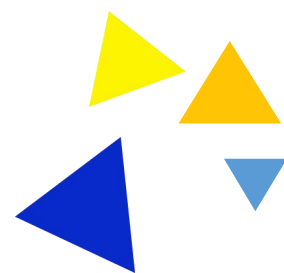


Test Project

BRICS-FS-14_Drone Operation

2022 BRICS Skills Competition

Total time for competition tasks: 6.3 hours



Content

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1. Competition form

Single.

2. Competition content

The competition content consists of five modules, which are completed in sequence. Provide participants with task descriptions, equipment layout, equipment operation instructions, and data sources or other technical basic conditions required to ensure the independence and fairness of each task module. The competition content includes the following mission modules based on drone operations:

- 1) UAV theory and professional ability assessment
- 2) UAV virtual simulation flight control
- 3) UAV installation and maintenance technology
- 4) UAV refined inspection application technology
- 5) UAV emergency rescue application technology

Competition tasks and scoring criteria can only be changed if the competition site cannot be completed and approved by the Chief Expert.

Competitors may be disqualified if they do not comply with OH&S requirements or put themselves and other competitors at risk.

After entrants complete the modules, the results will be scored.

3. Project modules and time requirements

3.1 Project modules and time requirements

There are 4 modules in the drone operation event, and the contestants are required to complete it within 6.3 hours. Refer to Table 1 for specific project module names and time requirements.

Table1 List of project modules and time requirements

Number	Module name	Completion time of competition content
1	Module A: UAV Theory and Vocational Ability Assessment	90min
2	Module B: UAV Virtual Simulation Flight Control	120min

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3	Module C: UAV Assembly and Maintenance Technology	210min
4	Module D: UAV refined inspection application technology	120min
5	Module E: UAV Emergency Rescue Application Technology	60min

See Table 2 for the competition schedule.

Table2 Competition schedule

date	time	Content description	When	place
On November 3rd	14:00-14:30	Teams sign in and judges sign in	30min	The convention center reports everywhere
	14:30-16:30	Referee training. Introduce the competition rules, evaluation procedures, and scoring schemes. Workplace draw	120min	The referee room
		Contestants meeting. Introduce the competition rules, training and competition test questions,. Draw lots, and make out the distribution of participating materials	120min	Technical expert room
	16:30-18:00	Competition venue environment visit, acceptance, action line experience	120min	competition terrain
On November 4	8:00 - 8:15	Referee, supervisor, experts, players gather	15min	Venue
	8:15 - 8:30	The referee, the player information check record admission	15min	
	8:30 - 8:50	The contestant accepts the competition test questions, and the chief expert introduces the competition content	20min	
	8:50-9:00	Preparation before the game, each place	10min	
	9:00-10	Module A Competition (FS-14-01 to	60min	

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	:00	FS-14-40)			
	10:10-11:30	Module B Competition (FS-14-01 to FS-14-40)		90min	
	11:30-13:30	Module B score + lunch + break		30min	
	13:30-16:00	Module C Competition (FS-14-01 to FS-14-40)		90min	
	16:00-16:20	Module C competition score		150min	
	16:20-17:20	Module E Competition (FS-14-01 to FS-14-40)		60min	
On November 5	8:00 - 8:15	Referee, supervisor, experts, players gather		30min	Offline venues
	8:15 - 8:30	The referee, the player information check record admission		50min	
	8:30 - 8:50	The contestant accepts the competition test questions, and the chief expert introduces the competition content		50min	
	8:50-9:00	Preparation before the game, each place		50min	
	9:00-9:20	Module E Competition: Group 1	Field field # 1: FS-14-01	20min	
			Field field # 2: FS-14-02		
	9:20-9:40	Module E Competition: Group 2	Field field # 2: FS-14-03	20min	
			Field field # 2: FS-14-04		
	9:20-10:00	Module E Competition: Group 3	Field field # 2: FS-14-05	20min	
			Field field # 2: FS-14-06		
10:00-10:20	Module E Competition: Group 4	Field field # 2: FS-14-07	20min		
		Field field # 2: FS-14-08			
10:20-10:40	Module E Competition: Group 5	Field field # 2: FS-14-09	20min		
		Field field # 2: FS-14-10			
10:40-11:00	Module E Competition:	Field field # 2: FS-14-11	20min		

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11:00-1 1:20	Group 6	Field field # 2: FS-14-12	20min
	Module E Competition: Group 7	Field field # 2: FS-14-13	
11:20-1 1:40	Module E Competition: Group 8	Field field # 2: FS-14-14	20min
		Field field # 2: FS-14-15	
11:40-1 2:00	Module E Competition: Group 9	Field field # 2: FS-14-16	20min
		Field field # 2: FS-14-17	
12:00-1 3:20	Rating + lunch + break		80min
13:20-1 3:40	Module E Competition: Group 10	Field field # 2: FS-14-18	20min
		Field field # 2: FS-14-19	
13:40-1 4:00	Module E Competition: Group 11	Field field # 2: FS-14-20	20min
		Field field # 2: FS-14-21	
14:00-1 4:20	Module E Competition: Group 12	Field field # 2: FS-14-22	20min
		Field field # 2: FS-14-23	
14:20-1 4:40	Module E Competition: Group 13	Field field # 2: FS-14-24	20min
		Field field # 2: FS-14-25	
14:40-1 5:00	Module E Competition: Group 14	Field field # 2: FS-14-26	20min
		Field field # 2: FS-14-27	
15:00-1 5:20	Module E Competition: Group 15	Field field # 2: FS-14-28	20min
		Field field # 2: FS-14-29	
15:20-1 5:40	Module E Competition:	Field field # 2: FS-14-30	20min
		Field field # 2: FS-14-31	

