

COMPETITION REGULATION 3D Car – modeling

Age of the participants: from 11 to 18.

Team: 2 people.

Software for creating 3D model: no restrictions

1. GENERAL PROVISIONS

The objective of the event: to develop technical creativity and create conditions for students to form interest in engineering 3D-modeling and prototyping.

Tasks:

- to increase the level of students' knowledge of computer-aided design (hereinafter referred to as CAD) systems;
- promotion of CAD study in general educational institutions and organizations of additional education;
- expansion of territorial coverage and formation of active CAD communities;
- identifying and supporting talented young people in 3D modeling engineering.

2. CONDITIONS OF PARTICIPATION

The composition of the team - no more than 2 participants.

The competition category consists of three main stages:

1. Protection of the modeled and printed project of the "Car of the Future". The model of the car is created in advance. (See **APPENDIX 1** of the Requirement for the project).
2. Aligning the produced projects with the chassis. Car racing competition.
3. Prototyping and printing of an additional part for the car chassis according to the specified dimensions and form. The task for prototyping is issued on the day of the competition.

3. CONDITIONS OF CONDUCT

- The competition shall be held over a period of two days;
- The manner of the competition stages shall be determined by the referee on the day.
- Each participant/team of participants shall show his/her model to the jury members in order to check the compliance of the model with the requirements set forth in Appendix 2.
- Each participant/team shall make a report and presentation of his/her model (Appendix 1).
- Each participant/team shall be given an opportunity to make a trial run (the time allotted for the trial runs shall be determined on the day of the competition);

- The order of heats of the participants shall be determined on the day of the competition by drawing of lots;
- Competitions in the **1st category** shall consist of alternating heats for the time being. The route is constructed by the participants of the competition on the day. Each participant passes a certain number of laps. The number of laps is determined on the day of the competition on the basis of the length of the track. A car model that has passed the distance for the shortest time is considered the winner.
- The competition in **2 categories** consists of doubles heats on the playoff principle. The 1st and 2nd category competitions are held on a track assembled from the standard set of scalextric.
- In the Prototyping stage the participants receive a given 3D model, which they must reproduce with maximum accuracy. It is then provided to the jury members. Time for model creation is not less than 1 hour.

1. All models of the participants are placed on a special table and are part of the whole.
2. The participants shall observe all safety measures for the work with the received equipment and shall be independently responsible for its performance.
3. The participants should have a laptop with the necessary software installed.
4. Electric power supply points (220V) will be available for the teams, and the team must have its own filter to ensure the delivery of power to its table. Consumption power will not exceed 0.5 kW.
5. The participants should have measuring devices (ruler, caliper, etc.) to measure 3D sample.
6. The project carried out by participants should represent 3D model, which complexity of elements is regulated by the task. No restrictions are imposed on the 3D development environment, and the output file should be in STL, OBJ, AMF format.
7. When the models are finished, participants use the printer software to slide the model to a memory card and then print it to a 3D printer from the memory card, which was installed and calibrated by the commands the previous day.
8. The time allocated to the creation and printing process shall not exceed 120 minutes, after which the models shall be inspected by the competition referees.
9. If errors are detected, the teams are given the opportunity to eliminate them, and penalty points are awarded.

3. 3D model inspection

- 3.1. During the inspection of the models, the referee makes a description, focusing on the complexity, size and other relevant characteristics.
- 3.2. During the description, the second referee records the indicators and scores in the table.

4. EVALUATION CRITERIA

All projects that meet the specified requirements (Appendix 1) and are admitted to the competition shall be evaluated according to the following criteria:

- in category 1, the winner is a car model which has covered the given distance in the minimum time, among all participants of the competition, 2 and 3 places are determined by ranking of time indicators;

- in category 2, the winner is the car model which won the final of the series of races, the 2nd place is taken by the car model which lost in the final, the 3rd place is taken by the car model which won the race for the third place.

5. SUMMARIZING AND AWARDING

9.1 The winners are determined by the amount of scores received in three competition stages (1.Prototyping, 2.Project Defense, 3.Races).

In addition, there are nominations:

- 1) The best time
- 2) Pair race winner
- 3) Better design

9.2 The summary shall be drawn up in minutes by the jury;

9.3 All contestants are awarded a participant's diploma;

9.4 The Organizers have the right to establish additional nominations, about which the Competition Organizing Committee informs participants. Winners are awarded with diplomas and prizes established by the Competition Organizers.

6. REQUIREMENTS TO THE PROJECTS

Each participant/team of participants prepares a **multimedia presentation** and a **car model**.

