2025

BRICS SKILLS COMPETITION

(BRICS FUTURE SKILLS AND TECHNOLOGY CHALLENGE)

Urban Rail Transit Operation Design and Emergency Management

BRICS-FS-35

Test Project

(International Finals_Onsite)

May, 2025

Catalogue

1. Competition Format

Individual (1 contestant and 1 expert).

2. Competition Content

The competition consists of four modules, which are completed in sequence. Participants are provided with task instructions, software operation methods, relevant operation data instructions, and other technical conditions such as data sources to ensure the independence and fairness of each task module. The competition consists of the following task modules:

(1) Assessment of professional knowledge of urban rail transit operation and management;

(2) Layout of station facilities and equipment and design of passenger flow line;

(3) Design of train operation scheme and editing of operation diagram;

(4) Bottom use plan and crew plan preparation;

Only if it cannot be completed at the competition site and approved by the chief expert, the competition task and scoring criteria can be changed.

If a participant does not comply with occupational health and safety and environmental requirements, or puts themselves and other participants at risk, they may be disqualified from the competition.

After the participants complete the module, the results will be graded.

3. Project Modules and Time requirements

3.1 Project modules and time requirements

The urban rail transit operation design and emergency handling competition consists of four modules, which require the contestants to complete within 3 hours and 40 minutes.

Refer to Table 1 for the specific project module name and time requirement.

Table 1 List of project modules and time requirements

order number	Module name	Completion time of competition content
1	Module A: Assessment of professional knowledge of urban rail transit operation and management	40 min
2	Module B: Layout of station facilities and equipment and design of passenger flow line	60 min
3	Module C: Train operation scheme design and operation diagram editing	60 min
4	Module D: Undercarriage operation plan and crew planning	60 min

Refer to Table 2 for the competition schedule.

Table 2 Competition schedule (for reference)

date	time	content
Competition Day 1	Before 12:00	All teams report
	13:00-14:00	Announce the competition precautions and check the equipment
	14:00-15:00	Site visit
	15:00-15:30	Open the opening ceremony
Competition Day 2	8:00	The teams will assemble before arriving at the venue
	8:30-12:10	All contestants complete all competition tasks
	12:10-16:00	calculation of results
	16:00-16:30	Read out the results
	16:30-17:00	Closing ceremony

3.2 Task content

To further enhance students' professional skills and occupational qualities, contestants must complete the professional theory knowledge test on the urban rail transit operation management knowledge assessment platform, which is provided by the teacher. Within the urban rail transit operation design simulation system, they must use the provided passenger entry and exit data to layout station equipment. After designing the station facilities and equipment layout, they should proceed to design train operation plans and edit the operation diagrams. They must also use the urban rail transit vehicle base utilization plan preparation system and the crew plan preparation system to complete the editing of vehicle base utilization plans and crew plans;

Module A: Assessment of professional knowledge of urban rail transit operation management

Participants answered the test paper issued by the assessment platform

题型	题目	选项A	选项B	选项C	选项D
单选	当车站公共区域和设备及管理用房发生火灾事故时，通风系统应能进行有效的（ ）排烟。	喷淋	气体灭火	通风	阻燃
单选	手动火灾报警按钮旁边应设置明显的标志和（ ）。	发光警灯	使用说明	报修电话	报警电话
多选	工程车作业时，应根据装载货物及编组情况（ ）。	合理限速	停止相关区段的牵引供电	安排卸货地点	施工人员
多选	OCC的行车记录包括运营前检查情况，（ ）情况。	行车日志	调度命令内容	施工作业内容	行车设备故障及影响
判断	城市轨道交通的建设和运营应满足文物保护的要求。	√	×		
判断	城市轨道交通线路初期运营期满两年，运营单位应当向城市轨道交通运营主管部门报送初期运营报告，并由城市轨道交通运营主管部门组织正式运营前安全评估。	√	×		

Figure 1 Sample questions for professional knowledge assessment of urban rail transit operation and management

Module B station facilities and equipment layout and passenger flow line design

The contestants should complete the layout of station facilities and equipment and the design of passenger flow line in the urban rail transit operation design simulation system (Figure 2) according to the requirements of the test questions. The tasks include the following contents:

In this task, participants must complete the layout design of station facilities and equipment, as well as the passenger flow line design, based on the hourly data of the entire day's passenger flow at a given station within a specified time frame. After the design is completed, they will evaluate the quality of the station's equipment layout and passenger flow line design by assessing the cost, efficiency, rationality, and length of the pedestrian flow lines.