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		Group 16	Field field # 2: FS-14-32	
	15:40-1 6:00	Module E Competition: Group 17	Field field # 2: FS-14-33 Field field # 2: FS-14-34	20min
	16:00-1 6:20	Module E Competition: Group 18	Field field # 2: FS-14-35 Field field # 2: FS-14-36	20min
	16:20-1 6:40	Module E Competition: Group 19	Field field # 2: FS-14-37 Field field # 2: FS-14-38	20min
	16:40-1 7:00	Module E Competition: Group 20	Field field # 2: FS-14-39 Field field # 2: FS-14-40	20min

3.2 Task content

Module A UAV theory and professional ability assessment (60min)

Task background: With the advancement of the artificial intelligence wave, drone technology is continuously changing the way of life of human society and the world. It is foreseeable that drones will be the most disruptive technology in the next few decades, with applications everywhere. The safety of drones has always been a topic of great concern to everyone. Even mature pilots may cause flight accidents if they neglect some details. Therefore, all personnel engaged in the UAV industry need to have solid theoretical knowledge and awareness of safe flight.

As a professional and technical personnel, contestants are requested to answer according to the theories, regulations and professional ability assessment questions provided by the venue, and verify their professional theories, flight regulations and professional ability.

Key assessment: UAV flight principle, aircraft structure composition, multi-rotor principle, navigation knowledge, UAV flight management regulations, UAV flight safety, UAV maintenance, UAV operation professional quality and other aspects of knowledge; theory The examination paper is a standardized test paper, which consists of 60 multiple-choice questions and 40 multiple-choice questions, which are conducted manually or online.

Module B UAV Virtual Simulation Flight Control (90min)

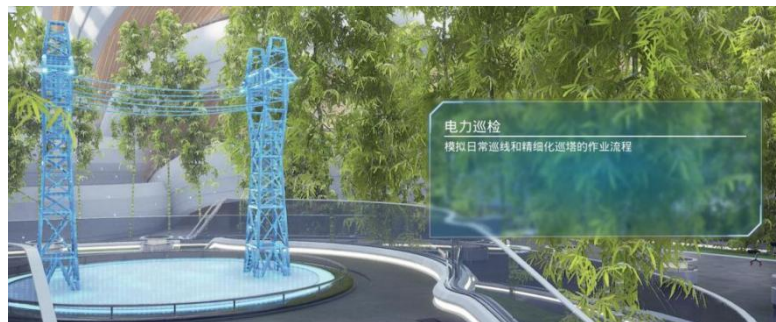
Task background: UAV flight operation technology is the most important basic skill of UAV

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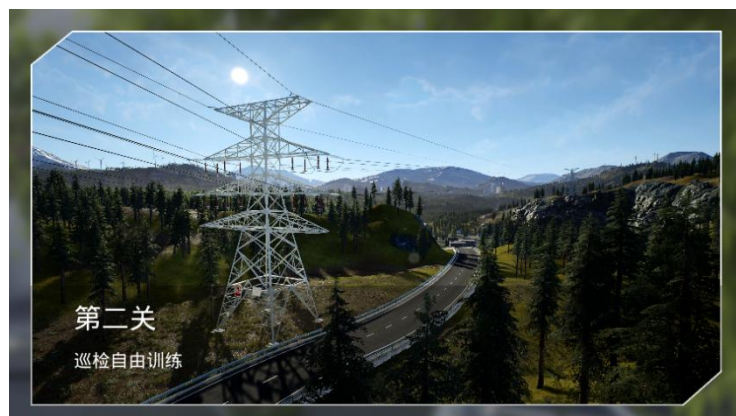
operators. In order to achieve superb flight technology, frequent training is required. Due to the high cost of construction of flight sites in specific application areas of UAVs, it can be used. UAV virtual simulation flight control for flight training in multiple application scenarios to improve flight operation skills.

Contestants should complete the virtual simulation flight control of the drone according to the task requirements. The tasks include the following:

1. Collect the power inspection photos of the two types of towers, the tension tower and the cat head tower, through the remote control;



Enter the second part of the module, and operate the drone to fly to the vicinity of the tower to take photos of the required parts. The photos should be clear and the shooting part should be in the center. Because it is a simulation of the real scene of electricity, if it is too close to the tower during the flight, it will cause signal In case of missing, out-of-control return, video transmission stuck, GPS satellite signal loss, etc., it is necessary to stay away from the tower, and continue to perform the task after the state returns to normal. If a similar problem occurs during the task, the timing will not be stopped until the shooting of the shooting part is completed.



(1) Competitors need to collect data on two types of towers: tension towers and cat head towers.

(2) Requirements for the collection site: one-sided outer horizontal glass insulator string, one-sided outer vertical hanging string, tower overview, tower head, tower base, tower card, and channel.

