



REPUBLIC OF TURKIYE  
MINISTRY OF NATIONAL EDUCATION  
The General Directorate  
of Technical and Vocational Education

# 15<sup>th</sup> INTERNATIONAL MoNE ROBOT CONTEST

## THEMATIC CATEGORY RULES





### **“THE REPUBLIC AND TECHNOLOGY”**

Reforms and developments in the economy, law, education, culture and society in the first years of the Republic; the Unmanned Aerial Vehicles (UAV) that we have started to produce domestically and nationally, the electric car developed by the Turkish Automobile Entrepreneurs Group (TOGG), national natural gas drilling activities and the National Space Programme launched by the Turkish Space Agency with the slogan "Where the Future Begins".

Developments that started in the first years of the Republic:

#### **DEVELOPMENTS IN THE FIELD OF ECONOMY**

1. Turkish Economic Congress, 17 February 1923
2. Developments in Industry and Trade, 1924
3. Developments in Agriculture, 1925
4. Developments in the Field of Transport and Public Works, 22 April 1924
5. Maritime Developments, 1 July 1926
6. Developments in the Field of Health, 1923

#### **NEW DEVELOPMENTS IN THE FIELD OF LAW**

1. Adoption of new constitution by the Grand National Assembly of Turkey and became effective 20 April 1924
2. Adoption of the Turkish Civil law, 17 February 1926
3. Adoption of other fundamental laws; Turkish Penal code from Italy in 1926, Commercial Code (Maritime Trade) from Switzerland in 1926, Commercial Code (Land Trade) from Germany in 1926, Enforcement and Bankruptcy Code from Switzerland in 1932.
4. Women were given the right to vote and be elected in municipal elections in 1930, in village head elections in 1933 and in general elections in 1934,

#### **REFORMS IN THE FIELD OF EDUCATION AND CULTURE**

1. The Law of Unification of Education, 3 March 1924
2. Alphabet Revolution, 1 November 1928
3. Studies in the Field of History; Establishment of the Society for the Study of Turkish History (Turkish Historical Society), 15 April 1931
4. Studies in the Field of Language; Establishment of the Turkish Language Research Society (Turkish Language Association), 12 October 1932
5. University Reform; Transformation from Darülfünun (higher institution at Ottoman era )to Istanbul University
6. Fine Arts and Sports

#### **REFORMS MADE IN THE SOCIAL FIELD**

1. Reform of the Hat and Regulations on Dress, 25 November 1925
2. Closure of Dervish Lodges, Zawiyahs and Tombs, 30 November 1925
3. Changes to the Calendar, Time and Measures, 26 December 1925
4. Adoption of the Surname Law 21 June 1934
5. Rights Granted to Turkish Women

Reference: The above information is taken from the link below.

<https://ogmmateryal.eba.gov.tr/panel/panel/EKKitapUniteOnizle.aspx?Id=393&sayfa=98>



In the 21st century, some of the technological developments started to be developed in our country:

You can find detailed information about today's technologies and detailed information about these studies from the links below.

<https://baykartech.com/tr/> Unmanned Aerial Vehicle

<https://www.togg.com.tr/> Turkey's Automobile Initiative Group

<https://www.trthaber.com/haber/gundem/denizden-karaya-turkiyenin-dogal-gaz-yolculugu700229.html> The discovery of 320 billion cubic metres of natural gas reserves in the Black Sea

<https://tua.gov.tr/tr> Turkish Space Agency

and many more in the 100th anniversary of our Republic...

### **THEMATIC ROBOT CATEGORY RULES "AHICAN IN THE FOOTSTEPS OF THE REPUBLIC, IN PURSUIT OF TECHNOLOGY IN BURSA"**

Thematic robot competition consists of a platform and two tracks.

Platform, It is the area that all games of this competition are played.

The first stage on the tracks represents the playground of the controlled robot; the second stage represents the playground of the autonomous robot.

During the competition, two different competitor teams will compete with their robots on the platform. Competitors will compete with a controlled (wireless) robot for the first stage on the track and an autonomous (self-moving) robot for the second stage. In the competition manual, the controlled robot will be referred to as the first robot and the autonomous robot as the second robot.

During the competition, two competitors, one competitor in the first stage and another competitor in the second stage, will be ready with their robots at the same time.

Before the competition starts, both robots will be placed in the first and second stage starting places where they will start the competition.

