

# **The First World Vocational College Skills Competition**

## **Competition Rules**

### **I. Name of the Skill**

No.: W14

Chinese name: 轨道交通驾驶技术

English name: Rail Transit Driving Technology

Industry: Transportation

### **II. Competition Purpose**

The competition aims to bring together standards, technologies, equipment, teachers, and students in the domestic and international fields of vocational and technical education, adhere to promoting Chinese vocational education to go global and serve international cooperation in production capacity, build an important platform for teachers and students of relevant international vocational schools to deepen friendship, exchange skills, and show their talents, and promote the construction of a world community of skills. Through the integration of skills competition, display, and experience exchange, the best practices of international vocational and technical education are expected to be shared, the influence of Chinese vocational and technical education in the world in this field is to be enhanced, and China's vocational and technical education will be aligned with global vocational and technical education.

The innovative development of intelligent transportation and smart trains is leading the direction of the world's rail industry. The competition is designed with a focus on elements of rail vehicles (urban rail, high-speed rail), which are a national business card, and reproduces the real work situations of rail vehicle drivers. The vocational education concept of engineering practical innovation is incorporated into the competition, and key contents of post responsibilities are emphasized. The competition benchmarks rail industry standards and shows the achievements of Chinese vocational education for rail vehicle drivers to the world.

### **III. Competition Content**

The competition includes Modules A and B, respectively: Module A, the operation of urban rail transit train drivers, the competition contents of which cover key operations of rail transit train drivers such as vehicle inspection, outbound operation, main track operation, troubleshooting, and contingency response; Module B, driving operation of multiple units, the competition contents of which focuses on the routine driving operations of drivers of multiple units and covers the key operations in the whole procedure of train driving.

#### **i. Module A: Operation of urban rail transit train drivers**

1. Preparation operation for urban rail transit train drivers

One competitor uses the simulation maintenance terminal to carry out static inspection of the train and sees if there are any abnormalities in the driver's cab, the under vehicle running gear, and the first passenger compartment at the outbound end of the train. A certain number of vehicle faults or abnormalities will be arranged during the operation, and the competitor needs to mark the relevant contents correctly with no need to restore the relevant vehicle faults or abnormalities.

## 2. Driving operation for urban rail transit train drivers

The three competitors take turns to undertake the work of different posts, including posts of the train driver, the train scheduler (auxiliary post), and the station personnel (auxiliary post). The operation contents include completing the dynamic performance test operation of the train, driving the train from the depot to the conversion rail by manual driving, driving the train to the first station by automatic driving after the train is upgraded to the CBTC mode, and main track operation (driving the train using a combination of automatic and manual driving). During the driving operation, the competitor also needs to complete contingency troubleshooting and contingency response.

### **ii. Module B: Driving operation of multiple units**

#### 1. Offline competition contents

Two competitors of Module B operation collaborate with each other to complete the task of driving multiple units on the route between three stations and in two intervals. In the first interval, the two competitors act as the multiple unit driver and the accompanying mechanic (auxiliary post) respectively, and the multiple unit driver drives the train to the intermediate station with the assistance of the accompanying mechanic. After the train stops at the intermediate station, the two competitors swap roles and complete in-station handover operation, and the multiple unit driver continues to complete the driving operation of the second interval with the assistance of the accompanying mechanic. Three contingency troubleshooting tasks need to be completed during operation

#### 2. Online competition contents

Online competition contents of Module B will be performed via the online assessment and evaluation software for simulation driving. The specific procedures and contents of online operation are basically the same as those of offline operation.

## **IV. Competition Method**

### **i. Team formation requirements**

1. The "0.5+0.5" Chinese-foreign mixed team (hereinafter referred to as the "mixed team") is adopted. One Chinese teacher and four students (two Chinese students and two foreign students) are mixed into one team. Competitors will register, compete, and win awards as teams.

2. Domestic student competitors must be full-time students of transportation majors in higher vocational schools and undergraduate schools. Domestic teacher competitors must be full-time teachers of transportation majors in higher vocational schools and undergraduate schools, and the teaching experience of teacher competitors in this major shall be no less than two years.

3. Foreign competitors must be foreign full-time students in related majors of vocational

schools or colleges and universities providing vocational education, and international students of undergraduate schools in China are also encouraged to participate.

4. Competitor replacement: If a competitor is unable to participate for any reason during the preparation, the relevant department should issue a written explanation ten working days before the start of the corresponding Competition. The competitor will be replaced after verification by the office of the Executive Committee. After the Competition starts, the team is not allowed to replace the competitor.

### **ii. Competition format**

The competition is held both online and offline, and teams compete through on-site operation or recorded videos. The three Chinese competitors shall complete the operation of Module A and Module B offline. The two foreign competitors shall complete the operation of Module B, which the team can choose to complete either by online video recording using virtual software or offline.

### **iii. Competition simulation training and exercise**

The competition training is conducted in a unified manner one month prior to the competition day. Competition software exercise is carried out one week before the competition day in a unified manner to simulate the environment of the competition site, the operation process, and operations such as downloading test questions and submitting test questions.

## **V. Competition Process**

The competition uses Test Project to issue the competition requirements, and competitors will cooperate to complete the tasks given in Test Project of the Competition. The cumulative competition duration is 200 minutes (The final schedule may be adjusted based on the status of the workshop, entry registration, etc.), and the competition timeline is shown in the table.

**Competition Timeline**

Date	Time	Contents
The day before the Competition	Before 12:00	Registration of participating team
	Before 14:00	On-site check-in of teams to participate in the competition on the afternoon of the day
	14:00-15:40	Module A operation by Chinese competitors from Groups 1, 2, 3, 4, and Module B operation by Chinese competitors from Groups 9, 10, 11, 12
	15:40-16:20	Equipment restoration
	16:20-17:00	Module B operation by foreign competitors from Groups 5, 6, 7, 8
Competition day (1)	Before 8:30	On-site check-in of teams to participate in the competition on the morning of the day
	8:30-10:10	Module A operation by Chinese competitors from

		Groups 5, 6, 7, 8, and Module B operation by Chinese competitors from Groups 1, 2, 3, 4
	10:10-10:50	Equipment restoration
	10:50-11:40	Module B operation by foreign competitors from Groups 9, 10, 11, 12
	Before 14:00	On-site check-in of teams to participate in the competition on the afternoon of the day
	14:00-15:40	Module A operation by Chinese competitors from Groups 9, 10, 11, 12, and Module B operation by Chinese competitors from Groups 5, 6, 7, 8
	15:40-16:20	Equipment restoration
	16:20-17:00	Module B operation by foreign competitors from Groups 1, 2, 3, 4
	After the completion of the competition	Closing ceremony

Note: The organization and arrangements of the Competition will be fine-tuned based on the organizational needs of the Competition. For specific arrangements, the official release of the competition guidelines shall prevail.

## **VI. Competition Task Paper**

The competition task paper consists mainly of practical questions. The competition task paper is developed by the expert panel, and the Test Projects should cover the full range of types, and be complete and professional, so as to meet the needs of the Competition. The Test Projects are designed to be of comparable difficulty to reflect the fairness of the Competition. The Test Projects will be made public on the Competition information platform one month prior to the start of the Competition.

## **VII. Competition Rules**

### **i. Lot drawing and familiarization with the workshop**

1. The Executive Committee will arrange a unified lot drawing for on-site teams after the registration, which will decide the location of the workshop for each team.
2. The Executive Committee will arrange on-site teams to get familiar with the workshop in a unified and orderly manner. When familiarizing themselves with the workshop, teams are limited to the observation area and are not allowed to enter the Competition area. It is strictly forbidden to communicate with on-site staff. Please refrain from making unfounded remarks that may cause damage to the overall image of the Competition.
3. Teams should strictly observe all rules for the Competition when familiarizing themselves with the workshop. In order to avoid accidents, crowding, talking loudly and jostling are strictly forbidden.