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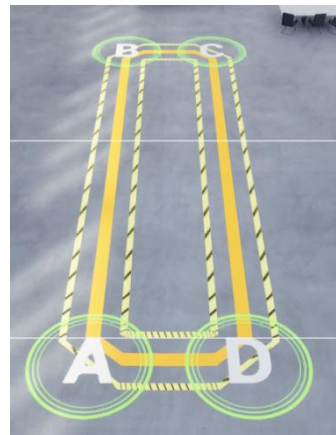
(3) Requirements for the number of photos collected: All glass insulator strings and hanging strings are taken from left to right and top to bottom. There are 5 photos for each glass insulator string and hanging string. The order of shooting must be in the horizontal direction. Shooting from left to right, vertical from top to bottom (a group of photos can be used for the hanging strings that are too close to the cat head tower); one photo each for the overall view of the tower, tower head, tower base, tower card, and passage.

(4) Quality requirements for collecting photo data: the part taken should be in the center of the figure; the photo should be clear; the shooting distance should be kept within 5m;

(5) Each contestant finally needs to enter the aerial photo album library to retain valid photos and delete unqualified photos.

2. In the A-speed flight mode, complete the rectangular cruise operation route operation;

The aircraft performs rectangular flight operations in the direction of the nose, in the sequence A-B-C-D; the flight mode is A mode; the flight altitude is 2 meters.



3. Complete the flight assessment of stable hovering operations;

The aircraft is in the hovering area and keeps spinning at a constant speed for one cycle; the aircraft mode is A mode; the aircraft height is less than 3 meters.



4. Complete the multi-dimensional operation flight assessment of UAV;

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The aircraft took off from point A, went back and forth to point B, a total of 4 times, and finally landed at point A. Every time you return to point A, change the direction of the nose, which is to tail, to the left, to the head, and to the right. After setting the nose orientation before flying, do not rotate the nose again unless it returns to point A. The flight mode is P mode.



5. Flight assessment for over-the-horizon operations;

After the aircraft takes off from point A, the image transmission perspective passes through the gantry frame from front to back, and the 6 QR codes in the frame are photographed, and the shooting distance is less than 2m. The mode is P mode.

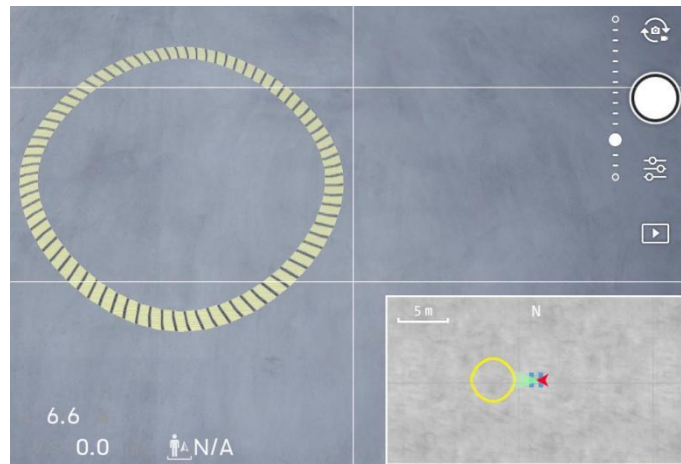


6. Use the remote control to complete the security flight operation;

The flight process is required to be smooth and non-stop throughout.

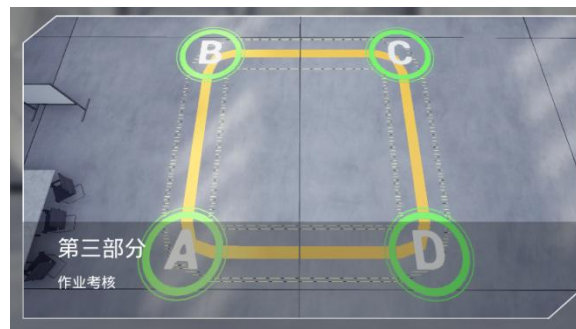
(1) Assessment of stable hovering operations

The aircraft is in the hovering area and keeps spinning at a constant speed for one week; the aircraft mode is A mode; the aircraft height is less than 3 meters; time requirements: more than 8S, completed within 20S.



(2) Homework assessment

Complete the flight in the direction of the nose, sequence A-B-C-D, and finally complete the tail landing at point D; the aircraft mode is A mode; the flight altitude is 2 meters.



(3) Assessment of over-the-horizon forensics work

Rectangular flight around the site; after the route is completed, it will be transferred to the over-the-horizon flight, and the designated license plate will be photographed;



7.Racing flight: It is divided into 6 levels, which are completed in sequence from the first level to the end of the last level;

There are 6 levels in total, which are completed in sequence from the first level to the end of the last level. During the test, each time a level is completed, report to the examiner when registering for flight use, and confirm with the examiner whether the next part can be performed.



(1) The aircraft mode is A.

(2) Players can choose the model according to the actual situation, and the referee has no right to interfere.

(3) There are three chances in total, each time you use one chance, you need to report to the examiner.

Task description: This module is provided by the Organizing Committee with simulation equipment, and the contestants complete the flight control task based on the simulation equipment.

