



RTC CUP Challenge Rulebook

1. General Provisions

In the “RTC Cup” competition the robot shall pass as many proving ground sections as possible for the given time completing the assigned missions.

The competition contains two categories: “**Extremal**” and “**Searcher**”. Within the “**Extremal**” category, the robot shall be outside the operator’s (the competition participant) field of view, the robot control shall be remote, using video sensors of the robot and its measuring equipment.

Within the “**Searcher**” category, the robot shall be within the operator’s field of view, enabling him/her to see the robot actions directly through his/her eyes or by means of the external surveillance cameras placed on the proving ground. The robot control shall be also remote.

The competition includes 2 attempts (rounds) within each category.

Robots, produced of **any hardware components**, nonhazardous for the wider public, allowed to participate in the competition.

2. Judging

The panel of judges perform control and summing-up in accordance with regulations for each category.

The judges are fully authorized throughout the competition; all participants shall comply with their resolutions.

3. Requirements to Teams

Schoolchildren and students shall participate. Number of participants within one team is not limited, but there shall be only one robot operator. Any team shall be entitled to set out just one robot in any category, by choice.

Within the “**Searcher**” category, the operator’s age shall not exceed 14 years. Within the “**Extremal**” category, there is no age limit.

The team **is obliged to** come to the technical training area and let a judge register them in order to confirm their readiness to participate in the competition 30 minutes prior their attempt.



The team shall assemble and debug its robot within a designated area.

4. **Requirements for Robot**

Maximum width of a robot is 350 mm, its maximum length - 400 mm and its maximum height - 600 mm. After the start, the robot can adjust its dimensions without limitation.

Maximum weight of a robot - 15 kg.

The robot shall be independent, with an onboard power source.

Range of communication with the robot shall be not less than 10 m.

The robot shall be safe for the wider public and shall not impose any danger to the stand's integrity.

Robot Requirements for “Searcher” and “Extremal” category:

Using manipulator or sensors in the tasks is required. Otherwise attempt will not be counted.

For “Extremal” category participants in age 17 and higher, using sensors in the tasks is required. Otherwise attempt will not be counted.

5. **Requirements to the Proving Ground Description and Configuration**

The proving ground is a reconfigurable obstacle line including standard obstacle types passing of which a mobile robot shall be designed for. The proving ground sections shall be painted gray. All sections shall be provided with the marking. The Tower section shall be painted white. General view of the testing stand configuration is provided in Figure 1.