Task description: This module is provided by the organizing committee with station passenger flow data and virtual simulation scenes. The contestants will complete the layout of station facilities and equipment and the design of passenger flow line based on the provided simulated stations, and then carry out simulation after

completion, and submit the results of various indicators after simulation.

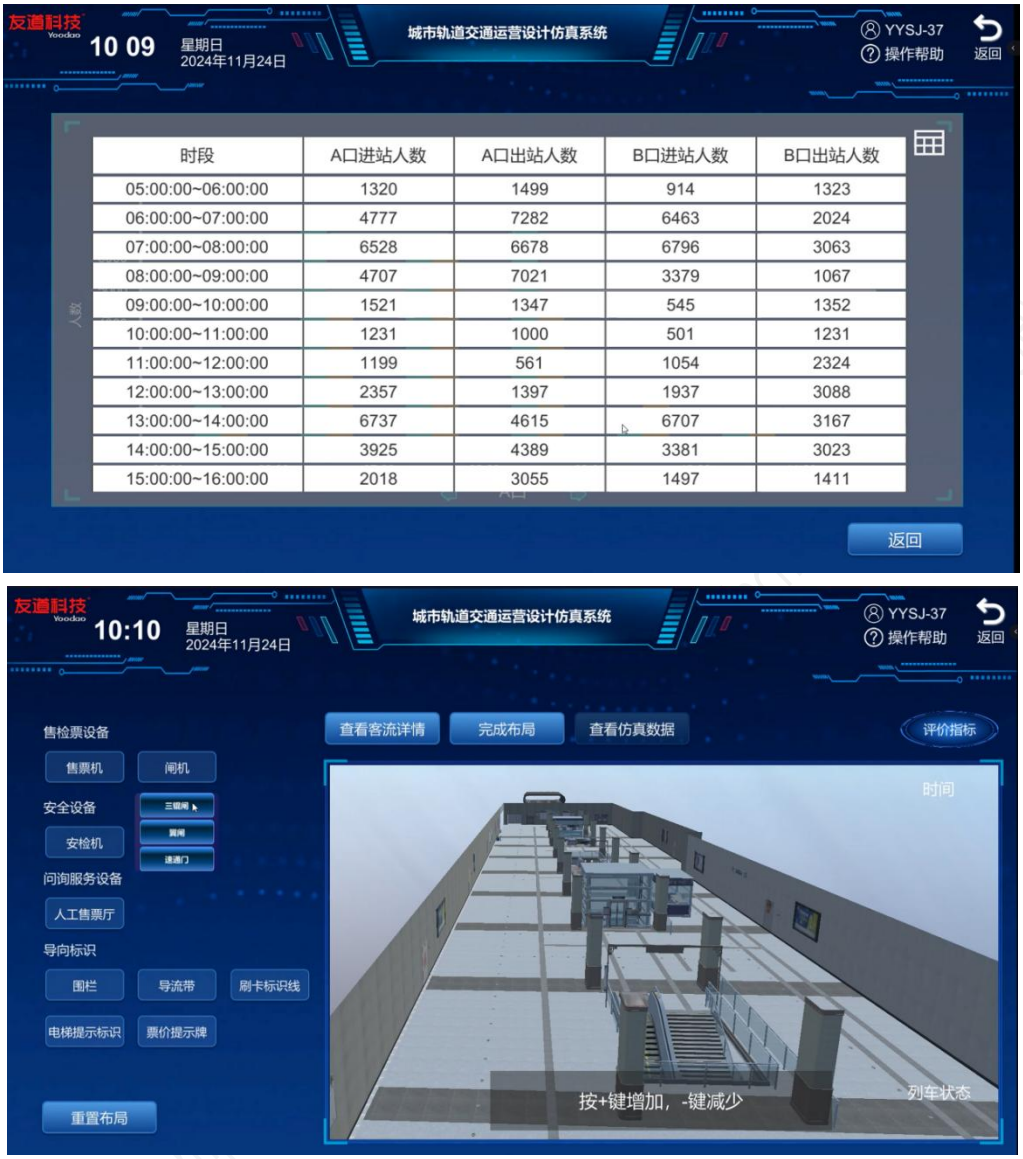

Figure 2 Sample design of station facilities and equipment layout and passenger flow line

Module C: Train operation scheme design and operation diagram editing

Participants are required to design the operation plan and draw the operation diagram based on the given 24-hour OD data of the route within the specified time. After completing this, they will import the drawn operation diagram into the system for simulation. Following the simulation, they will evaluate the quality of the operation diagram by outputting indicators such as operating costs, passenger waiting times,

occupancy rates, and comfort levels. The operation diagram must meet constraints such as the line's operational time, minimum operating intervals, and minimum turnaround intervals.