Module C UAV Assembly and Maintenance Technology (150min)

Task background: With the development of the UAV market in recent years, multi-rotor UAVs have quickly gained the attention of the majority of consumers due to their excellent control performance and the convenience of vertical take-off and landing. The industry's best-selling product type. Compared with other UAVs, multi-rotor drones have unique advantages. Compared with fixed-wing drones, it has the advantages of vertical take-off and landing and fixed-point hovering; compared with single-rotor helicopters, it has no tail rotor device. Therefore, it has the advantages of simple mechanical structure, high safety, and low cost of use. It is particularly important to be proficient in the relevant knowledge and practical operation skills of the assembly and debugging of multi-rotor UAVs. Due to sudden natural disasters, it is necessary to expeditiously assemble and debug a batch of multi-rotor UAVs for first-line emergency rescue. A batch of unmanned aerial vehicle equipment that has just been withdrawn from the rescue front line needs to be repaired and repaired as soon as possible, and then put into the rescue scene again.

Competitors need to complete the assembly, commissioning and test flight of the model according to the drone bill of materials provided on site, the drone installation guide and related documents provided on site, as well as the drone damage assessment equipment and testing tools, and carry out the drone equipment repair damage.

Contestants should complete the drone installation and maintenance technology according to the task requirements.

The tasks include the following:

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- 1) Carry out the UAV system selection design experiment according to the task;
- 2) Select the optimal system configuration according to the analysis of the experimental data of the UAV dynamic test comparison experiment;
- 3) Use the UAV assembly and debugging tool to assemble the UAV related components;
- 4) Check the standardization and correctness of UAV assembly;
- 5) Use the flight control debugging software to debug the UAV flight control parameters;
- 6) After the debugging is completed, the UAV flight stability test is carried out;
- 7) Adjust the flight control parameters according to the test results to ensure flight stability;
- 8) According to the phenomenon displayed by the UAV maintenance and damage assessment system, analyze the possible location of the UAV failure;
- 9) Use professional detection tools to detect the UAV fault location and determine the fault location;
- 10) According to the test results and the maintenance and damage assessment task work card provided by the task book, write down the troubleshooting method and give effective measures for daily maintenance to eliminate the failure;

Task C1: UAV system selection (30min)

(1) UAV power selection

The UAV power system is the core system of the UAV and an important component of the multi-rotor UAV. The matching relationship between the motor and the blades is particularly important. Therefore, the best power combination can obtain the best efficiency and power. The competition mainly examines the contestants' ability to analyze the measurement and detection data of the UAV power system, complete the selection and debugging of the UAV power by comparing the test data of power components of different specifications, and organize the power test report.

According to the power test platform equipment provided by the stadium, complete the relevant data collection of the power test, and then record in the power test data report according to the model in the power test report to complete the corresponding power test report.

Compare the relevant data collected with different propeller specifications, select the best power matching situation of this model, and explain (Note: add supporting materials; and explain the reason why one of them does not fit, if it cannot be explained, the Item grades are treated as invalid);



Rendering of UAV power system selection test station

*All participating teams need to complete the power test report on the participating computer and save it to the desktop; raise their hands after completion, and leave the competition area with the permission of the referee;

Task description: The organizing committee provides a unified data source for this module, and the contestants complete the data analysis and calculation tasks based on the provided data source.

Task C2: UAV assembly and debugging (90min)

This competition mainly assesses the overall ability of the contestants to assemble and debug the UAV. In the assembly and debug station area, the contestants use a full set of UAV parts, supporting tools and consumables in their own station area to complete the assembly of the UAV. and debugging. Competitors are required to complete the assembly of the UAV as quickly and correctly as possible, in line with the mechanical and electrical assembly process, and perform corresponding debugging and calibration through the corresponding parameter adjustment software.

Competitors use the power suits obtained from the results of the competition-specified assembly and debugging of the UAV suit and the selection of the power system of the UAV in Mission 1 to assemble the UAV system;

After the players are assembled, they use professional software to set and test open source flight control parameters (the number of tests is unlimited, but must be completed within the specified time);

After the contestants have completed the test, they will signal the referee to perform a flight demonstration of the aircraft status;

The player operates the aircraft to return to the take-off point 1m*1m above the apron and hovers the aircraft at a height of 2m plus or minus 0.2m;

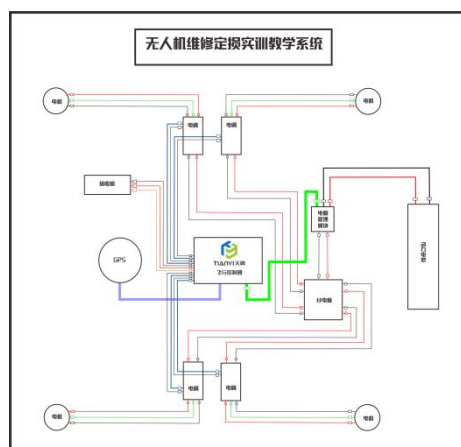
The contestant turned around and watched the aircraft land smoothly on the 1m*1m tarmac.



