



REGULATIONS OF THE COMPETITION

"MANEUVERING OF CONTROLLED QUADROCOPTERS"

Age of participants: 16-18 years.

Team: 1-2 people.

Robots: Quadcopter/drone with remote control.

Equipment used: no restrictions.

Description of the task: Capture and delivery of cargo by a quadcopter/drone to a given point along the appropriate trajectory in the minimum time. The competition is held for controlled quadcopters/drones equipped with grippers.

Changes in the 2025 regulation:

1.3. A device for gripping cargo must be installed on the quadcopter body. A two- or three-finger grip must be used.

Appendix 1, Fig. 5. Example of a load to be moved: an example of one of the loads to be moved has been added. To move load №2, a two- or three-finger grip must be used.

1. Requirements for robots

1.1. The dimensions (width × length) of the quadcopter are not regulated, but the aircraft must be able to freely pass through a circle with a diameter of 65 cm in flight. Participants demonstrate a qualification flight before being quarantined.

1.2. The weight of the device must not exceed 500 grams.

1.3. A device for gripping cargo must be installed on the quadcopter body. A two- or three-finger grip must be used.

1.4. The quadcopter is controlled by the operator using a remote control, smartphone, computer or other remote control device.

1.5. The rotating blades of the quadcopter must be equipped with protective arcs or other safety devices.

1.6. The quadcopter must not damage the parts of the competition ground in any way. If this violation is repeated, the team may be removed from the competition and disqualified.

2. Requirements for the landfill

2.1. The training ground is a fenced section consisting of two parts – a flight control zone and a competition field where the participant's quadcopter performs tasks (see Fig. 1, Appendix No. 1).

2.2. The competition field contains the following elements:

2.2.1. *Start section* . A take-off area with a diameter of at least 100 cm, located on the floor surface (see Fig. 2, Appendix No. 1).

2.2.2. Delivery points:

– *Delivery point 1.1*. Box with a green mark.

Dimensions (L×W×H): 100×100×50 cm. Designed for delivery of Cargo No. 1.

– *Delivery point 1.2*. Box with a green mark.

Dimensions (L×W×H): 100×100×50 cm. Designed for delivery of Cargo No. 1.

– *Delivery point 2.1*. Box with an orange mark.

Dimensions (L×W×H): 100×100×100 cm. Intended for delivery of Cargo No. 2.

– *Delivery point 2.2*. Box with an orange mark.

Dimensions (L×W×H): 100×100×100 cm. Intended for delivery of Cargo No. 2.

2.2.3. *Vertical gates for quadcopter flight* (2 pcs.: Gate No. 1 and Gate No. 2). A polygon element with an internal span diameter of 100 cm and located at a height of at least 40 cm, placed on the floor surface (see Fig. 3, Appendix No. 1).

2.2.4. *Horizontal gates for quadcopter flight* (2 pcs.: Gate No. 3 and Gate No. 4). A polygon element with an internal span diameter of 100 cm and located at a height of at least 100 cm, placed on the floor surface (see Fig. 4, Appendix No. 1).

2.2.5. *Box for transported objects*. Three-color box consisting of green, orange and blue sections. Dimensions (L×W×H): 100×100×50 cm (100×300 cm).

2.2.6. Movable loads.

Load No. 1. The width of the captured part is not less than 5 cm, the load weight is not more than 30 g.

Load No. 2. The width of the captured part (trunk) is not less than 10 mm, the width of the cone (on the upper part of the load) is not less than 16 mm, the weight of the load is not more than 20 grams.

2.3. The models of the cargo are made using 3D printing. The dimensions and models of the cargo may differ slightly, with the weight remaining the same (see Fig. 5, Appendix No. 1).

2.4. The landfill is fenced around the perimeter with a net or other possible methods.

2.5 The layout of the delivery points becomes available on the day of the competition. The location of the gates is chosen before training and does not change during the competition.

3. Procedure for holding the competition

3.1. The team starts the competition at the signal of the judge. The operator is in the flight control zone at the time of the start. The quadcopter must be located in the start zone.

3.2. After the “Start” signal, the team operator has no right to leave the control zone on the training ground until the end of the attempt.

3.3. In addition to the operator, one of the judges is located in the control zone.

3.4. During the stages of the competition, participants have the right to change the operator.

3.5. Teams are prohibited from flying a quadcopter above the fence lines, outside the competition field area, and if there are people in the competition field area. In case of violation of this clause, the team will be disqualified.

3.6. If the quadcopter attempts to leave the competition area without control, the judge stops the attempt and issues a warning.

3.7. The competition consists of three stages, involving the transportation of loads to a specified point and passing through a ring.