Task description: The organizing committee will provide the operation diagram editing system for this module. Contestants will complete the calculation and analysis of OD passenger flow, design of operation plan, operation diagram editing and passenger flow simulation based on the operation diagram in the system. Contestants can optimize and adjust the simulation results and repeat the simulation, and choose the best one to submit the result.

6:00-7:00																							
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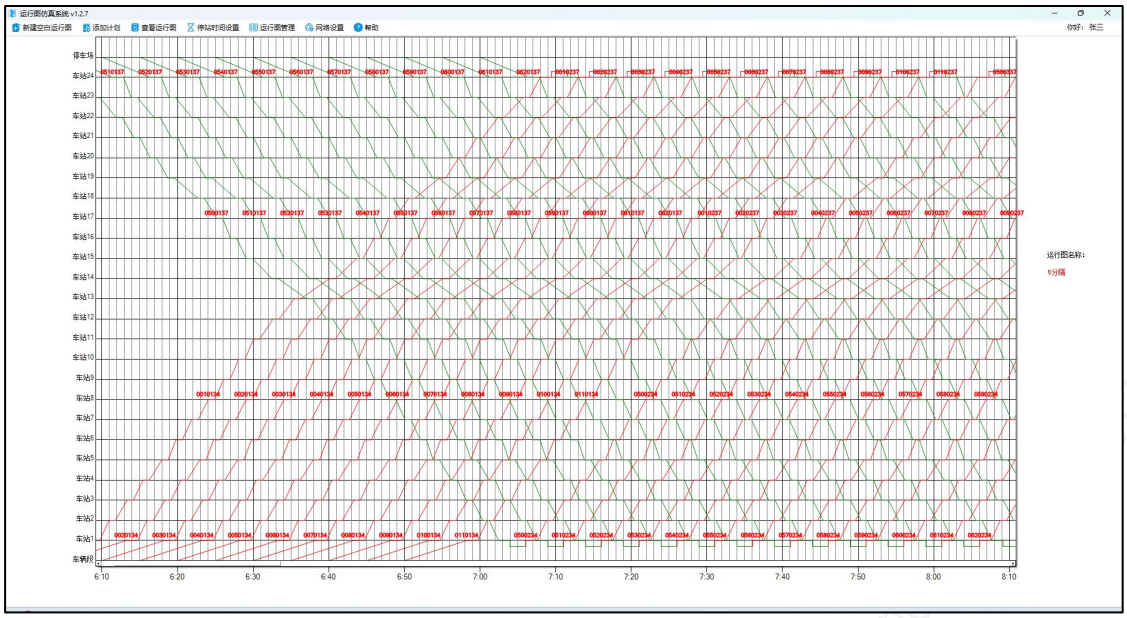

Figure 3 Sample design of train operation scheme and operation diagram editing

Module D: Undercarriage utilization plan and crew planning

(1) Vehicle bottom application plan preparation

According to the task requirements, the train operators should use the urban rail transit car base application planning system (Figure 4) to assign car bases to train services based on urban rail transit lines, train routes, and operation diagrams. The system outputs indicators such as the number of car bases, connection time, and car base utilization balance, which are used to evaluate the quality of the car base application plan;