### **ii. Competition requirements for competitors**

1. The competitors must obey the unified arrangement and command of the on-site judge when they enter the workshop, and they need to check and test the competition equipment

and operating environment first and report to the judge in time in case of any problem.

2. Competitors must not perform formal competition operation before the judge announces the start of the Competition.

3. During the Competition, competitors are not allowed to leave their workstations at will, communicate with other competitors, or leave the workshop without permission. In case of any problem, the competitor must raise his/her hand to the judge and ask before dealing with the problem; otherwise, it will be treated as cheating.

4. During the Competition, only the judge is allowed to enter the workshop, and no persons unrelated to the Competition are allowed to enter the workshop.

5. During the Competition, competitors must strictly observe the safety operation procedures, ensure personal and equipment safety, and accept the supervision and warning by on-site judges and technical personnel. If the Competition cannot be continued due to equipment failure or damage caused by the competitor, the jury president has the right to terminate the Competition. If the equipment failure is not caused by the fault of competitors, the jury president will decide on a case-by-case basis (suspending the competition timing or moving the team to the last batch for the Competition). If equipment failure is identified, additional time will be granted at the discretion of the judge.

6. Competitors are not allowed to leave the workshop without permission during the Competition. If there are special circumstances, consent must be obtained from the judges. If competitors take a break, drink water, and use the restroom, these are included in the competition time, and no extra time will be allocated. The competition timing tool is based on the clock placed at the workshop.

### **iii. Result evaluation and publication**

1. A result management organization consisting of a jury and a supervision and arbitration team is founded under the leadership of the Executive Committee of the Competition through division of responsibilities. Specific requirements and division of responsibilities are as follows:

(1) The jury is under the “jury president responsibility system” with one jury president, who is fully responsible for the judging and management of the Competition, and deals with the controversial issues arising from the Competition.

(2) The supervision and arbitration team is responsible for supervising the work of the jury and reviewing the results of the Competition by sampling, accepting written appeals against the judging results submitted by leaders of participating teams, organizing reviews and providing timely feedback on the results of the reviews.

#### **2. Result components**

If on-site operation is adopted for modules A and B, the results will be calculated normally. If the team performs online operation using software and completes Module B by uploading the recorded video, the results obtained will be given a factor of 0.9 as the results of the module.

The components of the total result of a team are:

Teams with online participation: Total result = Module A result  $\times$  70% + [0.5  $\times$  (0.9  $\times$

online Module B result + offline Module B result)] × 30%

Teams without online participation: Total result = Module A result × 70% + (0.5 × total results of two Module B sessions) × 30%

Teams that choose to complete the second session of Module B by online video recording must send the competition video that meets the competition requirements to the e-mail designated by the Executive Committee before 18:00 (Beijing Time) the day before the official competition day. The Executive Committee will check and try to play the videos and seal them for filing, and on the official competition day the jury will unseal them.

### 3. Result evaluation

#### (1) On-site marking

Based on the marking sheet, the judge will mark the teams' operation standardization and performance. The marking results will be signed for confirmation by the judge and the jury president.

#### (2) Result marking

The competition results submitted by the competitors and the quality of competition will be marked according to the marking standards of the Competition, and the marking process will be monitored throughout.

### 4. Result review and announcement

(1) To ensure the accuracy of the result evaluation, the supervision and arbitration team will review the results of all teams (competitors) ranked among the top 30% of the overall results of the Competition; the results of the rest teams (competitors) will be reviewed on a sampling basis, with a coverage rate of no less than 15%.

(2) The supervision and arbitration team shall promptly notify the jury president in writing of any marking errors identified in the review, who will correct the results and sign for confirmation.

(3) If the error rate of review and sampling exceeds 5%, it will be identified as a non-small probability event, and the jury shall review all the results.

(4) After the competition results are reviewed for accuracy, the results of the Competition will be reviewed and signed by the jury president and the leader of the supervisory and arbitration team for confirmation.

(5) The competition results will be announced in paper form to all teams at the designated place after declassification.

## **iv. Health, safety and environmental protection of the Competition**

### 1. Health, safety and environmental protection policies

All personnel engaged in the Competition must comply with the policies on safe and ethical production and all kinds of technical specifications related to it, the electrical safety operating procedures, and the regulations of the Competition on health, safety and environmental protection.

### 2. Health and safety training and its implementation

Each competitor shall be responsible for his or her own safety and health. All competitors are required to receive relevant training. The Executive Committee of the First World Vocational College Skills Competition is responsible for supervising its implementation and ensuring the health, safety and environmental protection of the personnel concerned in accordance with the regulations.

3. Any work in the Competition shall not damage the environment in and around the workshop. Each competitor must keep the workshop, materials and equipment in his or her work area clean. Smoking is prohibited in the workshop.

4. The concept of green manufacturing is promoted, and recyclable materials shall be treated and collected after being sorted.

#### 5. Pandemic prevention and control requirements

(1) Routine epidemic prevention monitoring shall be conducted during the Competition. Epidemic prevention check shall be carefully conducted on a daily basis. The staff shall be informed of the health condition of competitors promptly through observation, inquiry and understanding, and fill in the standing book carefully. If symptoms such as fever, headache, diarrhea, vomiting, depression, etc. are found among the competitors, or if the competitors are found to have been in contact with confirmed or suspected infected patients in an inquiry, it shall be reported immediately, and records shall be properly kept at the same time. No individual shall conceal, delay, or falsely report, or ask others to conceal, delay, or falsely report the COVID-19 outbreak, and whoever violates it will be held accountable.

(2) When a suspected COVID-19 outbreak is found among the competitors and team leaders, the staff shall use the temporary quarantine observation room for quarantine and medical observation (one room for one person) immediately, promptly contact the education and health (CDC) sectors to coordinate testing, and strengthen the tracking management of suspected patients.

(3) If a case is confirmed by the institution of disease prevention and control and the medical institution, the patient shall be immediately sent to a designated hospital for quarantine and treatment, and contacts of the patient shall be notified of the case confirmation. The duration of quarantine and treatment is subject to the results of medical examination.

(4) Suspicious items that cause the spread of infectious diseases shall be sealed to control the source of infection, cut off the transmission route, and prevent the spread of disease, and wait for the institution of disease prevention and control to test and handle it.

(5) When an infected patient receives treatment in the hospital, no student is allowed to visit without the consent of the medical staff.

(6) When a suspected or confirmed case appears, active measures shall be taken immediately to keep competitors and team leaders informed, pacify the emotions of teachers and students, reassure people, and establish the belief to overcome the disease.

### **VIII. Competition Environment**

#### **i. Workshop**

The workshop shall be no smaller than 500m<sup>2</sup> and contain no less than six competition workstations. The workshop is set up with a competition workstation area, judge area,

service area, technical support area, and medical support area, and a lounge is also available. Good light, illumination, and ventilation shall be ensured for the workshop, and stable water, electricity, and emergency power supply equipment shall be provided. The workshop provides a full range of live video equipment to meet the needs of spectators outside the workshop. The service area provides medical care and other services and guarantees. The offline entry criteria for international teams are uniformly and appropriately adjusted according to the actual situation of their location.

## **ii. Competition workstations**

Each workstation shall occupy an area not smaller than 5 m × 6 m, with the workstation number marked, and be equipped with a competition technology platform of the corresponding module. The workstation area of the Competition of the rest modules shall meet the equipment requirements to ensure that the teams do not disturb each other.