Task C3: UAV maintenance and damage assessment (30min)

This competition mainly assesses the contestants' ability to detect and analyze UAV faults. Contestants are required to use the UAV fault detection platform to detect the common UAV failure phenomena, analyze and judge, and master the UAV system. Fault detection method, UAV fault analysis data processing and conclusion, etc.;

The UAV fault detection platform placed in the arena has a total of 5 fault phenomena, and the contestants are required to find the fault phenomenon after powering on the power testing platform equipment, and use a multimeter to measure the place where the fault exists and find out the cause of the fault. Carry out analysis and judgment, and consider and record the troubleshooting method of its failure. (Contestants are required to complete the test report on the workstation)



Module D UAV refined inspection application technology (60min)

Contestants should complete the production of the 3D model of the power inspection of

the UAV according to the task requirements and carry out refined inspection task route planning on the model. The tasks include the following:

- 1) Reconstruct the 3D model of the tower;



- 2) Perform refined route planning on the 3D model of the tower, set relevant photo actions, take screenshots of each flight waypoint as a preview photo, and name the waypoints and save them to the designated location;



Task description: The organizing committee provides a unified data source for this module, and the contestants complete the model reconstruction and refined inspection route planning tasks based on the provided data source.

Module E UAV Emergency Rescue Application Technology (20min)

Contestants should complete the reconnaissance and rescue materials delivery in the UAV emergency rescue according to the task requirements. The tasks include the following:

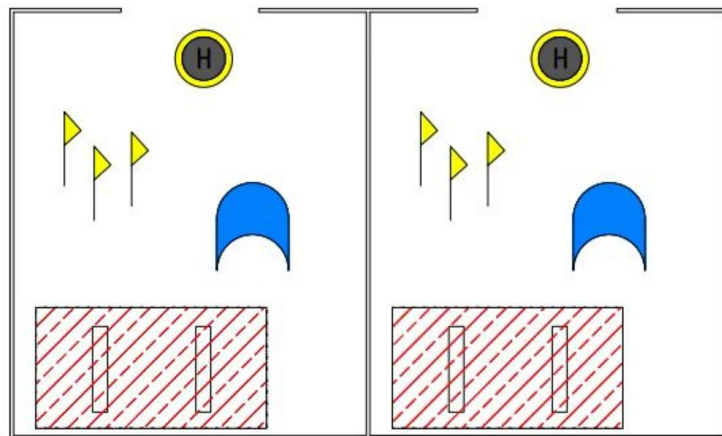
Mission E1: UAV Disaster Reconnaissance (10min)

Competitors turn on the power switch of the remote controller, turn on the power switch of the drone, and do the pre-flight inspection. After hearing the "start" password, the contestants press the "start" button of the timer, turn their backs to the flight field, take off the drone, and observe through the image transmission to fly over the knife flag, the obstacle net, the gantry in sequence, and then fly to the disaster situation. In the reconnaissance area,

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search for inflammable and explosive materials and heat sources, and take pictures. After taking pictures, return to the take-off and landing area, unplug the video cable of the remote control, connect the laptop, and use the data cable or card reader to record the reconnaissance taken by the drone. Copy the photos and panoramas to the laptop, put the reconnaissance photos in the "Reconnaissance Photos" folder on the computer desktop (create a new folder in the folder and name it "Participant x"), turn off the power of the drone and the remote control in turn, the operation is over, press the timer "end" key.

Task description: The operation time limit is 20 minutes.

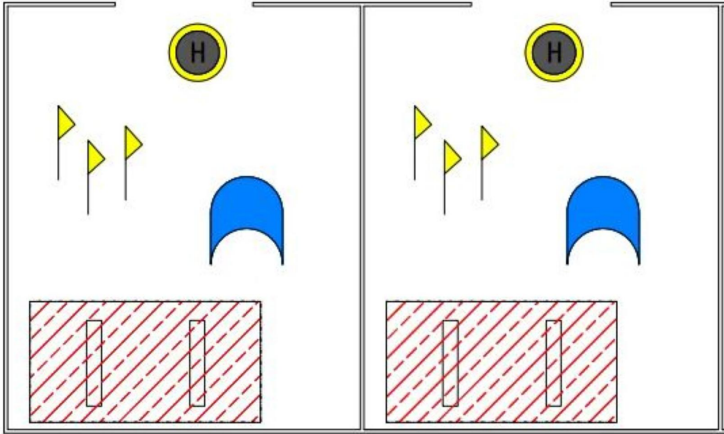


Task E1: Precise delivery of UAV rescue supplies (10min)

Place 3 iron cylinders 15m in front of the take-off and landing area (①The iron cylinder is 50cm high and 15cm in diameter; ②The iron cylinder is 50cm high and 25cm in diameter; ③The iron cylinder is 50cm high and 35cm in diameter), and each contestant has 5 rescues. The materials are tossed in sequence. At the beginning of the competition, the players turn on the power switch of the drone, do a pre-flight inspection, and raise their hand to the referee to signal "ready" to the referee after the inspection. After hearing the "start" password, the contestant presses the "start" button of the timer, hangs the target object on the drone's throwing hook, and operates the drone to fly above the iron cylinder beyond the visual range (the contestant can choose any one by himself/herself). The iron barrel is used as the drop area for relief materials, and the diameter of the barrel is different.), put the relief materials into the iron barrel, return the drone to the take-off and landing area after all materials are dropped, and turn off the power switch of the drone.

