



REGULATIONS OF THE COMPETITION

"ENGINEERS OF THE FUTURE - 3D PROTOTYPING"

Age of participants: Level 1 - 10-14 years.

Level 2 - 15-18 years old.

Team: 1-2 people.

Equipment used: 3D printer.

Simulation environment: unlimited.

Description of the task: Participants are given a model on the day of the competition. It is necessary to create a 3D model of the product in a computer-aided design (CAD) system, prepare a project for printing a prototype on a 3D printer. The model itself must be reproduced with maximum precision on the provided 3D printer. The printer model becomes known on the day of the competition.

1. Requirements for participants

1.1. On the day of the competition, teams receive instructions in which participants are introduced to the rules for setting up 3D printers provided by the organizers.

1.2. Before the start of the competition, participants are given time (at least 30 minutes) to calibrate the printer and print a test model.

1.3. During the competition, participants receive a given model, which they must reproduce with maximum accuracy and provide it to the jury members. The time for creating the model is determined by the panel of judges, but not less than 1 hour.

1.4. All manufactured models of the participants are placed on a separate table.

1.5. Participants must comply with all safety measures when working with the equipment received and are solely responsible for its functionality.

1.6. Participants may bring measuring instruments (ruler, caliper, etc.).

2. Requirements for the participants' work

2.1. At the printer setup stage, participants can receive advice from a representative of the company providing printers for use by the competition organizers.

2.2. The trial model must meet the required criteria. In case of gross non-compliance, participants may not be admitted to the competition stage.

2.3. The project completed by the participants must be a 3D model, the complexity of the elements of which is regulated by the task. There are no restrictions on the 3D development environment, but the output file must have one of the following formats: STL, OBJ, AMF.

2.4. After completing the creation of the models, the participants use the printer software to prepare the model by recording it on a memory card, and then print it on a 3D printer from the memory card, the installation and calibration of which was done by the teams in advance.

2.5. The time allocated for the process of creation and printing is no more than 150 minutes, after which the models are inspected by the competition judges. The duration of the competition is determined by the panel of judges on the day of the event.

2.6. If errors are detected, teams are given the opportunity to correct them, and penalty points are awarded.

3. Procedure for holding the competition

3.1 During the inspection of the models, the judge will make a description, focusing on the complexity, size and other relevant characteristics.

3.2. During the description, the second judge records the indicators and points in the table.

4. Counting points and determining winners

4 .1. Scoring:

Criterion	Characteristic	Points
Assembling and setting up a 3D printer (30 points)	Getting your 3D printer ready for a test print	0-10
	Printer calibration (setting up and printing a test model)	0-10
	Evaluation of the compliance of the trial model with the standard	0-10
Modeling (40 points)	The shape of the part corresponds to the sample	0-10
	Overall dimensions are maintained	0-10
	The elements of the part are made according to the sample	0-10
	All elements are rounded or chamfered	0-10

Print (60 points)	The sample is made with acceptable accuracy.	0-10
	No warping (peeling off from the platform, bending)	0-10
	No underextrusion (holes and gaps in printing of vertical surfaces)	0-10
	Absence of defects with the top layer (holes and cracks in the printing of horizontal surfaces)	0-10
	Lack of stratification of the lower layer	0-10
Total		120

4.2. Based on the points earned by the team, an overall rating is formed.

4.3. The team with the highest number of points is declared the winner.

Organizational recommendations

1. Provide each team with a 3D printer.
2. Assign a team of judges consisting of at least three people to each field..

Methodological recommendations

1. Permissible complication of the regulations:
 - based on the issued model, it is necessary to create a 3D model of the product in a computer-aided design (CAD) system;
 - prepare a project for printing a prototype on a 3D printer;
 - make a drawing of the product.