Each workstation in the workshop is provided with single-phase 220 V AC power independently controlled and equipped with a leakage protection device, and necessary safety protection measures are available. In order to ensure the smooth running of the Competition, the computers in the workshop shall be equipped with uninterruptible power supply system.

## **iii. Competition equipment**

All competition equipment will be provided and guaranteed by the Executive Committee of the Competition (“Executive Committee”). The hardware and software platforms required for the Competition in the competition area will be prepared according to the number of participating teams, and standard competition equipment will be provided for these teams.

## **iv. Venue opening**

The competition environment is designed according to the needs of the Competition, and is opened to the media and industry experts under the premise that the Competition is not disturbed. The media and industry experts are allowed to visit the site along the designated route within the specified time period. The display site is set up with a live display area, and a media interview area is also provided. Good light, illumination and ventilation shall be ensured for the workshop, and stable water, electricity, and emergency power supply equipment shall be provided. The display workshop provides conditions for setting up media equipment.

## **v. Site firefighting and escape requirements**

(1) There must be “emergency safety evacuation maps” hung in the workshop and a conspicuous “safety exit” sign. Competitors and judges must be clearly informed of the locations of safety lanes and safety gates before the Competition.

(2) A 1.5-meter wide “safety evacuation lane” at least shall be set in the workshop, with a “safety lane” sign clearly painted on the ground, and a corresponding “safety protection fence marking line” in the working area.

(3) The workshop must be equipped with sufficient “fire extinguishers” to ensure that each competition workstation has a fire extinguisher.

## **vi. Requirements of the lighting system**

- (1) The workshop is well-lit and can guarantee normal competition during the day.
- (2) The workshop should be installed with enough energy-saving lights to ensure that normal competition can be conducted even in the evening or when the light is dim.
- (3) Competition workstations shall be equipped with portable lights or torches.

## **IX. Technical Specifications**

### **i. Industry technical standards**

1. GB/T 7928-2003 General Technical Conditions for Subway Vehicles
2. GB/T 26718-2011 Technical Requirements for Urban rail Safety System
3. GB/T 50839-2013 Technical Specifications for Safety Control of Urban rail Engineering
4. GB/T 34571-2017 Rules for Routing of Rail Locomotives and Vehicles
5. National Vocational Skills Standards for *Rail Train Drivers (Urban Rail Transit Train Drivers)* (Occupation code: 4-02-01-01)
6. LD/T 81.1-2006 Technical Specifications for Vocational Skills Practical Training and Appraisal Equipment
7. CRH380A Assessment Standards for Brake Removal and Locomotive Rescue, Haulage, and Preparation of Unified Multiple Units
8. CRH2A/CRH380A Assessment Standards for Brake Removal and Locomotive Rescue, Haulage and Preparation of Unified Multiple Units
9. IEC60077 Electrical Equipment for Railroad Construction Locomotives and Vehicles
10. IEC60571-2006 Electronic Equipment for Railroad Vehicles
11. IEC60664-1-2007 Electrical Coordination of Electrical Equipment in Low-voltage Systems

### **ii. Technical platform standards of the Competition and modules**

The technical standard details will be updated and published based on the Competition technology platform once it is confirmed by the Competition technology platform.

### **iii. Overall operation requirements**

1. Competitors must have safety awareness and professional ethics, abide by all safety regulations, use tools correctly and protect personal safety. In case of any accident, competitors will quit and cancel the Competition.
2. The competitor shall wear personal protective gear correctly throughout the Competition. If the wearing is not qualified, the judge has the right to remind the competitor or stop the operation. During the Competition, it is prohibited to operate outside the operation area or intentionally obscure the operation contents. The competitor shall use tools and materials in a standardized manner and place them in the specified post, and keep the operation area neat and clean. It is prohibited to spill products, accessories and tools onto the ground, or go back and forth to fetch tools and materials inside and outside the workshop.

3. Pay attention to the standard and rated current of the power outlet, and use 220 V/50 Hz AC power in a safe manner.

4. The workshop and equipment shall be inspected before operation, and tools and materials shall be picked according to the operation requirements. The operation process requires “seeing, finger-pointing and calling out”, that is, seeing, doing and saying. The operation process needs to be accurately recorded in accordance with the requirements of the record card. After operation, it is required to clean up the site and return the tools.

5. When a fault is found during troubleshooting, use on-site materials and tools to mark or deal with it accordingly, and describe the defect in detail.

6. The item result will be canceled if the competitor talks back to the judge, disrupts the order, deliberately procrastinates, damages the competition equipment and environment, or causes serious accidents during the operation.

## X. Technology Platform

### i. Requirements for competition equipment

<b>Module of Preparation Operation for Urban Rail Transit Train Drivers</b>			
<b>No.</b>	<b>Equipment name</b>	<b>No.</b>	<b>Equipment name</b>
1	Competition system of preparation operation for urban rail transit train drivers	2	Competition management system of preparation operation for urban rail transit train drivers
<b>Module of Driving Operation for Urban Rail Transit Train Drivers</b>			
<b>No.</b>	<b>Equipment name</b>	<b>No.</b>	<b>Equipment name</b>
1	Side window display (left)	10	Train fuse screen
2	Forward 3D vision display	11	Right control panel (bottom)
3	Side window display (right)	12	Screen door and train door buttons (both left and right)
4	MMI display	13	Spare parts cabinet
5	HMI display	14	Extinguisher
6	Left control panel (top)	15	Broadcast panel
7	Left control panel (bottom)	16	Driver controller handle
8	CCTV display	17	Competition management system for urban rail vehicle drivers
9	Right control panel (top)		
<b>Module of driving operation for multiple units</b>			
<b>No.</b>	<b>Component of system</b>	<b>No.</b>	<b>Component of system</b>
1	Competition management system of multiple unit simulation driving	2	Multiple unit simulation driving system
3	Vehicle ground control system		

### ii. Functional requirements for equipment of preparation operation for urban rail transit train drivers

<b>System name</b>	<b>Functional requirements</b>
Module of	1. The competition system of preparation operation for urban rail transit

preparation operation for urban rail transit train drivers	<p>train drivers models the vehicle body structure, running gear, passenger compartment, etc. at 1:1 scale with reference to the specifications of Type B urban rail transit vehicles, and the overall structure, layout, and appearance is consistent with the actual vehicle. The system should be able to meet the requirements of the assessment of operation contents of the dynamic and static train tests for urban rail transit train drivers. Also, it should be able to make a comprehensive analysis of the items and points of violations of rules and regulations in the process of the competitor's operation, and automatically determine whether the analysis result is correct.</p> <p>2. The competition management system of preparation operation for urban rail transit train drivers should be able to display the current online competitor, and allow exporting the competitor's operation results and other information and selecting a user to view the detailed operation records of the selected user.</p> <p>The system should be able to produce reasonable and accurate evaluation results in the form of report cards based on the various operating conditions of the competitors.</p>
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**iii. Functional requirements for equipment used in driving operation for urban rail transit train drivers**

The area required for the installation of each competition workstation is about 5m × 6m, and the workshop needs to be equipped with AC220 V power supply with a power of about 10 KW. The competition workstation consists of the driver's console, train simulation terminal, joint control terminal, and the practical training device of the multiple unit brake. The driver's console is made based on the Type B subway train at 1:1 scale, which can meet all the operation needs of the driver's driving. The train simulation terminal is used to simulate a complete virtual train and provide the rest of operation conditions other than the driver's console. The joint control terminal is used to cooperate with the driver in completing standard joint control operation.