1. Multimedia presentation shall necessarily include the information on:

- car model prototype;
- the stages of creating a 3-dimensional model;
- problems solved in the course of model design and manufacturing;
- stages of completion;
- design features, etc.

Report time is no more than 7 minutes.

2. **Car model** (item) The theme of this competition is "The Car of the Future".

2.1. The car model submitted for participation shall comply with the following dimensions:

- Length: 100-165mm
- Width: до 64mm
- Height: 30-50mm
- On the back of the body to provide a groove 7 mm long, 4 mm at widths for the installation of 3 D - model, created on the parameters issued on the day of the competition.
- See Appendix 2 for chassis dimensions for body installation.

2.2.The body of a car model should be designed by participants independently in CAD. The body of the car model shall be made by means of 3D printing. The chassis shall be provided to the competitors on the day of the competition. Chassis dimensions are provided in Appendix 2. The 3D chassis model corresponding to the specified dimensions is available on the website **roboland.kz** in the file **modelavto.stl**. This model can be used by the participants in the process of creating the car body of the future. All moving parts (axles, wheels, motor, current collector, gears) must be used from the standard Scalextric set. It is allowed to use wheel disks of own design, independently made by means of 3D printing.

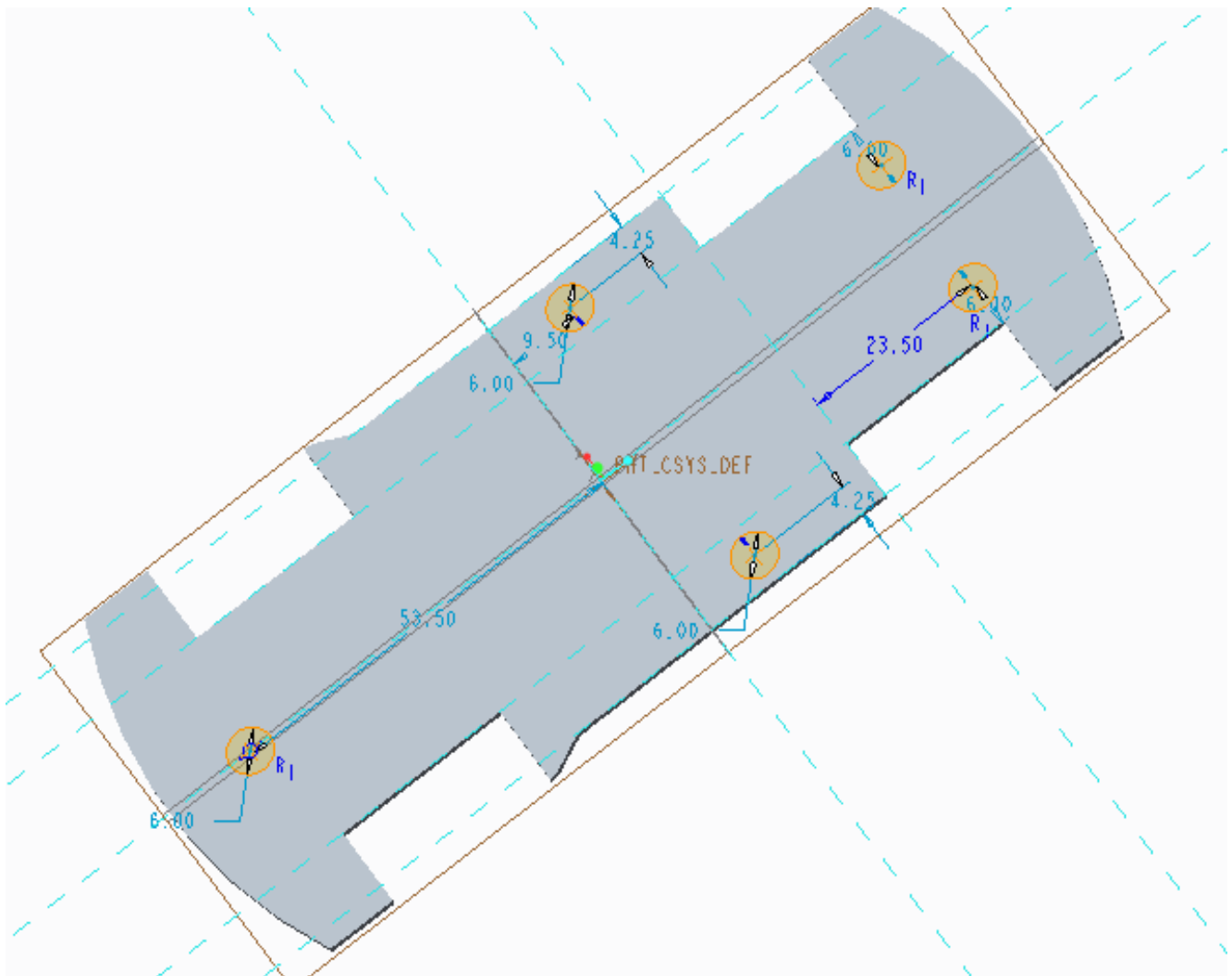
2.3.Magnets, bearings, additional or improved gears, axles and tyres **are not allowed** to use. Only one motor may be installed (the motor location is determined by the participant himself). **It is not allowed** to change the circuit diagram (the motor must be directly connected to a current collector).

