation Regulations	**Penalty Measures**
Impersonating others to participate in the competition	Disqualification of the team

Violation Regulations	Penalty Measures
Instructor refusing to follow advice and entering the competition venue to provide guidance or operate	Disqualification of the team
Searching for information online or seeking off-site help during the competition	Disqualification of the team
Academic misconduct such as plagiarism in competition results	Disqualification of the team
Disclosing team information (e.g., school name, logo, or instructor's name) to experts	10 points deducted
Submitted competition results showing the team's school, identity, or other related information	10 points deducted
Using any AI-assisted tools to answer questions during the competition	Score of 0
Failure to upload competition results and computer screen recordings within the specified time (based on the time displayed on the platform)	Score of 0

4.If a team has any doubt about the results, it may apply to the competition organizing committee for arbitration.

IX. Skill-Specific Rules

Skill-specific rules must not contradict or take precedence over the competition rules. They will provide specific details and clear explanations for various aspects that vary across skill competitions. These include, but are not limited to, personal computing devices, data storage devices, internet access, work procedures, and document management and distribution.

Topic/Task	Skill-Specific Rules
Using technology — USB, memory cards	1) Participants are prohibited from bringing memory cards or any other portable storage devices into or out of the competition venue.
Using technology: Personal laptops, tablets, and mobile phones	1) Experts and interpreters may use personal laptops, tablets, and mobile phones. 2) Participants are not allowed to bring personal laptops, tablets, or mobile phones into the competition venue.
Using technology — Personal cameras	Only after the competition tasks are completed or with the approval of the chief expert may participants, experts, and interpreters use personal photography and video recording devices in the competition venue.
Evaluation of competition tasks	1) For each workstation (module), the chief expert will assign a supervising expert with the highest professional level in that field. While participants are completing the competition tasks, this expert will monitor OHS compliance and the completion or non-completion of competition task points, which can only be evaluated during the participants' task execution. The designated expert bears full responsibility for the fairness of the participants' evaluation. 2) If, at a workstation, the participant and the expert are from the same organization, the expert may be replaced once during the module duration.
Making 30% changes to competition tasks	During the period of introducing 30% changes (on Day C-2), experts must perform the following tasks: 1) Based on the equipment and software provided by the competition sponsors (for all modules): - Update the installed assembly drawings (or photos); - Update the electrical schematics; - Update the task point descriptions regarding the software and hardware characteristics of the equipment provided by the competition sponsors.
Technical issues encountered by participants during task completion	1) If a technical issue arises during the implementation of the competition tasks (not due to the participant's fault), the participant will be granted additional time equal to the duration from the discovery of the defect to its complete resolution. 2) If the technical issue is found to be caused by the

Topic/Task	Skill-Specific Rules
	participant's fault, the participant will not be granted additional time.
PPE (Personal Protective Equipment)	Personal protective equipment such as safety clothing, steel-toe shoes, and gloves shall be provided by the participants themselves.