3.7.1. The participants are introduced to the task and the trajectory of movement before the start of the competition. The order of visiting the points depends on the participant's strategy.

3.7.2. An additional attempt may be awarded by the judge's decision.

3.8. The attempt is considered completed:

3.8.1. When performing the task of transporting cargo from the launch pad and back, after the corresponding command from the judge.

3.8.2. If the judge stops the attempt, if the quadcopter is unable to continue the competition and/or if the quadcopter loses motor activity for 5 seconds (determined by the judge).

3.8.3. When a team member stops an attempt with a loud command: “Stop.”

3.8.4. Upon reaching the time limit for completing stages.

3.9. The time limit for completing the stages is 3 minutes. The time may be changed by the judge during the test flights of the quadcopters, but not later than 30 minutes before the start of the competition.

3.10. The time of the attempt is recorded by the judge in the competition protocol; the best attempt is counted.

4. Counting points and determining winners

4.1. Before the start of the competition, participants are informed of the quadcopter movement patterns, with points indicated.

4.2. The team receives points for completing each of the task points.

4.3. *Possible* elements of the quadcopter movement scheme and scoring:

Element	Criterion	Points
Takeoff	Successful takeoff of a quadcopter from a platform	5
Gate #1, Gate #2	Through passage of a quadcopter through the gate, in any direction convenient for the operator	10 for each gate
Gate #3, Gate #4	Through passage of a quadcopter through the gate, in any direction convenient for the operator	10 for each gate
Cargo capture	Lifting the load off the surface	10 for each load
Cargo placement	Placing cargo on the specified site	20 for each load
Landing	Successful landing of the quadcopter on the launch pad	5

4.4. Completion of the stage is considered complete when the quadcopter blades stop rotating.

4.5. If the quadcopter falls, stops or lands outside the starting area during the task, the maximum time of the attempt is recorded in the protocol, and the points scored up to that point are awarded.

4.6. Each team is given at least two attempts (the specific number of attempts may be changed by the judges' decision).

4.7. The attempt with the maximum number of points counts.

4.8. The team with the highest number of points will be declared the winner.

4.9. If the teams score the same number of points, the team that spends the least amount of time on completing the task is declared the winner.