No.	Item	Functional requirements
1	Overall system requirements	<p>The system should meet the requirements of standardized operation, contingency troubleshooting, contingency response, rescue coupling, and train propulsion operation in the opposite direction and the requirements of practical training and assessment of urban rail transit train drivers.</p> <p>It must be a fully functional simulation system for subway train driving. The system should conform to kinetic characteristics of the vehicle and fully simulate the train control logic.</p> <p>All operating systems should support Windows 7 and above, and all interactive systems should provide Chinese graphical interface, which is in line with the operation mode of conventional window-based systems, and such systems can be proficiently operated after a short training.</p>
2	Hardware	1. The driver's console: It should be made based on the Type B

	components	<p>subway train at 1:1 scale and have the same function and control logic as the equipment on an actual train. It contains: The emergency brake application button, pantograph raising and lowering buttons, high-speed circuit breaker button, direction selection handle, driver controller handle, activation key switch, vehicle status display HMI, signal display MMI, intercom equipment, and other necessary buttons, meters, switches, knobs, etc. The driver can realize simulated driving and control of the train by controlling such equipment to simulate various states during train operation.</p> <p>3. Vision display system: In order to allow the driver to be immersed in a completely realistic operating environment and experience the visual sensation during real train operation, three monitors are installed on the driver's console for the display of the forward, left, and right vision respectively.</p> <p>4. Sound simulation equipment: Sound simulation equipment can provide students with real auditory effects in the operation environment and a realistic simulation of the sound environment during operation.</p> <p>5. Train fuse screen cabinet It can select the commonly used control fuse of the subway train and form interlocking control relationships through software to control the vehicle status. It includes the two major sub-functions of the driver's cab fuse screen and the passenger compartment fuse screen, and can realistically reproduce the actual function of each fuse. It can be linked with the vision display system, HMI, MMI, and CCTV for corresponding linkage display.</p>
3	Requirements for virtual scenario components	<p>The virtual scenario line shall contain no less than 11 stations (no less than ten intervals) and no less than one depot, and adopt automatic turn-back when the train turns back.</p> <p>1. Train operation simulation system The train operation simulation system includes train performance simulation and control characteristic simulation. It uses train performance parameters, control logic and work parameters to accurately simulate the real vehicle functions, which is simulation at the level of principles. It includes modules such as locomotive control logic, troubleshooting and abnormality handling, instructor system, vision system and sound system.</p> <p>2. Display system The system needs to include four electronic display systems on the driver's console: The MMI vehicle display system, HMI signal display system, CCTV passenger compartment monitoring display system, and radio panel. The stability, maintainability and consistency with the real vehicle should be ensured.</p> <p>3. Vision system The system should be able to meet the special needs of terrain scheduling, which involves a large quantity of complex rendering information, and has optimization for special equipment in this</p>

	<p>industry such as the signal and turnout. The system mainly provides elements such as the front track, stations along the line, equipment and landscape along the line, and internal parts of the subway. The line vision is based on data of the real line, and the line parameters such as line longitudinal sections, signals, transponders, and bridges of the model built are consistent with the real ones. It simulates the actual driving environment and the original appearance of the line, including the whole line scenarios under the circumstances of different speeds, different times, different weather, and different landscapes, ensuring the consistency between driving control and environmental changes.</p> <p>4. Sound system It can simulate the sound generated during train operation. The sound simulation system should be able to simulate the sound environment during the train operation, which needs to parallel the visual environment, so that the user can get more information from the environment providing both vision and hearing, thus enhancing the immersion and interactivity.</p> <p>5. Competition management platform It can work with the driving simulator online or offline. When working offline, it should allow course design, fault information management, assessment record management, system data management, and other work. When working online, it should be able to realize the management and monitoring of the driving simulation process, system fault diagnosis, remote maintenance, and other functions.</p> <p>1) System software: It should allow the routine maintenance and management of the driving simulation device, preparation and maintenance of the competition content, monitoring and intervention of the driving training and interactive/assessment process, etc.</p> <p>2) Scenario editor: The training contents can be designed based on different scenario types of driving simulation, fault, and abnormalities, and corresponding assessment can be arranged for students. The contents of the scenario preparation workstation should include at least the following:</p> <ul style="list-style-type: none"> <li>a) Task parameter settings;</li> <li>b) Task model settings;</li> <li>c) Operation time settings;</li> <li>d) Adding trains and setting their approach graphically;</li> <li>e) Operating conditions: The instructor sets the relevant operating conditions of the train based on the teaching progress; weather conditions: Setting the weather as sunny, rainy, snowy, etc.; running time: Setting the starting simulation time of the task and the duration of the task, etc.; train position: Setting the starting and ending positions of the train.</li> </ul> <p>3) Result management system: The result management system is a module in the simulator system used to view the examination and</p>
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		<p>training results of students.</p> <p>4) Assessment subsystem: It contains the operation real-time monitoring and recording module and the intelligent marking module. The system can monitor and record every step of the exercise process in real time, and automatically evaluate the results against the standard answers.</p> <p>6. MMI control software It can simulate a variety of contingencies, such as line faults, mechanical failure in equipment, ATP faults, and a series of other possible faults and problems. It can simulate the fault states such as failure in train emergency brake release, failure in service brake release, train traction with no flow, failure in single compartment brake release, on-board ATP faults, and faults of various indicator lights.</p>
4	System software functions	<p>i. Specific contents of system software functions</p> <p>1. Assessment requirements for standardized driving simulation Standardized driving simulation exercise and practical training shall include modules such as control methods, driving skills, equipment operation and joint control operation, application of brakes, and switching of different driving modes. It shall include the necessary elements such as the depot, conversion rail, and transponders. The video needs to include the upgrade of the train from RM communication level to CBTC communication level after passing through two passive transponders and one active transponder. It shall include automatic train benchmark stop, DTI countdown, automatic train door opening, and automatic train station announcement. It shall include train manual driving benchmark stop, manual door opening, and automatic train station announcement.</p> <p>2. Requirements for train driving simulation troubleshooting It is required to be provide a fault handling procedure consistent with the real situation, including all possible faults and contingencies of the train. Through fault settings, it can simulate the fault status of the screen, meters, indicator lights and other equipment on the console of the urban rail simulation practical training system. It can simulate various unexpected faults, including not limited to the following troubleshooting: Failure of release of full train emergency brake, train HMI crashes or blank screen faults, failure in opening of all train doors, failure in brake release of a single train compartment.</p> <p>3. Functional requirements for contingency response competition assessment It is required to simulate various unexpected accidents encountered during the operation of urban rail trains, including emergencies, different weather, different environments, etc.</p> <p>ii. Functional requirements for driving simulation</p> <p>1. Standard operation contents of driving simulation (including but not limited to)</p>

		<p>Outbound operation; inbound operation; main track driving; one standardized operation (outbound operation + main track driving + inbound operation)</p> <p>2. Troubleshooting contents of driving simulation (including but not limited to)</p> <p>The fault of full train traction with no flow; fault of full train traction inverter; fault of two auxiliary inverters; fault of a single auxiliary inverter; fault of failure in release of full train emergency brake; fault of failure in release of full train service brake; fault of failure in release of full train parking brake; fault of failure in release of single compartment brake; fault of failure in full train door opening; fault of failure in full train door closing; fault of failure in single door closing; fault of failure in linkage between the train door and the screen door; vehicle/ground signal system fault; train air compressor fault; fault of train HMI crash or blank screen; broadcast fault.</p> <p>3. Contents requirements for contingency response (including but not limited to)</p> <p>The handling of foreign objects hanging on the contact net during train operation; the handling of waterlogging during train operation; the handling of foreign objects intruding into the boundary during train operation; the handling of fire during train operation; the handling of passenger alarm during train operation; the handling of insufficient lookout distance in special weather; the handling of foreign objects caught in the door when the door is closed for operation.</p>
5	Competition management system	<p>1. Requirements for basic functions</p> <p>(1) The query function should have both statistical and detailed numbers. It allows query of various types of operation information, train location, train status, and other information in the detailed list, and it can access data by linkage.</p> <p>(2) It can provide the function for multiple-choice query.</p> <p>(3) It provides functions for data upload, download, and export, and the format of export files is applicable to Excel, PDF, Word, and other mainstream office software.</p> <p>It can compare and analyze the data, and the comparison and analysis indicators are intuitive and clear. It allows flexible adjustment to the data push mode based on needs.</p> <p>2. Other functional requirements</p> <p>(1) The response time of each functional operation and the return time of query results should be able to meet the real-time requirements of the Competition.</p> <p>(2) It should have the competition data detection function: It can automatically filter and screen data on the platform according to the specified data detection rules, and present the wrong data in a specific form.</p>