The second robot will not be able to start its task before the first robot completes its task. When the first robot completes each task, it will go to the RF box area, take the key of the relevant task, take it to the RF area and transmit the completion of the relevant task to the door where the second robot is located and ensure that the task door is opened.

#### **Tasks:**

During the competition, the 1st, 2nd, 3rd and 4th tasks will be completed by the first robot and the 5th task will be completed by the second robot.

#### **Task 1. Developments in Agriculture (G\_1)**

Representative sowing by taking the task materials representing wheat from where they are located and taking them to the area representing the field.

#### **Task 2. Development in Transportation (G\_2)**

Taking the task materials representing the sleepers used for fixing the rails between the railway tracks from where they are located and taking them to the red coloured pit at the tunnel





entrance where the sleepers will be placed, making the representative assembly and passing through the tunnel.

### **Task 3. Electric Car Factory (G\_3) (G\_3)**

Taking the task material representing the electric car logo from its location and taking it to the area representing the Electric Car Factory and placing the logo in the factory.

### **Task 4. Black Sea Natural Gas Drilling (G\_4)**

Taking the mission material representing the drill pipe from its location and taking it to the water-filled area representing the Black Sea and performing a representative drilling.

### **Task 5. Rocket Launch Pad in the National Space Programme (G\_5)**

The second robot reaches the rocket launch pad and loads itself on the launch pad.

The team that completes its tasks and illuminates the parliament building will be considered to have finished the competition, at this time the stopwatch will stop automatically and the competition will be completed.

The ranking will be based on total points and time.

**Stopwatch:** It will be digital and in a place visible to everyone in the field.

### **Task 1. Developments in Agriculture (G\_1)**

The first robot will move from the starting point and pick up the task materials representing wheat in the G\_1 area and take them to the area representing the field and leave the task materials in this area. After completing the task, it will go to the RF box area and pick up the box at the RF\_1 point and bring the material to the RF area and open the E\_1 door in front of the second robot. With the opening of the door, the second robot will move autonomously from the yellow coloured area and stop without crashing when it sees the E2 obstacle.

### **Task 2. Developments in Transport (G\_2)**

The first robot will pick up the task materials in the G\_2 area, which represent the sleepers laid between the railway tracks to fix the rails, and take them to the area representing the railway and drop the task materials on the red coloured place in this area. After completing the missing sleeper, the robot will go through the tunnel to the RF box area and pick up the box at the RF\_2 point, bring the material to the RF area and open the E\_2 door in front of the second robot. With the opening of the door, the second robot will move autonomously from its location and stop without crashing when it sees the E3 obstacle.

### **Task 3. Electric Car Factory (G\_3)**

The first robot will pick up the task material representing the electric car logo in the G\_3 area and take it through the tunnel to the area representing the Electric Car Factory, place the task material in one of the logo slots on the factory roof, and then the robot will go to the RF box area, pick up the box at the RF\_3 point, bring the material to the RF area and open the E\_3 door in front of the second robot. With the opening of the door, the second robot will autonomously move from its location and stop without crashing when it sees the E4 obstacle.

### **Task 4. Black Sea Natural Gas Drilling (G\_4)**

The first robot will pick up the task material representing the drill pipe in the G\_4 area, take it to the area representing the natural gas drilling area, which is filled with water, and insert the task



material into the drilling slot in this area. After the pipe is installed in the drilling slot, the robot will go to the RF box area and take the box at the RF\_4 point from where it is located, bring the material to the RF area and open the E\_4 door in front of the second robot. With the opening of the door, the second robot will move autonomously from its location and move to the space shuttle launch ramp area at E\_5 and reach the pipe obstacle there.

#### **Task 5. Rocket Launch Pad in National Space Programme (G\_5)**

The second robot will hold on to the pipe representing the ramp with its own means and climb up to the red line on the pipe and stop without hitting the top point.

The team that completes its tasks and illuminates the parliament building will be deemed to have finished the competition, at this time the stopwatch will stop automatically and the competition will be completed.