Task description: During the casting process, the drone shall not touch the iron cylinder; the flight height shall not be lower than 2m; the length of the sling shall not be shortened without permission; it is strictly forbidden to carry communication tools such as mobile phones; the operation time is limited to 40 minutes.

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4. Project Module Scoring Criteria

Table 3 Scoring Criteria

Module	Detailed rules (the accumulated points shall not exceed the allocated points each time)	Score
A	<p>1. According to the theoretical automatic scoring system, the scores will be converted in equal proportions (for example, 100 points will be converted into a total score of 15 points)</p> <p>2. Those who violate the competition requirements, such as cheating in the competition, answering questions overtime, and disobeying the referee's requirements, will have their grades cancelled.</p>	15.00
B	<p>1. Collect the power inspection photos of the two types of towers, the tension tower and the cat head tower, through the remote control;</p> <p>1) For the shooting of insulator strings and overhang strings, if the sequence does not meet the requirements, the 5 photos of this target will be counted as missing;</p> <p>2) Deduct 0.1 points if the photo is blurred;</p> <p>3) 0.2 points will be deducted for missing a photo;</p> <p>4) 3 points will be deducted for a frying machine;</p> <p>5) 0.1 points will be deducted if the shooting target is not centered;</p>	12.00
	<p>3. Use the remote control to complete the security flight operation;</p> <p>1) Assessment of stable hovering operations During the spin process, it should be rotated at a uniform speed throughout the whole process. If there is a sudden fast or slow, the total score will be deducted by 0.1 points. If it flies out of the mission area, 0.2 points will be deducted. If the aircraft crashes, 0.7 points will be deducted.</p> <p>2) Homework assessment If there is a flight out of the mission area, there will be no results in this project; fixed-point turns are allowed, but no pauses are allowed in straight-line flight. If there is a stalled flight, 0.1 points will be deducted from the total score; 0.7 points will be deducted if the aircraft crashes.</p> <p>3) Examination of over-the-horizon forensics work</p>	4