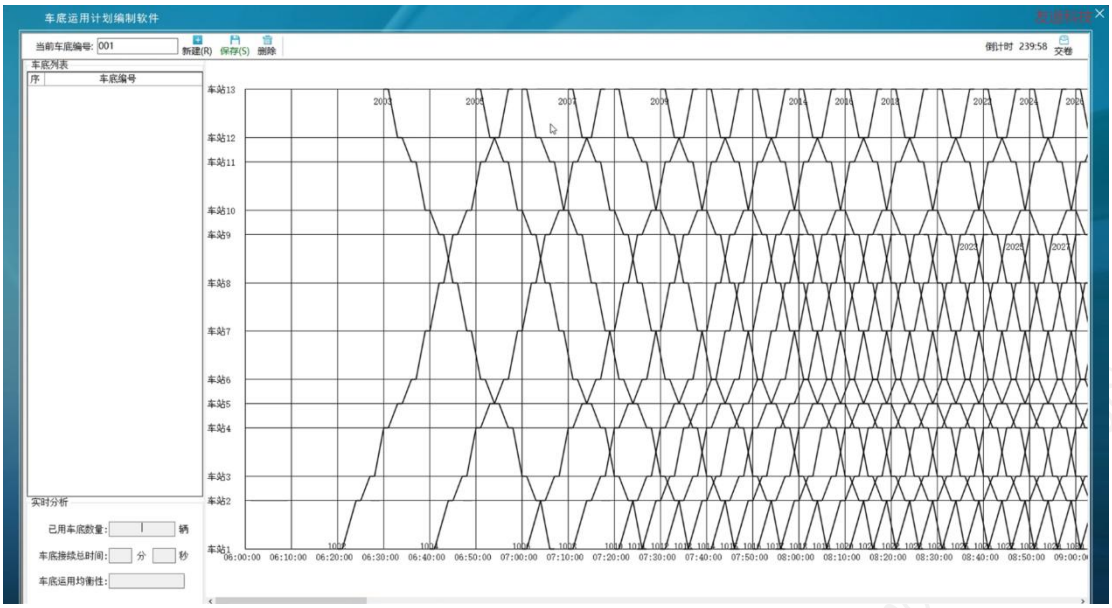

Figure 4 Sample problem of urban rail transit car bottom application plan

(2) Cabin plan preparation

According to the task requirements, the train operator should assign train operation tasks to the crew members in the urban rail transit service plan preparation system (Figure 5) according to the urban rail transit line, train route, and car bottom utilization plan. The system outputs indicators such as the number of crew members, the difference between rest time and working time, and the total working time to evaluate the quality of the service plan.

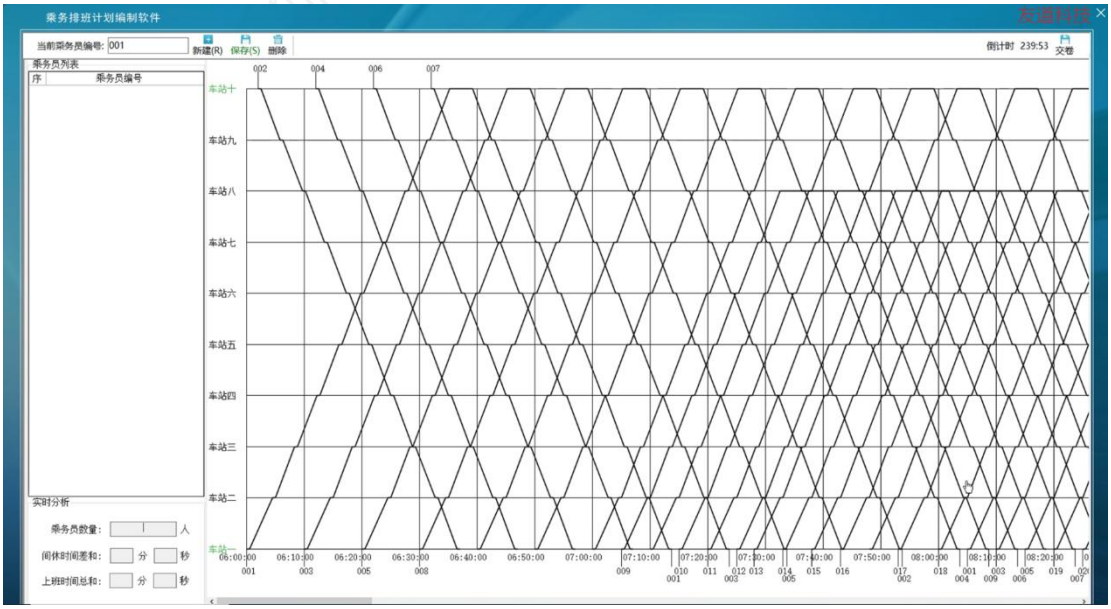

Figure 5 Sample problem of rail transit service application plan

4. Scoring criteria

Module	Detailed Rules and Regulations	Value
A	Urban rail transit operation management professional knowledge assessment	30.00
B	Station facilities and equipment layout and passenger flow line design	20.00
C	Train operation scheme design and operation diagram editing	30.00
D	Car undercarriage utilization plan and crew plan preparation	20.00
Total		100.00