## THEMATIC ROBOT CATEGORY RULES

**“AHICAN IN THE FOOTSTEPS OF THE REPUBLIC, IN PURSUIT OF  
TECHNOLOGY IN BURSA”**

## COMPETITION PLATFORM

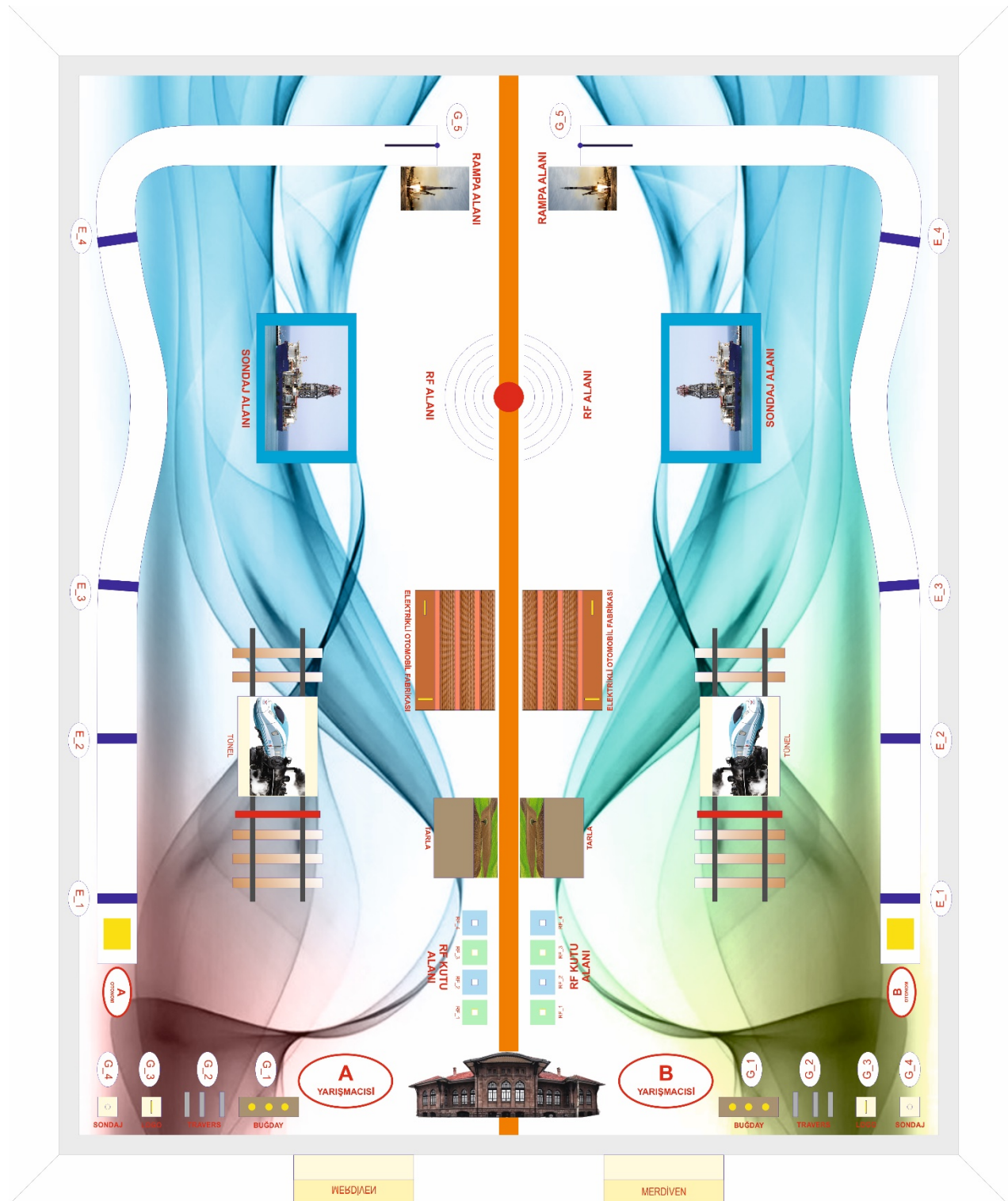


Figure-1 Top view of platform.