**iv. Functional requirements for equipment used in driving operation of multiple units**

System name	Functional requirements
<p>Competition management system of multiple unit simulation driving</p>	<p>It should be able to display the current online competitor, can display in real time the online competitor's operation line, speed, operation status, and other information, and allows selecting a user to view the detailed operation records of the selected user. Maintenance and modification can also be made to the contingency troubleshooting procedure in the system. The system supports multidimensional statistical analysis of users' operation records, contingency troubleshooting records, assessment records, and other data.</p> <p>The management system can monitor the competitor's operation and the operation result in real time, and evaluate the competitor's operation records and operation procedures in all aspects. The system should be able to produce reasonable and accurate evaluation results in the form of report cards based on the various operating conditions of the competitors.</p>
<p>Multiple unit simulation driving system</p>	<p>The driving simulation system needs to model multiple units at 1:1 scale, and the overall structure, layout, and appearance should remain consistent with the actual vehicle. The system is able to reproduce realistically the operating conditions of multiple units in different situations for the drivers of multiple units in terms of visual and control realism, and to realize the skills assessment of multiple units connection in the virtual driving environment with a high degree of immersion.</p> <p>The simulation system needs to be able to realistically simulate the traction and braking characteristics of multiple units in various conditions and working conditions. It must be able to respond to driver's operations accurately in real time.</p> <p>The simulation system needs to include the MMI display, CIR display and train control screen of the multiple units. The operation functions, interface switching, and terminal display should be basically the same as the real vehicle. The interface display items, layout, graphic shape and color, the dynamic display when the examiner operates the equipment and in train system control should be consistent with the actual vehicle. Each indicator light is associated with the status of the equipment of each system in the real vehicle, and is basically consistent with the output of the equipment operation logic.</p> <p>The simulation system should be able to meet the requirements of the assessment on the dynamic and static train tests, train driving simulation, troubleshooting, and other operation for multiple units drivers. The system needs to be able to realistically simulate the traction and braking characteristics of multiple units in various conditions and operating conditions. The system should be able to make a</p>

	<p>comprehensive analysis on the items and points of violations in the competitor's operation, and automatically determine whether the analysis result is correct.</p> <p>The system needs to support the software registration procedures for the train control equipment during outbound operation. e.g., registration driver number, registration train number, transfer to CTCS-2 and CTCS-3 signal modes, automatic brake test failure, abnormal CPU disconnection, etc. The system should be able to meet the requirements for assessment of preparation operation, dynamic and static inspection and experiment of the train, and the simulated driving operation contents for multiple units drivers. The operation contents are assessed in a procedure or result-oriented manner. Also, it should be able to make a comprehensive analysis of the items and points of violations of rules and regulations in the process of the competitor's operation, and automatically determine whether the analysis result is correct.</p> <p>The system should support the brake test of the vehicle and operation of the brake handle. Both the status of pressure change and the contingency brake trigger can be observed on the MMI display.</p> <p>The system should support the vehicle vigilance alarm experiment, and the experiment process will switch the MMI display to the vigilance alarm interface to confirm the vigilance braking action.</p>
<p>Online assessment and evaluation system for simulation driving of multiple units</p>	<p>The online assessment and evaluation software for simulation driving of multiple units adopts BS architecture design and consists of the competition management system for simulation driving of multiple units and the system for simulation driving of multiple units. The competition management system for simulation driving of multiple units mainly completes the monitoring and process evaluation functions of the driving manipulation data of the client through the software deployed on the server end, and the system for simulation driving is mainly deployed on the client computer for the participants to complete the driving and troubleshooting operation of multiple units, and the competitors can complete the practice and competition assessment of the preparation operation, en route operation, contingency troubleshooting, and other procedures through the client.</p>

## **XI. Result Evaluation**

### **i. Principles for development of marking criteria**

The competition result evaluation follows the principle of fairness and openness, with skills assessment as the main focus, taking into account the teamwork spirit and professional ethics.

Marking judges shall assume the responsibility for evaluating the skill demonstration, compliance with operation specifications, and competition works of the competitor teams (or competitors) in accordance with the marking criteria of the Competition. The marking

criteria shall be as objective as possible, with quantifiable marking points and traceability throughout the marking process.

Assessment rules: In the competition, the competitors must complete the competition step by step according to the technical documents including technical rules and submit the results, and the judge will mark it step by step (conducting the process marking for operational standardization).

Ranking rules: Competitors are ranked by the total result from highest to lowest. In case of equal marks, the competitors will be ranked by the total time taken to complete the competition, and the competitor that uses shorter time will win.

## **ii. Judges**

The categories of judges are from rail transportation related enterprises, non-participating schools, and non-competition cooperating enterprises, and have deputy senior professional and technical titles or above or are senior technicians. In order to meet the needs of internationalization of this competition, the judges should have good English communication skills and the ability to read, write and communicate in professional English for rail vehicles.

The jury of the Competition is formed by expert panel, consisting of one jury president, two jury leaders, 16 judges (including four marking judges for recorded videos), and two check-in judges, with a total of 21 judges. Specifically, the jury president is responsible for the organization and supervision of all the competition items; the jury leader is responsible for on-site supervision of judging of each module; the judge is responsible for the supervision of the workshop discipline and the evaluation of the standardization of competitor's actions and joint control language; the check-in judge is responsible for the information check-in of all the competition items.

## **iii. Marking method**

### **1. Organization and division of responsibilities**

(1) The organizations involved in the management of the competition results include the jury and the supervision and arbitration team, which are led by the Executive Committee.

(2) The jury is under the "jury president responsibility system" with jury presidents, on-site judges, encryption judges, and marking judges (Encryption judges and marking judges can be other types of judges at the same time).

(3) The check-in staff is responsible for the registration, identity verification, etc. of teams (competitors). The on-site judges make the workshop records properly, maintain the workshop discipline, and evaluate the on-site marks of the teams according to the regulations. The marking judges are responsible for evaluating the competition processes and performance of the teams (competitors) according to the competition marking standards.

(4) The supervision and arbitration team is responsible for supervising the work of the jury and reviewing the results of the Competition by sampling. The supervision and arbitration team is responsible for accepting appeals against the judging results submitted by leaders of participating teams, organizing reviews and providing timely feedback on the results of the reviews.

## 2. Result evaluation methods

Result evaluation is to evaluate the performance and final results of the teams or competitors in the Competition based on the competition assessment objectives and contents. The competition results and answer sheets submitted by the competitors will be evaluated and marked according to the evaluation standards of the Competition.

All marking forms and result summaries are filed for verification, and the final results are reviewed and confirmed by the jury president and submitted to the office of the Executive Committee of the First World Vocational College Skills Competition.

## 3. Result announcement methods

The mark keeper will summarize the declassified results of each team (competitors) into the competition results, and announce the results after the signature of the jury president and the supervision team leader. If there is no objection in two hours following the announcement, the final results of the total marks of the Competition will be entered into the competition management system. After the jury president, supervision team leader, and chief arbitrator have reviewed and signed on the system-derived marking form, the final results will be announced and the certificate will be issued at the closing ceremony.