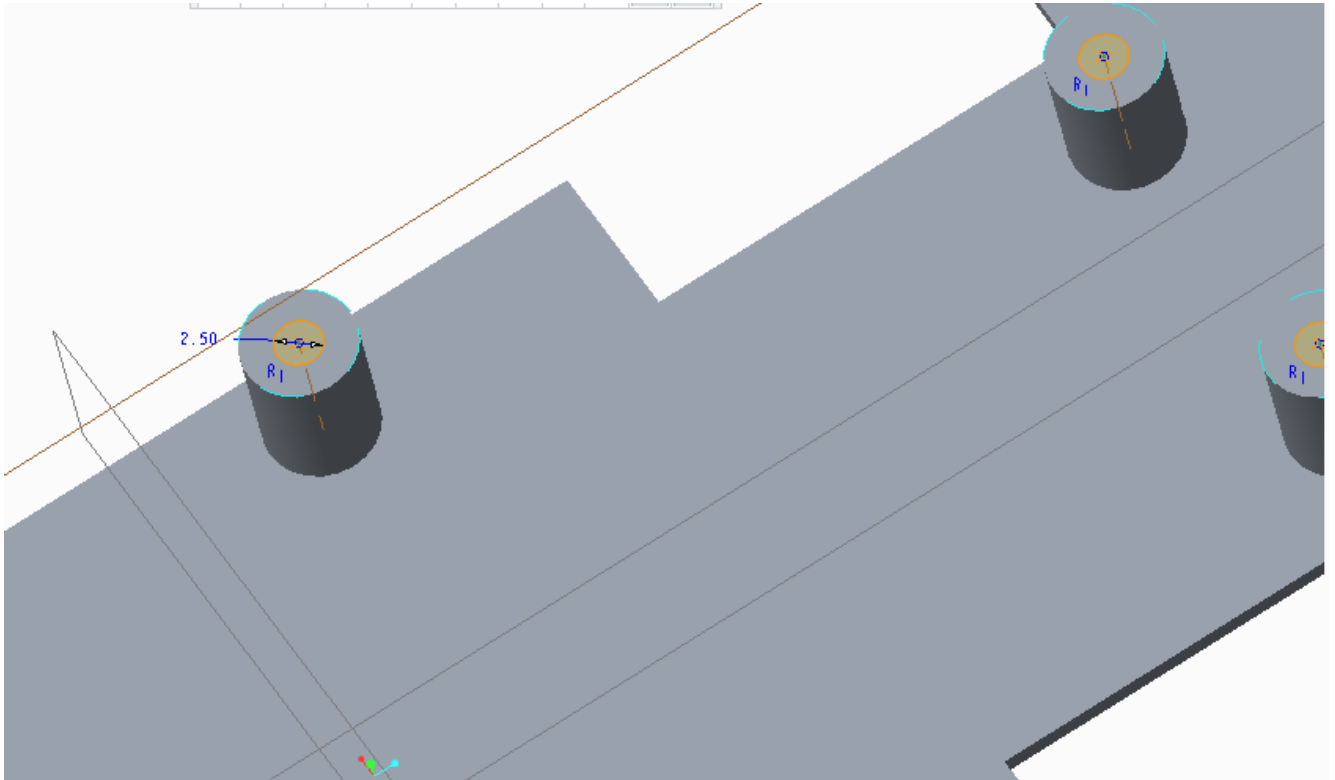
2.4.The electric motor, gears and connecting wires shall be hidden under the body of the car model.

2.5.The body and chassis must be securely fastened together. Screws can be used to connect. The use of adhesive tape and glue to connect the body and the chassis **is not permitted**.

2.6.All wheels of a car model mounted on a track shall contact the surface of the track.

Chassis drawing





Wheel diameter – 20mm.