**Platform:** It is covered by colorful printed foil.

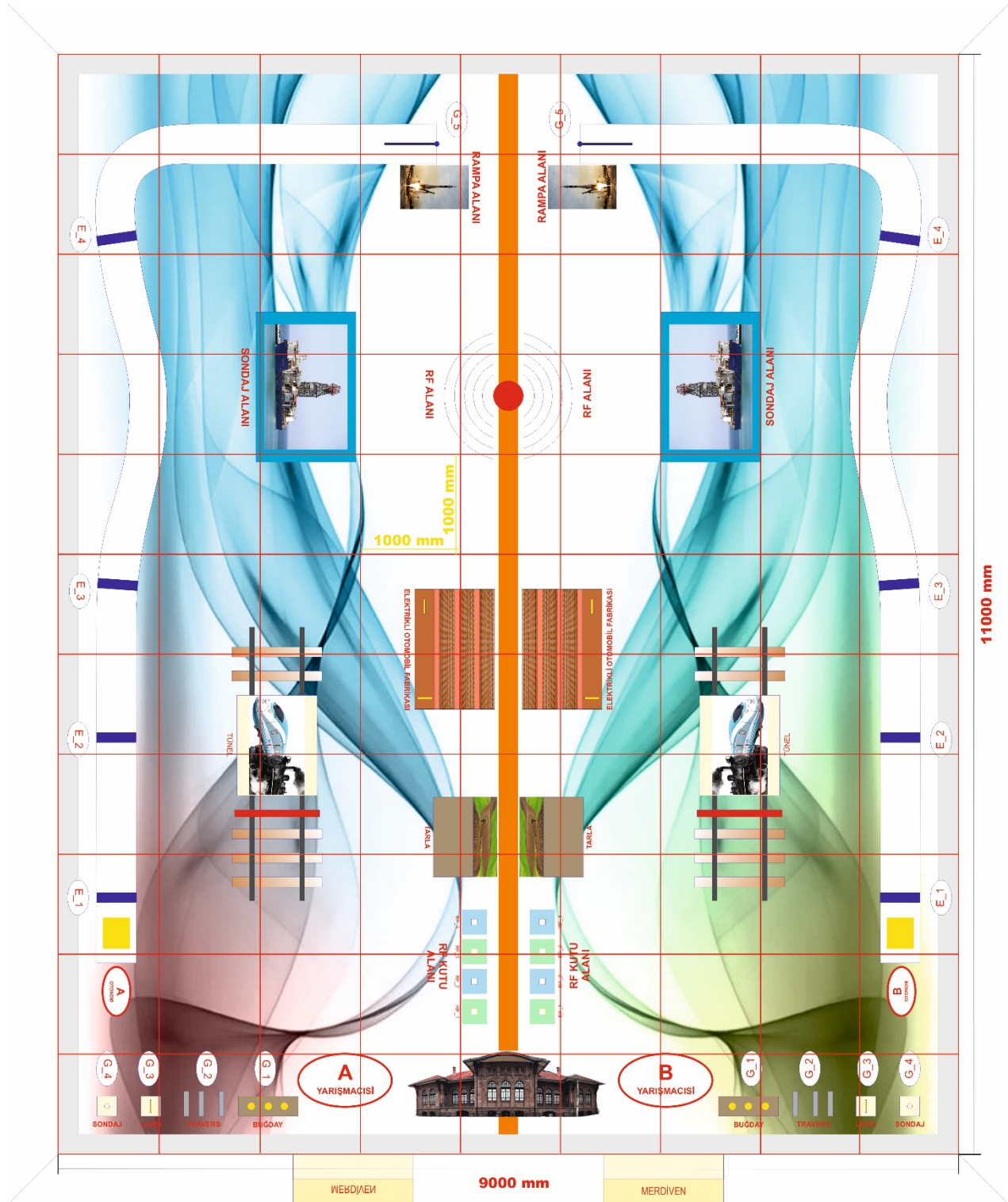


Figure-2 Grid view of Platform.