### iv. Judgment method

The competition uses a full mark of 100 points, and the judgment methods include result-based marking and process-based marking.

#### 1. Result marking

The competitor completes the competition contents within the specified time according to the requirements of Test Project, and the system will provide result-based marking.

#### 2. Process marking

For the parts involving site management and safety in operation specifications, the judges will give points step by step to the teams (competitors) based on the safety, standardization, reasonableness, and completion quality in the process of step-by-step operation according to the marking standards.

If the competitors commit fraud, disobey the instructions of the judge, or disturb the order of the workshop, the jury president will deduct the corresponding points according to the rules. Serious circumstances will result in disqualification from the Competition, with the competition results recorded as 0 points.

### v. Marking allocation for items

The competition uses a full mark of 100 points, the mark weight of each module is shown in the table of the weight of each module, and the final mark is the sum of the percentage mark of each module.

Table of Module Weights

Module		Weight proportion
Module A	Operation for urban rail transit train drivers	70%
Module B	Driving operation of multiple units	30%

Total:	100%
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Marking Allocation Table Used in Preparation Operation for Urban Rail Transit Train Drivers

No.	Item	Marks	Marks Specific gravity (SG)	Contents	Notes
1	Preparation operation	100		One round of train static inspection of the train to see if there are any abnormalities in the driver's cab at either end of the train, the under vehicle running gear, and the first passenger compartment at the outbound end of the train.	-

Marking Allocation Table Used in Driving Operation for Urban Rail Transit Train Drivers

No.	Item	Marks	Marks Specific gravity (SG)	Contents	Notes
1	Train dynamic performance test	5	5%	Inspecting the dynamic performance of the train, including dynamic tests of the doors, train braking system, traction system, and auxiliary control system.	-
2	Train outbound operation	5	5%	Train yard operation, smooth driving, approach signal status confirmation, interlock control between posts, and approach alignment.	-
3	Driving operation	30	30%	Driving the train on time at the required speed, driving smoothly, benchmark stop, and door opening and closing operations. At the same time, contacting train scheduling post personnel and station staff according to the post contact standardization.	-
4	Contingency troubleshooting	20	20%	Brake system faults, including four scenarios in total: (1) failure in release of full train emergency brake; (2) failure in release of full train service brake;	The item is randomly selected as the

No.	Item	Marks	Marks Specific gravity (SG)	Contents	Notes
				<p>(3) failure in release of full train parking brake; (4) failure in release of single compartment brake.</p> <p>Traction system faults, including two scenarios in total: (1) Fault of full train traction with no flow; (2) fault of full train traction inverter.</p> <p>Auxiliary system faults, including three scenarios in total: (1) Fault of two auxiliary inverters; (2) fault of a single auxiliary inverter; (3) train air compressor fault.</p> <p>Door system fault, including four scenarios in total: (1) Failure in full train door opening; (2) failure in full train door closing; (3) failure in single door closing; (4) failure in linkage between the train door and the screen door.</p> <p>Other system faults, including three scenarios in total: (1) Vehicle/ground signal system fault; (2) fault of train HMI crash or blank screen; (3) broadcast fault.</p>	assessment item.
5	Contingency response of emergencies	15	15%	<p>Handling of foreign objects hanging on the contact net during train operation</p> <p>Handling of waterlogging during train operation</p> <p>Handling of foreign objects intruding into the boundary during train operation</p> <p>Handling of fire during train operation</p> <p>Handling of passenger alarm during train operation</p> <p>Handling of insufficient lookout</p>	The item is randomly selected as the assessment item.

No.	Item	Marks	Marks Specific gravity (SG)	Contents	Notes
				distance in special weather Handling of foreign objects caught in the door when the door is closed for operation	
6	Train turn-back operation	10	10%	Operation of automatic train turn-back; Operation of manual train turn-back.	-
7	Train inbound operation	15	15%	Train yard operation, smooth driving, approach signal status confirmation, interlock control between posts, approach alignment, and train shutdown operation.	-
Total		100		-	-

Marking Allocation Table for Driving Operation of Multiple Units

No.	Item	Marks	Marks Specific gravity (SG)	Contents	Notes
1	Pre-departure operation	10	10%	Pre-departure operations such as operation equipment inspection, system test, train powering-on, train activation, and high-voltage power supply.	-
2	En route operation	30	30%	Including but not limited to en route triggering of the emergency brake without reason, en route triggering of vigilance actions, overspeeding during operation, and excessive impulse value during operation.	-
3	En route operation troubleshooting	40	40%	Including but not limited to system activation faults, traction system faults, network system faults, the emergency operation mode, brake system faults, key system reset faults, bus faults, and driver display faults.	Three contingency response items arranged

No.	Item	Marks	Marks Specific gravity (SG)	Contents	Notes
4	Operation standardization	20	20%	Standards for finger pointing and looking, calling and answer, in-station handover, and joint control of the vehicle and machinery.	-
Total		100		-	-

## **XII. Awards and Prizes**

A gold, silver and bronze medal will be awarded to each different team, and the top 50% of the overall teams (other than the top three) will be awarded the winning prize.

## **XIII. Preliminary Plans for the Competition Venue**

In accordance with the relevant policies, contingency response plans for workshop emergencies and contingency response plans for epidemic prevention and control are developed.

## **XIV. Safety**

### **i. Competition safety plan**

Event safety is a prerequisite for the smooth running of all work of the skills competition and a core issue that must be considered in the preparation and operation of the Competition. The Executive Committee shall take practical and effective measures to ensure the personal safety of competitors, team leaders, judges, staff, and audience during the Competition.

#### **1. Competition environment**

(1) The Executive Committee shall organize a special inspection on the workshop, accommodation places and transport before the Competition, and make explicit safety requirements. The arrangement of the workshop, the equipment and facilities within the workshop, should comply with the relevant national safety regulations. If necessary, workshop simulation tests can also be conducted to identify possible problems. The organizer must exclude hazards in accordance with the requirements of the Executive Committee before the Competition.

(2) A cordon should be set up around the workshop, and all the competitors should enter the workshop with valid documents issued by the Executive Committee to prevent the entry of unauthorized persons in case of accidents. The necessary labor protection should be provided for the competitors with reference to the requirements of the relevant occupational posts within the competition site. In the section with dangerous operation, the judges should take strict precautions against the wrong operation of the competitors.

(3) The organizer should provide conditions to ensure the implementation of the contingency plan. For competitions involving work at height, possible falling objects, large electricity consumption, fire prone and other circumstances, policies and plans must be specified, and first aid personnel and facilities must be equipped.

(4) Flammables, explosives, and all kinds of hazardous materials unrelated to the Competition shall be strictly prohibited from being brought into the workshop, and it is not allowed to bring school bags into the workshop.

(5) The Executive Committee shall formulate the staff evacuation plan for the open workshop and experience area in conjunction with the organizer. In addition to complete indication signs, additional guidance personnel shall be assigned and alternate lanes shall be opened in areas where there are crowded and intersecting traffic and pedestrian flow in the workshop environment.

(6) During the Competition, the organizer of the Competition shall strengthen the key posts in the management of the workshop and establish a security management log.

## 2. Living conditions

(1) During the Competition, in principle, the Executive Committee will arrange the food and accommodation for the competitors and team leaders. The organizer shall respect the culture and beliefs of ethnic minorities and arrange the food and accommodation for the competitors and coaches of ethnic minorities in accordance with relevant national ethnic policies.

(2) The place of accommodation arranged during the Competition should have the business permit for hotel/accommodation. If the school dormitory is used for accommodation, the Executive Committee and the school providing the dormitory will be jointly responsible for the accommodation, health, and food safety during the Competition.