4.10. In case of equality of points and time spent, the next most effective attempt is taken into account.

**An example of a competition polygon¹
and its elements**

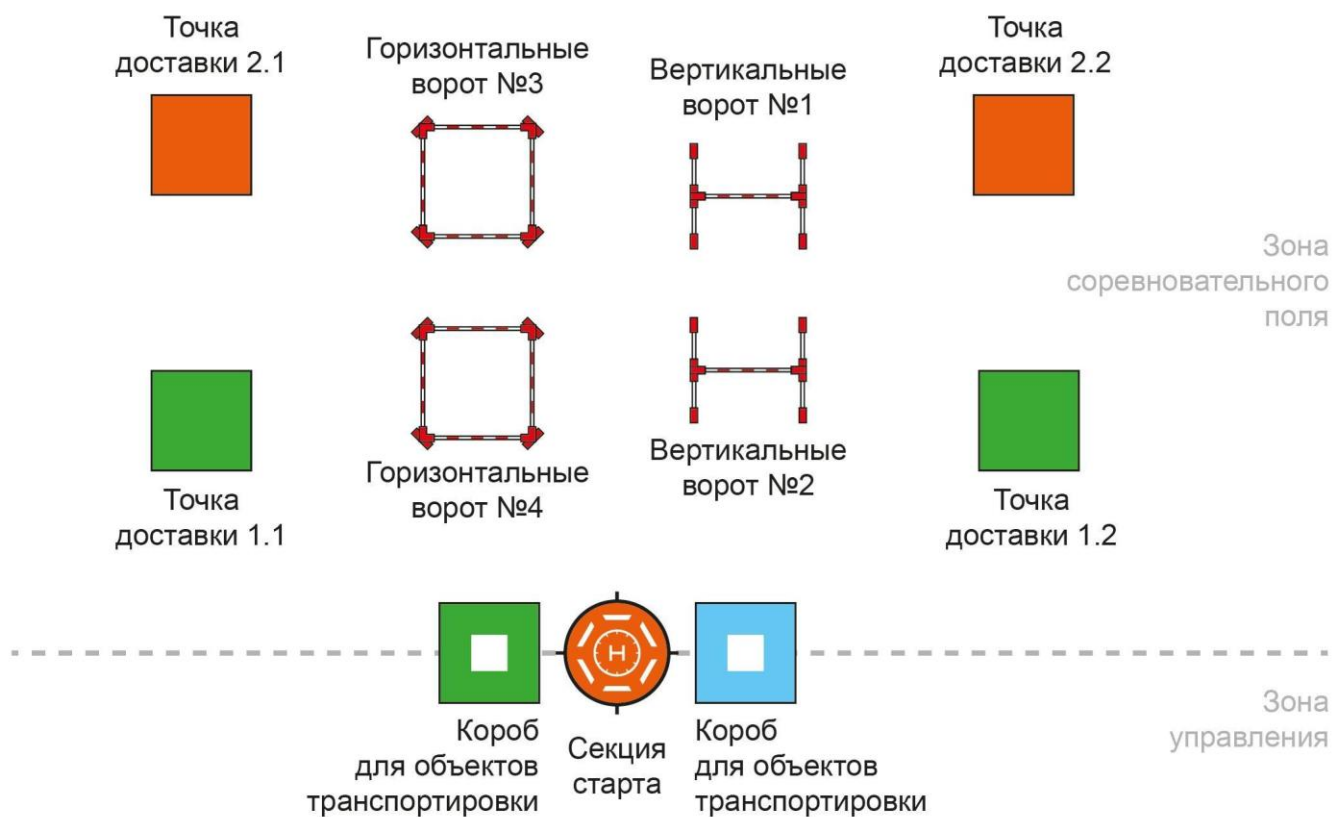


Fig. 1. Sample of a competition site

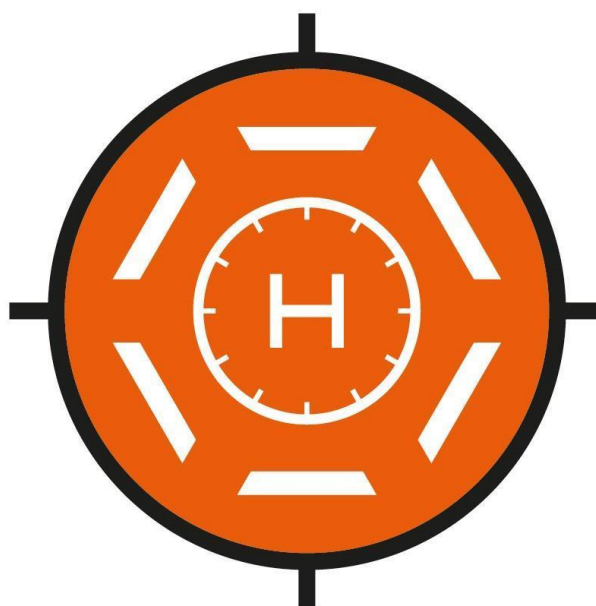


Fig. 2. Example of a takeoff pad

^{1*} – The final configuration of the landfill may differ from that shown.