### 3D COMPETITION PLATFORM

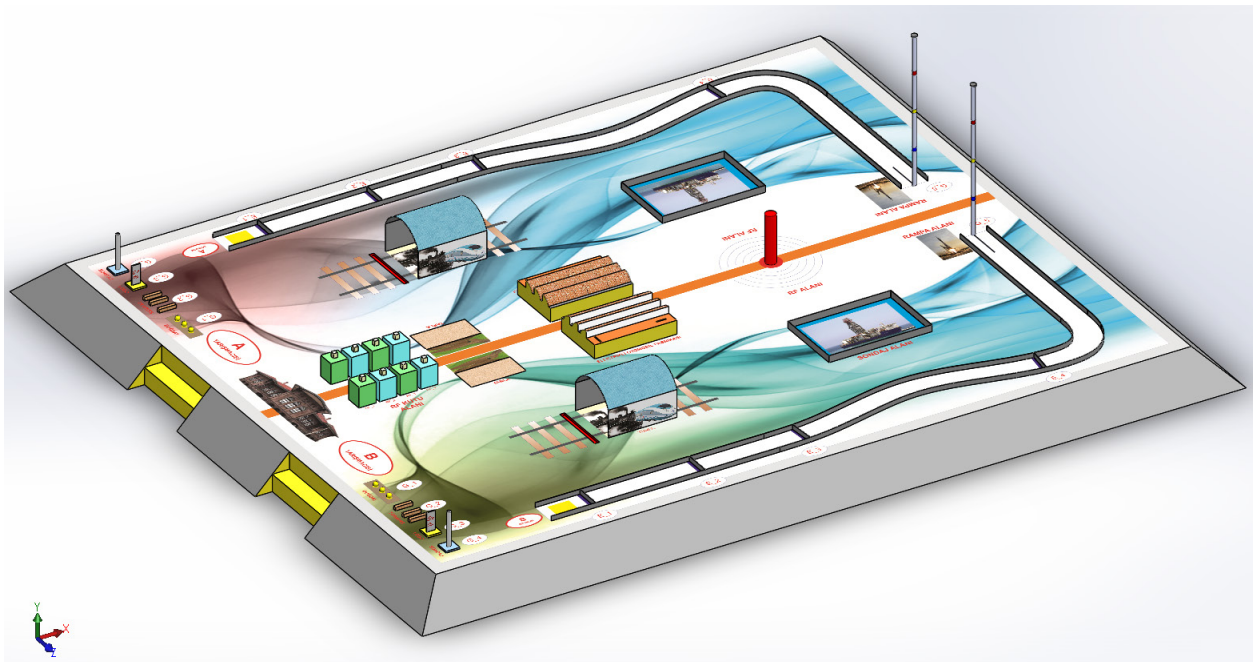


Figure-3 3D view of track A and track B

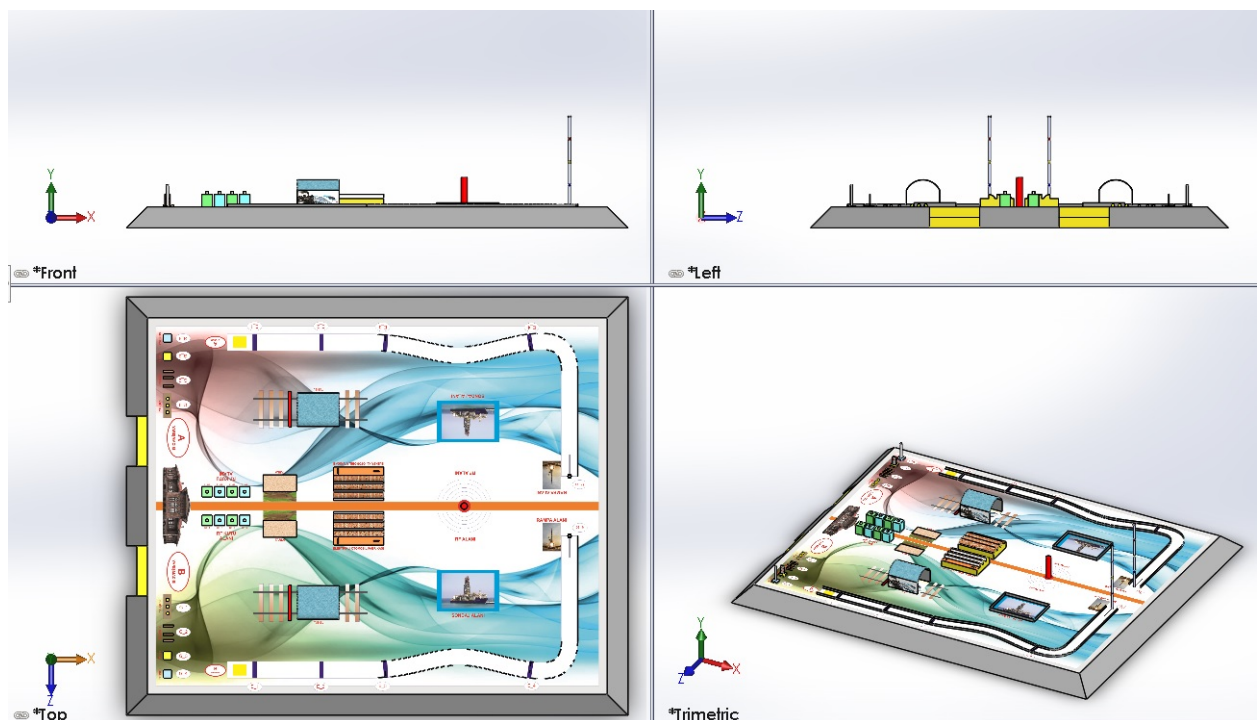


Figure-4 Perspective view of tracks on the platform