(3) Transport safety of organized visits and observation activities during the Competition is under the responsibility of the Executive Committee. The Executive Committee and the organizer shall ensure the transport safety for competitors, team leaders, judges and staff during the Competition.

(4) The security management, in addition to the necessary security quarantine measures that can be taken, should strictly comply with the relevant national laws and regulations to protect personal privacy and personal freedom.

## 3. Team responsibility

(1) Each school shall purchase personal accident insurance for the competitors and team leaders during the Competition when organizing the teams.

(2) After the teams of each school are formed, the relevant management policy shall be formulated and safety education shall be provided to all competitors and team leaders.

(3) The teams shall strengthen the safety management of the competitors and achieve the alignment with the safety management of the workshop.

## 4. Emergency response

If an accident occurs during the Competition, whoever finds it should report to the Executive Committee immediately, and also take measures to avoid further deterioration. The Executive Committee should immediately activate the contingency plan to address the problem.

## 5. Penalties

(1) Teams involved in a major safety risk may be disqualified from continuing with the Competition, if they are alerted and warned by the staff of the workshop but of no avail.

(2) Staff who violate rules will be held accountable according to the corresponding policies. Where the circumstances are serious and cause major security incidents, the relevant parties will be held legally accountable by the judicial authorities.

#### 6. Pandemic prevention and control requirements

(1) Routine epidemic prevention monitoring shall be conducted during the Competition. Epidemic prevention check shall be carefully conducted on a daily basis. The staff shall grasp the health condition of competitors promptly through observation, inquiry, and understanding, and fill in the standing book carefully. If symptoms such as fever, headache, diarrhea, vomiting, depression, etc. are found among the students, or if the students are found to have been in contact with confirmed or suspected infected patients in an inquiry, it shall be reported immediately, and records shall be properly kept at the same time. No individual shall conceal, delay, or falsely report, or ask others to conceal, delay, or falsely report the COVID-19 outbreak, and whoever violates it will be held accountable.

(2) When a suspected COVID-19 outbreak is found among the competitors and team leaders, the staff shall use the temporary quarantine observation room for quarantine and medical observation (one room for one person) immediately, promptly contact the education and health (CDC) sectors to coordinate testing, and strengthen the tracking management of suspected patients.

(3) If a case is confirmed by the institution of disease prevention and control and the medical institution, the patient shall be immediately sent to a designated hospital for quarantine and treatment, and contacts of the patient shall be notified of the case confirmation. The duration of quarantine and treatment is determined based on the results of medical examination.

(4) Suspicious objects that cause the spread of infectious diseases shall be sealed to control the source of infection, cut off the transmission route, and prevent the spread of disease, and wait for the institution of disease prevention and control to test and handle it.

(5) When an infected patient receives treatment in hospital, no student is allowed to visit without the consent of the medical staff.

(6) When a suspected or confirmed case appears, active measures shall be taken immediately to keep competitors and team leaders informed, stabilize the emotions of teachers and students, reassure people, and establish the belief of overcoming the disease.

#### **ii. Safety plan for demonstration and experience**

The demonstration module includes live competition demonstration and equipment demonstration. The live demonstration of the competition is carried out simultaneously with the competition via a live platform on the Internet, and the safety plan is consistent with the competition safety plan. The safety plan for competition equipment live demonstration is as follows:

##### 1. Demonstration environment

(1) The Executive Committee shall organize a special inspection of the demonstration site and equipment before the demonstration, and make explicit safety requirements. The

arrangement of the demonstration site and equipment and facilities in the demonstration site shall comply with the relevant national safety regulations. The organizer must exclude hazards in accordance with the requirements of the Executive Committee before the presentation.

(2) A cordon should be set up around the workshop, and all the visitors should enter the workshop with valid documents issued by the Executive Committee to prevent the entry of unauthorized persons in case of accidents.

(3) The organizer should provide conditions to ensure the implementation of the contingency plan. For skills involving work at height, possible falling objects, large electricity consumption, fire prone and other circumstances, policies and plans must be specified, and first aid personnel and facilities must be equipped.

(4) Flammables, explosives, and all kinds of hazardous materials unrelated to the demonstration shall be strictly prohibited from being brought into the workshop, and it is not allowed to bring school bags into the workshop.

(5) The Executive Committee shall formulate the staff evacuation plan for the display area in conjunction with the organizer. In addition to complete indication signs, additional guidance personnel shall be assigned and alternate lanes shall be opened in areas where there are crowded and intersecting traffic and pedestrian flow in the workshop environment.

(6) During the demonstration, the organizer shall assign dedicated personnel for dedicated posts among key posts in workshop management and create a safety management log.

## 2. Emergency response

If an accident occurs during the presentation, whoever finds it should report to the Executive Committee immediately, and also take measures to avoid further deterioration. The Executive Committee should immediately activate the contingency plan to address the problem and report to the Executive Committee of the First World Vocational College Skills Competition. The presentation may be suspended if there is a major safety problem, and whether to suspend the presentation shall be determined by the Executive Committee. After the event, the Executive Committee should report the details to the Executive Committee of the First World Vocational College Skills Competition.

## 3. Penalties

Observers involved in major safety problems may be disqualified from continuing the visit if they are alerted and warned by the staff but of no avail.

# **XV. Competition Notice**

## **i. Notice for teams**

1. Competitors should not be replaced, in principle, after their sign-ups are confirmed. If a competitor is unable to participate in the Competition during the preparation, the competent department of the team shall issue a written explanation, replace the competitor with a substitute in line with relevant competitor qualifications, and have the substitute reviewed. After the Competition starts, the team is not allowed to replace the competitor. Competitors are allowed to miss the Competition.

2. Teams are not allowed to bring any equipment, tools (including communication tools, storage devices, etc.), or technical data. The equipment, tools, and technical data required during the Competition are all provided in a unified manner by the Executive Committee.
3. Each team has the right to enter the workshop to familiarize themselves with the environment in the specified time period one day prior to the start of the Competition. After entering the workshop, the team shall not touch the competition equipment or damage the competition scenario. Deliberate saboteurs shall be held responsible, and serious circumstances will result in disqualification from the Competition.
4. Each team must purchase personal accident insurance for the team leader and competitors.

## **ii. Notice for competitors**

1. Competitors should strictly comply with the regulations and operation specifications of the workshop, ensure personal and equipment safety, accept the supervision and warnings of the judges and compete in a courteous manner.
2. Competitors should participate in the Competition and relevant activities with an entry certificate issued by the Executive Committee and valid IDs, and wear them throughout the operation process in the workshop for inspection.
3. Competitors should enter the workshop within the specified time, confirm and sign for the site conditions, start the competition according to the unified instruction, and should not start operation before receiving the start signal. Each team decides its own division of labor, work procedures and time schedule, and completes the competition items at the designated workstation.
4. Competitors should work continuously during the Competition, and food, water, etc. are provided by the workshop in a unified manner. If competitors take a break, drink water, and use the restroom, these are included in the competition time.
5. Competitors should not leave the workshop earlier during the Competition. If a competitor cannot continue to participate for special reasons (such as physical discomfort), the competitor should raise his/her hand and ask the judge for permission before leaving the workshop. After leaving the workshop, competitors are not allowed to stay outside the workshop or return to the workshop.
6. Competitors should not perform any operation related to the Competition after the jury president announces the end of the Competition. If a team finishes the competition in advance, the competitor should raise his/her to give a sign to the judge. The judge will record the completion time of the Competition, and the team should leave the workshop after the team leader signs for confirmation.
7. Competitors shall submit the competition results and related documents in accordance with the competition requirements and regulations. It is forbidden to make any marks unrelated to the Competition on the competition results, such as the institution name, the competitor name, etc.; otherwise, it is considered as cheating.
8. Competitors must strictly follow safety operating procedures to ensure personal and equipment safety. During the Competition, if a safety incident or equipment failure occurs due to the competitor's personal reasons, the jury will rule that the competition is over,

retain the competition qualification, and accumulate the effective competition results. If the equipment failure occurs for reasons other than the competitor's personal reasons, the jury will make a ruling and make up the time spent on troubleshooting for the competitor based on the specific situation, and the team leader will sign to confirm.