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	0.1 points will be deducted if the number of photos is missing; 0.05 points will be deducted if the photos are not clear; 0.7 points will be deducted if the aircraft crashes.													
	4. Racing flight: It is divided into 6 levels, which are completed in sequence from the first level to the end of the last level; 1) Each level is successfully completed with 0.5 points, and each level has three flying opportunities.	4												
C	1. UAV power selection	8.00												
	<table border="1"> <thead> <tr> <th>first-level indicator</th> <th>Points for scoring (the accumulated points shall not exceed the assigned points each time)</th> <th>points</th> </tr> </thead> <tbody> <tr> <td>1. Preparation for power system test; preparation of tools, measuring tools and equipment</td> <td> <ul style="list-style-type: none"> ●Carefully read the relevant requirements of the task book, otherwise points will be deducted ●Confirm whether the equipment parts are missing, otherwise points will be deducted; ●Confirm whether the installation tools are complete, otherwise points will be deducted; </td> <td align="center">0.5</td> </tr> <tr> <td>2. Experimental steps and data collection of UAV power system selection</td> <td> <ul style="list-style-type: none"> ●Check all equipment by yourself to ensure that there is no problem before powering on, and signal to the referee before powering on, otherwise points will be deducted □The test bench type, test bench model, and deduction are not selected in the system settings on the test software; □The security protection option in the software configuration tab sets the current upper limit protection function, otherwise points will be deducted; □Fill in the test information correctly (motor model, propeller model, etc.), otherwise points will be deducted; □The isolation cage is closed and then powered on, otherwise points will be deducted; □Correctly set the road terminal voltage according to the requirements of the question stem, otherwise points will be deducted; □Open the isolation door after the motor completely stops and power off, otherwise points will be deducted; □The data (pulling torque, airspeed, power consumption, current) at the start of each mission is cleared, otherwise points will be deducted □Record and successfully export each set of test data (EXCEL table; and the table naming method is "XXXX (motor) - XX (KV value) - XX (blade model)", and the data table is required to be saved on the desktop; otherwise, points will be deducted </td> <td align="center">2</td> </tr> <tr> <td>3. Analysis of power</td> <td> <ul style="list-style-type: none"> □The tension data is measured correctly, otherwise 0.5 points will be deducted; □Motor efficiency measurement is correct, otherwise </td> <td align="center">4</td> </tr> </tbody> </table>	first-level indicator	Points for scoring (the accumulated points shall not exceed the assigned points each time)	points	1. Preparation for power system test; preparation of tools, measuring tools and equipment	<ul style="list-style-type: none"> ●Carefully read the relevant requirements of the task book, otherwise points will be deducted ●Confirm whether the equipment parts are missing, otherwise points will be deducted; ●Confirm whether the installation tools are complete, otherwise points will be deducted; 	0.5	2. Experimental steps and data collection of UAV power system selection	<ul style="list-style-type: none"> ●Check all equipment by yourself to ensure that there is no problem before powering on, and signal to the referee before powering on, otherwise points will be deducted □The test bench type, test bench model, and deduction are not selected in the system settings on the test software; □The security protection option in the software configuration tab sets the current upper limit protection function, otherwise points will be deducted; □Fill in the test information correctly (motor model, propeller model, etc.), otherwise points will be deducted; □The isolation cage is closed and then powered on, otherwise points will be deducted; □Correctly set the road terminal voltage according to the requirements of the question stem, otherwise points will be deducted; □Open the isolation door after the motor completely stops and power off, otherwise points will be deducted; □The data (pulling torque, airspeed, power consumption, current) at the start of each mission is cleared, otherwise points will be deducted □Record and successfully export each set of test data (EXCEL table; and the table naming method is "XXXX (motor) - XX (KV value) - XX (blade model)", and the data table is required to be saved on the desktop; otherwise, points will be deducted 	2	3. Analysis of power	<ul style="list-style-type: none"> □The tension data is measured correctly, otherwise 0.5 points will be deducted; □Motor efficiency measurement is correct, otherwise 	4	
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selection test results	<p>0.5 points will be deducted;</p> <p><input type="checkbox"/>The system power effect measurement is correct, otherwise 0.5 points will be deducted;</p> <p><input type="checkbox"/>If the output tension data is negative, 0.5 points will be deducted;</p> <p><input checked="" type="checkbox"/>If the measurement data in the test report is not recorded, 0.5 points will be deducted;</p> <p><input type="checkbox"/>0.5 points will be deducted if the correct conclusion is not drawn in the test report;</p> <p><input type="checkbox"/>A conclusion is drawn in the test report, but the reason is not analyzed and stated clearly, 0.5 points will be deducted;</p> <p><input type="checkbox"/>The test report is standardized and tidy, otherwise 0.5 points will be deducted;</p>		
4. Professional norms and field discipline	<p><input type="checkbox"/>Clean the workbench, tools, and equipment parts in a timely manner, otherwise points will be deducted</p> <p><input type="checkbox"/>Tools and parts cannot fall to the ground, otherwise 0.1 points will be deducted per time</p> <p><input type="checkbox"/>After the chief referee issues an order to end the game, continue to operate and deduct 1 point</p> <p><input type="checkbox"/>If the test report fails to fill in the team's serial number as required, and the real-name system is used, 1 point will be deducted</p> <p><input checked="" type="checkbox"/>Leaving the team's position without authorization, communicating with players in other positions, disqualifying the competition, and voiding the results</p> <p><input checked="" type="checkbox"/>Loud noises and unreasonable disturbances in the arena, and entering the arena with unacceptable items such as paper, USB flash drives, mobile phones, etc., will be disqualified and the results will be invalidated</p>	2	
Total		8	
2. UAV assembly and debugging			14.00
first-level indicator	Points for scoring (the accumulated points shall not exceed the assigned points each time)	points	
1. Preparation for UAV Assembly and debugging	<p><input type="checkbox"/>Read carefully the precautions for assembly and debugging in the competition task book 0.5 points;</p> <p><input checked="" type="checkbox"/>Confirm whether the equipment and tools are missing, otherwise 0.5 points will be deducted;</p> <p><input type="checkbox"/>Confirm whether the equipment is running normally, otherwise 0.5 points will be deducted;</p> <p><input checked="" type="checkbox"/>Confirm whether the computer and the assistant software are normal, otherwise 0.5 points will be deducted;</p>	1	
2. The drone body assemble	<p><input checked="" type="checkbox"/>Correctly complete the charging of the remote control battery and the aircraft power battery (to ensure that the single-chip voltage is above 4.1V), otherwise 0.2 points will be deducted;</p> <p><input checked="" type="checkbox"/>Correctly use the screws to complete the drone tripod installation (the screw head of the three-way connector is to the outside, the screw should be inserted from the unthreaded side) and it is firm,</p>	5	

	<p>otherwise 0.2 points will be deducted;</p> <ul style="list-style-type: none"> ●Correctly use screws to complete the assembly and installation of the drone battery compartment to the lower center plate and be firm, otherwise 0.3 points will be deducted; ●Correctly use the screws to complete the installation of the drone arm and make it firm, otherwise 0.2 points will be deducted; ●Correctly use screws to complete the installation of the drone motor base, otherwise deduct 0.3 points; ●Correctly use the screws to complete the installation of the UAV power motor and the steering is correct, otherwise 0.5 points will be deducted; ●The ESC installation of the drone is completed correctly, and the connection sequence of the lower center board is correct, otherwise 0.5 points will be deducted; ●Correctly complete the drone flight control installation and need to use 3M glue, and the flight control circuit is connected correctly, otherwise 0.5 points will be deducted; ●Correctly use the screws to complete the installation of the UAV LED status indicator and the line connection is correct, otherwise 0.5 points will be deducted; ●The installation of the drone receiver is completed correctly, and the connection between the flight control and the receiver is correct, otherwise 0.5 points will be deducted; ●Correctly complete the GPS installation of the drone and the line connection is correct, otherwise 0.5 points will be deducted; ●Correctly complete the connection of the UAV flight control power supply cable and the adapter cable, otherwise 0.5 points will be deducted; ●Correctly use the screws to complete the installation of the upper and lower center plates of the drone and be firm, otherwise 0.5 points will be deducted; ●Correctly use screws to complete the installation of the drone housing, otherwise deduct 0.5 points; ●Correctly use the screws to complete the installation of the drone blades and be firm, otherwise 0.5 points will be deducted; 	
<p>3. UAV system debugging</p>	<ul style="list-style-type: none"> <input type="checkbox"/>Complete the remote control calibration and model selection, otherwise 1 point will be deducted <input type="checkbox"/>Correctly set and adjust the flight control sensitivity parameter, otherwise 1 point will be deducted ●Complete the ESC, battery parameter setting and calibration, otherwise 1 point will be deducted <input type="checkbox"/>Complete the magnetic compass calibration, 	<p>4</p>