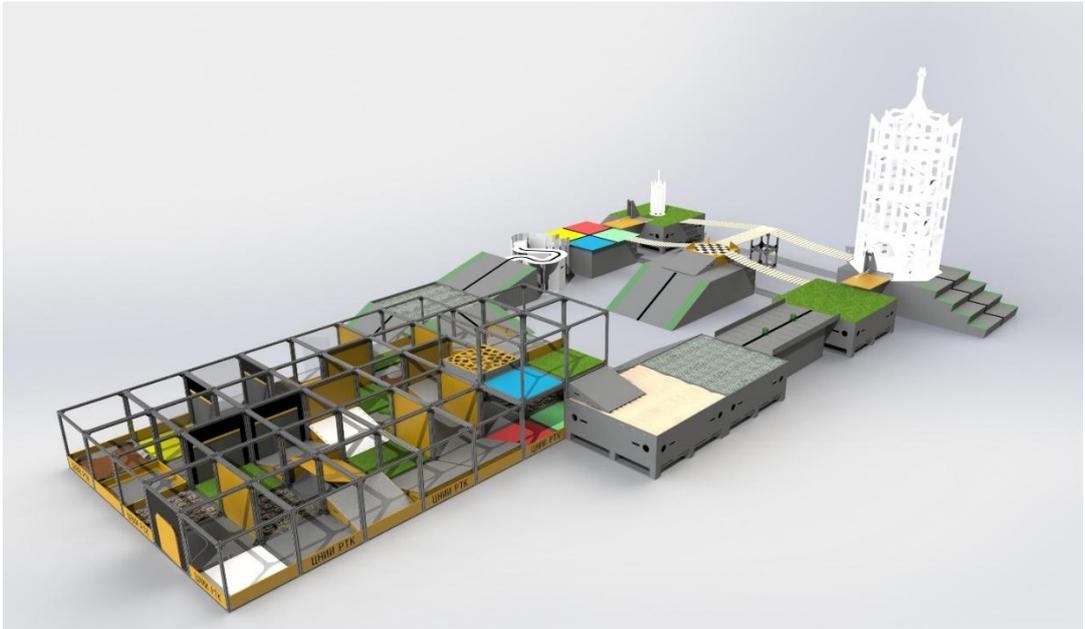


Figure 1. General View of Testing Stand Configuration

The proving ground configuration is subject to variation, it shall be reported in details to the teams on the competition date. Some of the proving ground sections may be absent.

List of the obstacles and points given for their passing shall be reported one week prior to the competition start.

For detailed description of the proving ground and its configuration, obstacle and test types included, their technical features refer to **Appendix No. 1** hereto.

6. **Assessment Criteria**

“**Searcher**” and “**Extremal**” categories shall be assessed according to the unified point system, but the winners within these categories shall be awarded separately, since “**Extremal**” category implies higher difficulty level.

The main assessment criterion is the amount of points obtained by the robot during one attempt.

The best of two attempts would be taken into account.

If two teams have the maximum point amount, the team which has spent less time for the task performance, shall be considered the winner.

Prior to start of the competition attempts, qualification shall be carried out which includes training group robot rides during which the participants can explore the proving ground and check which tests their



robots are able to pass. No points shall be given during the qualification. For the point assessment system, point table and conditions of passing of the proving ground sections refer to **Appendix No. 2** hereto.

7. Competition Course

The team shall come to the training area 30 minutes prior to start of its attempt. The operator and the robot shall be in the competition area and ready to start 10 minutes prior to start of the attempt.

Under the operator's control, the robot shall cross the maze, passing the tests and completing the tasks, then ride through the field sectors and enter the tower. In different proving ground areas there shall be beacons of different colors. The robot shall collect and place them in the corresponding color areas.

It is not necessary to pass each of the available tests and stand sections, the operator shall decide how to arrange its route. The robot's initial position shall be defined prior to the competition start and based upon the proving ground configuration.

Each attempt shall take not more than 10 minutes.

The points shall be given for passing of the maze and tests, completion of the tasks, riding through the field sections, collection and placement of the beacons according to the special color zones, actions inside the tower. If the robot performs an action in the automatic mode, the participant **shall be obliged to** notify the judges on this prior to the attempt. Such operations shall be performed under the judge supervision and assessed against a double point amount.

An automatic action is passing a section without the operator's control input; use of any sensors is obligatory during the passing. A section shall be deemed passed in the automatic mode if the robot entered the cell and left it through another entrance, if any, without the automatic mode interruption.

Motion according to encoders or timer shall not be deemed as such in the automatic mode.

New sections specially provided to be passed in the automatic mode, are introduced on the proving ground. For more details on them refer to **Appendix No. 3: Automatics on the Proving Ground.**

8. Fines



If the operator has to intervene the robot operation (the robot is stuck, bugged, requires reload or repair), a fine shall be imposed. If the operator has to repeat such intervention, the attempt shall be over.

If the robot is stuck and unable to pass the section, then, subject to the operator's will, it shall be lifted and carried to the section entrance point. So it shall either seek bypass ways or try to pass the section one more time. Such operation shall be considered as an intervention.

If the robot is stuck in any section and fails to get out, the attempt shall be over within 2 minutes.

Only the judge is authorized to lift any robot, pass it to the participant or put it back during the attempt.

In the course of the operator's intervention in the robot's operation, the judge shall not stop the time marking.

If the robot has made an attempt to enter the Maze and touched the proving ground, so further loss of connection with the robot, significant damages, etc. shall be recorded in the minutes of the current attempt. If the attempt has started, but the robot failed before it touched the proving ground, so the participant shall be given a chance to repair the robot and make this attempt one more time.

9. **Additional Requirements**

For a repeated passing of a section, **no points shall be given.**

Only one person, the operator shall control the robot during an attempt.

The rest of the team and the mentor shall be behind the fence at that time.

The organizers shall be entitled to impose additional restrictions.