9. Competitors must strictly observe the rules and regulations of the workshop, obey the judges, and compete in a courteous manner. If cheating occurs, the team will get zero points for the item. If the competitors disobey the instructions of the judge and disturb the order of the workshop, corresponding marks will be deducted according to the rules. If the circumstance is serious, the competitor will be disqualified and the result will be canceled.

10. In order to cultivate the professionalism of skilled talents, during the Competition, competitors should pay attention and keep the working environment and equipment neat and tidy in line with the principles of 5S (i.e., sorting, tidying, sweeping, cleaning and quality) of enterprise production. For those who do not meet the operational standards, the judge has the right to deduct points as appropriate according to the marking rules.

### **iii. Notice for staff**

1. The workshop staff are hired by the Executive Committee and their duties are divided by the Executive Committee.

2. The staff shall, under the leadership of the Executive Committee, abide by professional ethics, adhere to the principles, act according to the rules, and perform the duties properly with a strong sense of responsibility, serious and conscientious attitude, and rigorous and meticulous style to provide orderly services for the workshop.

3. The staff must wear the uniform provided by the Executive Committee, have a tidy and clean appearance and good manners, and talk politely.

4. The staff must be familiar with the competition rules, conscientiously implement the competition rules, and act in strict accordance with the work procedures and relevant regulations.

5. The staff shall stick to the post, and shall not be late, leave early, or leave without permission.

6. The workshop staff shall actively maintain the order of the workshop in order to facilitate the normal performance of competitors.

7. The workshop staff shall not answer any technical questions about the competition raised by competitors during the Competition, and they shall report to the Executive Committee in case of controversial issues.

8. Whoever violates the rules, brings bad influence to the Competition, or causes serious damage will be subject to necessary punishment.

## **XVI. Appeal and Arbitration**

1. Each team can submit an appeal to the supervision and arbitration team of the Competition about the instruments, equipment, fixtures, materials, objects, computer software and hardware, tools and supplies used in the competition, competition officiating, workshop management, and non-standard behavior of the staff that do not conform to the Competition Rules.

2. The subject of the appeal is the team leader. Team leaders may submit written appeal to the supervision and arbitration team within two hours after the end of the Competition (when the competitors have completed the Competition).
3. A written appeal should give a full and factual account of the incident, time, personnel involved and the basis for the appeal, and should be signed by the team leader. Non-written appeals will not be accepted.
4. The supervision and arbitration team will organize a review within two hours after receiving the appeal report and inform the complaining party in writing of the review result in a timely manner. If the complaining party still disagrees with the review result, the team leader may submit an appeal to the Supervisory Arbitration Committee of the Competition Division, whose arbitration result shall be final.
5. The arbitration award should be signed for by the complaining party and cannot be received on his/her behalf. If the complaining party leaves at the agreed time and place, he/she is considered to have waived the appeal. The complaining party may waive the appeal at any time. The complaining party shall not disrupt the workshop for any reason through drastic actions.
6. The Supervisory Arbitration Committee has the right to hold the relevant personnel responsible for any intentional use of the appeal as an opportunity to disrupt the order of the Competition and destroy the fair competition environment.

## **XVII. Competition Observation**

1. In order to make it convenient for the media, enterprise representatives, school students and teachers, and other people from all walks of life to understand the competition, the workshop has an open area for competition observation and interviews.
2. Observers can gather at the specified time and place, enter the workshop in groups in an orderly manner under the guidance of the workshop guide following the designated route for observation. No loud noise is allowed during observation, so as not to affect the competitors.
3. Observers are not allowed to enter the Competition area, touch the equipment, or stay for a long time in front of a workstation, and are strictly forbidden to talk with the competitors, on-site judges, staff, etc. Observers shall obey the command of the workshop staff, and shall not affect the normal progress of the Competition.
4. Observers are not allowed to bring cellphones, iPads and other communication tools into the workshop or to collect or record data of the workshop. The staff has the right to remind observers of and stop all kinds of uncivilized behavior that violates the workshop order.

## **XVIII. Live Competition**

- i. By the unified arrangements of the Executive Committee of the First World Vocational College Skills Competition, modern network media technology is used for the live broadcast of the competition process.
- ii. Multimedia technology and equipment are used to record video materials, record the whole process of the Competition, provide comprehensive information materials for publicity, arbitration, and resource conversion, and produce course streaming resources after the Competition.

iii. Videos on interviews with outstanding competitors and instructors and comments by experts and judges are produced and released on the specified website to highlight the skills and characteristics of the Competition.

### **XIX. Resource Conversion**

#### **i. Resource sharing of competition contents**

After the Competition, it is planned to convert the Test Projects, practical training tutorials, and enterprise cases into the basic materials of a resource library, upload them to the designated online platform and store them in the teaching resource system of the cloud platform, so as to provide a common library of information-based media teaching resources for domestic and foreign schools and share quality teaching resources in real time.

#### **ii. Promotion of innovation and reform of the curriculum system**

Competition experience sharing sessions will be actively organized to promote innovation and reform of the curriculum system. Competition experience sharing sessions will be actively organized to promote the reform of major construction programs, curriculum systems, and teaching plans for transportation schools based on relevant contents of the Competition.

#### **iii. Construction of course resources of mobile digital teaching**

Mobile digital courses and resources suitable for learning in the mobile environment will be constructed to serve teachers' classroom teaching and students' independent learning and promote students' situational, interesting, and interactive independent learning.

### **XX. Miscellaneous**

Please refer to Appendix 1: English and Chinese Explanations for the explanation of English terms or abbreviations in the rules.

## Appendix 1: English and Chinese Explanations

ATC	Automatic Train Control (列车自动控制)
ATO	Automatic Train Operation (列车自动驾驶)
ATP	Automatic Train Protection (列车自动防护)
ATS	Automatic Train Supervision (列车自动监控)
CCTV	Closed Circuit Television (闭路电视)
CBTC	Communication Based Train Control System (基于无线通信的列车运行控制系统)
MON	Monitor System (显示屏; 监视器)
HMI	Human Machine Interface (车辆显示屏)
MMI	Man Machine Interface (人机界面/信号显示屏)
RM	Restricted Manual (限制人工驾驶)
DTI	Departure Time Indication (列车发车倒计时器)
VCB	Vacuum Circuit Breaker (真空断路器)
EGS	Protective Earthing and Ground Switch (动车组保护接地开关)
AC	Alternating Current (交流电)
kw	Kilowatt (千瓦)
A	Ampere (安培, 电流单位)
V	Volt (伏特, 电压单位)
M	Metre/Meter (米, 长度单位)
Hz	Hertz (赫兹, 频率单位)
LED	Light Emitting Diode (发光二极管)
CIR	Cab Integrated Radio Communication Equipment (机车综合无线通信设备)
CTCS	Chinese Train Control System (中国列车运行控制系统)
CAN	Controller Area Network (控制器局域网络)
CPU	Central Processing Unit (中央处理器)
WIFI	WIFI
Mbps	Megabits per second (兆比特每秒)
ID	Identity Document (身份识别号)
GB/T	National Standard of the People's Republic of China
iPad	iPad