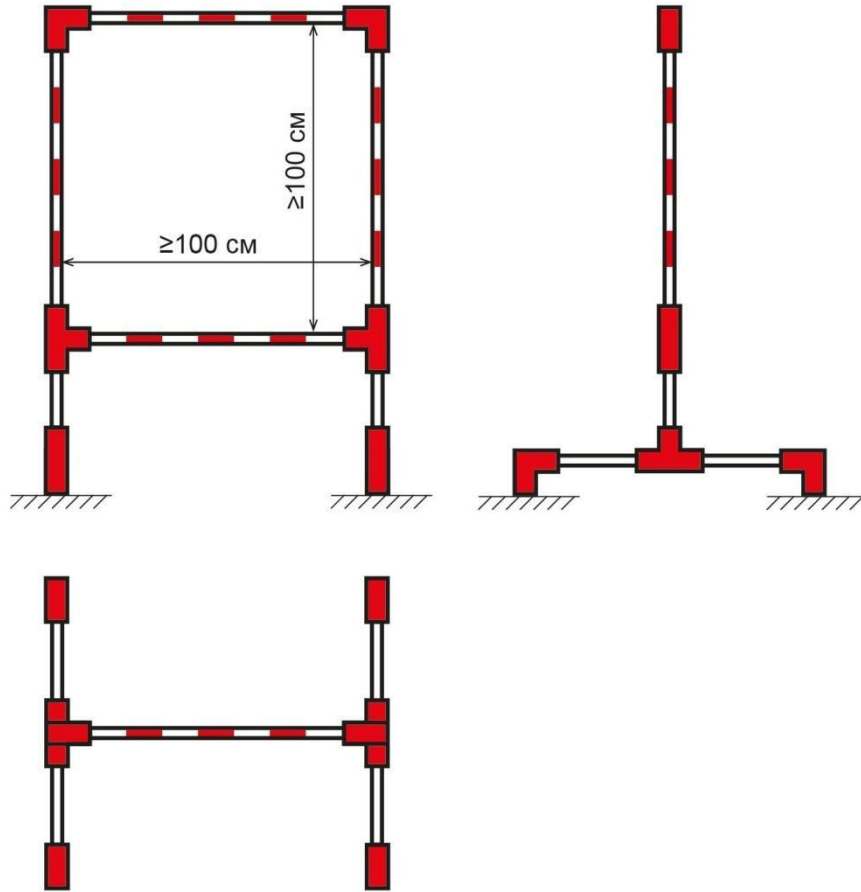


Fig. 3. Example of vertical gates

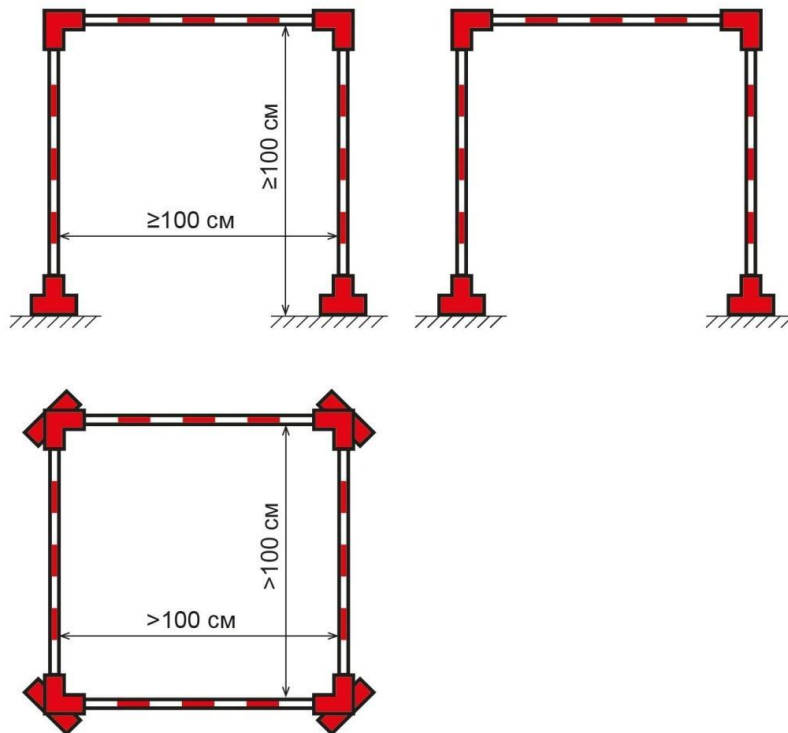
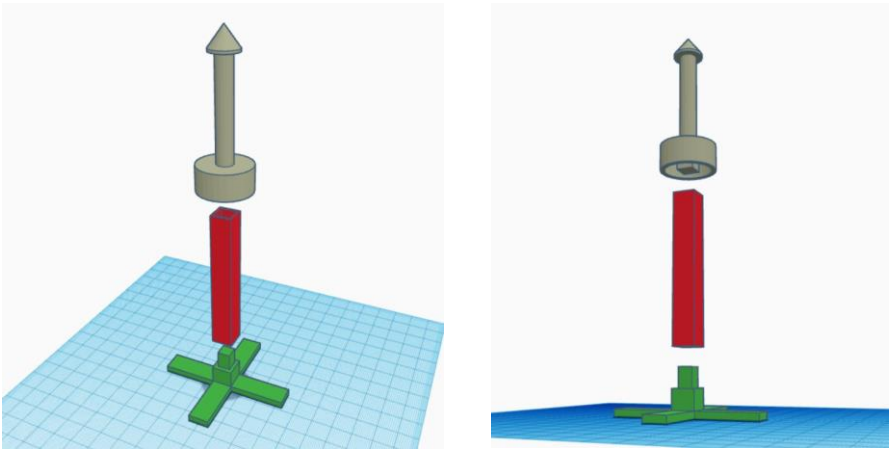


Fig. 4. Example of horizontal gates

Cargo #2:



Cargo No. 1:

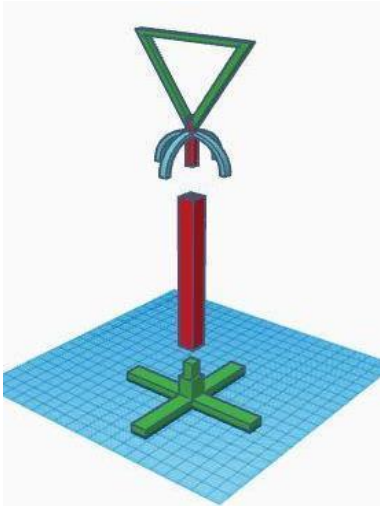


Fig. 5. Examples of transported cargo