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	otherwise deduct 1 point		
4. UAV flight Verification Test	<input type="checkbox"/> Pre-flight inspection and test of the drone, otherwise 0.5 points will be deducted; <input type="checkbox"/> The remote control can be used to unlock normally, the flight status is normal, otherwise 1 point will be deducted; <input type="checkbox"/> Use the remote control to lock normally, otherwise deduct 0.5 points; <input type="checkbox"/> The flight status indicator shows that the status is normal, otherwise it will be deducted by 0.5 points; <input type="checkbox"/> The flight performance is stable and the state is normal, otherwise 1 point will be deducted; <input type="checkbox"/> Complete the left and right translation and the front and rear translation actions and the flight action is standard, otherwise 1 point will be deducted; <input type="checkbox"/> The flight status of GPS and attitude mode is normal, otherwise 0.5 points will be deducted;	3	
5. Professional norms and field discipline	<input type="checkbox"/> Clean the site and workbench in time, otherwise points will be deducted; <input type="checkbox"/> All tools will be restored after installation and adjustment, otherwise points will be deducted; <input type="checkbox"/> Continue the operation after the chief referee issues an order to end the game and deduct points <input checked="" type="checkbox"/> Loud noises and unreasonable disturbances in the arena, and entering the arena with unacceptable items such as paper, USB flash drives, mobile phones, etc., will be disqualified and the results will be invalidated	1	
Total		14	
3. UAV maintenance and damage assessment			8.00
first-level indicator	Points for scoring (the accumulated points shall not exceed the assigned points each time)	points	
1. Preparation for setting and debugging	<input type="checkbox"/> Carefully read the precautions for UAV maintenance and damage assessment in the competition task book <input type="checkbox"/> Confirm the power of the device and remote control, otherwise points will be deducted <input checked="" type="checkbox"/> Confirm whether the multimeter of the detection tool is working properly, otherwise points will be deducted	1	
2. Find and judge the fault phenomenon of the UAV to	<input type="checkbox"/> The power-on sequence of the equipment is correct, otherwise points will be deducted; <input checked="" type="checkbox"/> After the UAV maintenance loss assessment training platform is powered on and unlocked, visually determine the failure phenomenon of the UAV system, and record it in the UAV maintenance loss assessment training report, detect and determine the fault location and quantity, and judge accurately. 0.4	2	

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	determine the fault location	points;	
	3. Failure cause analysis	<input type="checkbox"/> The cause of the failure is analyzed and correct, and each item is awarded 0.4 points;	2
	4. Troubles shooting method	<input type="checkbox"/> According to the detected fault, the correct fault solution or maintenance advice will be given. Fill in one item and get 0.4 points;	2
	5. Professionalism and Field Discipline	<input type="checkbox"/> After the competition task is completed, the equipment will be powered off and the measuring tool will be restored, otherwise points will be deducted; <input type="checkbox"/> Continue the operation after the chief referee issues an order to end the game and deduct points; <input type="checkbox"/> The work card for the maintenance and damage assessment task is written in a standardized, concise and clear manner, otherwise points will be deducted; <input checked="" type="checkbox"/> Leaving the team's position without authorization, communicating with players in other positions, disqualifying the competition, and voiding the results; <input checked="" type="checkbox"/> Loud noises and unreasonable disturbances in the arena, and entering the arena with unacceptable items such as paper, USB flash drives, mobile phones, etc., will be disqualified and the results will be invalidated; <input type="checkbox"/> It is strictly forbidden to open the drawer of the maintenance and damage assessment training platform; otherwise, the qualification of the contestants will be cancelled, and the results will be treated as invalid;	1
	Total		8
D	UAV refined inspection application technology 1. 1 point will be deducted for one less planned waypoint in the UAV's refined inspection route planning; 2. If the route is too close to the tower, the flight mission may fail, and 1 point will be deducted for each route; 3. The angle and position of each waypoint photographing action in the route should be set reasonably without omission, otherwise 0.5 points will be deducted for each waypoint.		20.00
E	1. UAV emergency reconnaissance 1) 0.5 points will be deducted if there is less than one obstacle during the flight of the drone; 2) A flammable and explosive object is missed during reconnaissance		7.00

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	<p>by the drone, and 0.5 points will be deducted;</p> <p>3) If the drone fails to identify the exact location of the heat source, 3 points will be deducted;</p> <p>4) If the drone crashes or times out, 7 points will be deducted;</p>	
	<p>2. Precise drop of UAV rescue supplies</p> <p>1) The precise throwing of UAV rescue materials is based on the diameter of the iron barrel, from small to large, and each time is scored 1.6 points, 1 point, and 0.6 points;</p> <p>2) No points will be awarded if it is not thrown into the iron bucket;</p> <p>3) If the drone crashes or times out, 8 points will be deducted;</p>	8.00
Total		100.00