**Platform:** It consists of A and B tracks and each track consists of two stages.

**FIRST STAGE** (*controlled robot*)

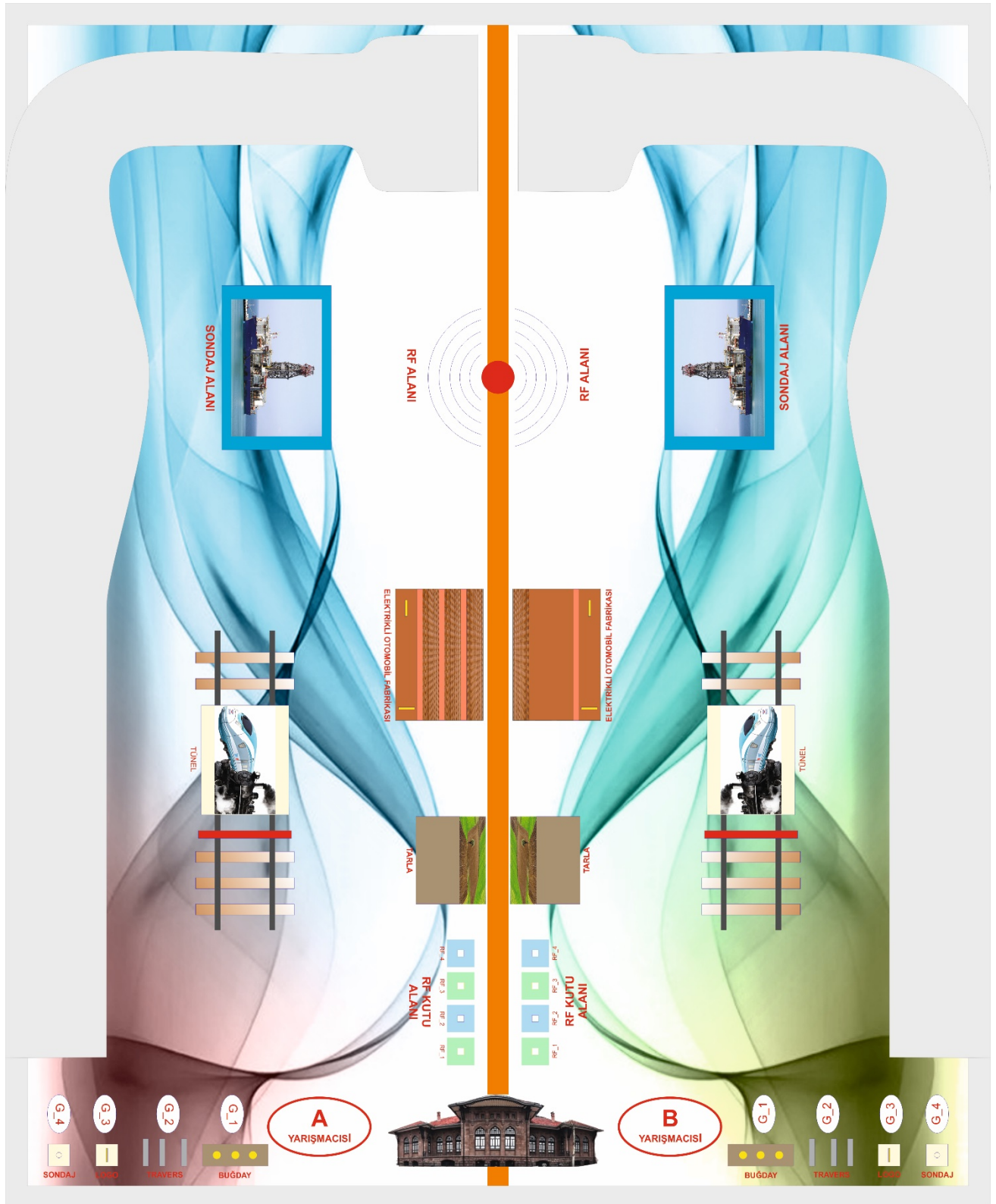


Figure-5 Top view of the controlled robot playground on the platform

SECOND STAGE (*Autonomous Robot*)

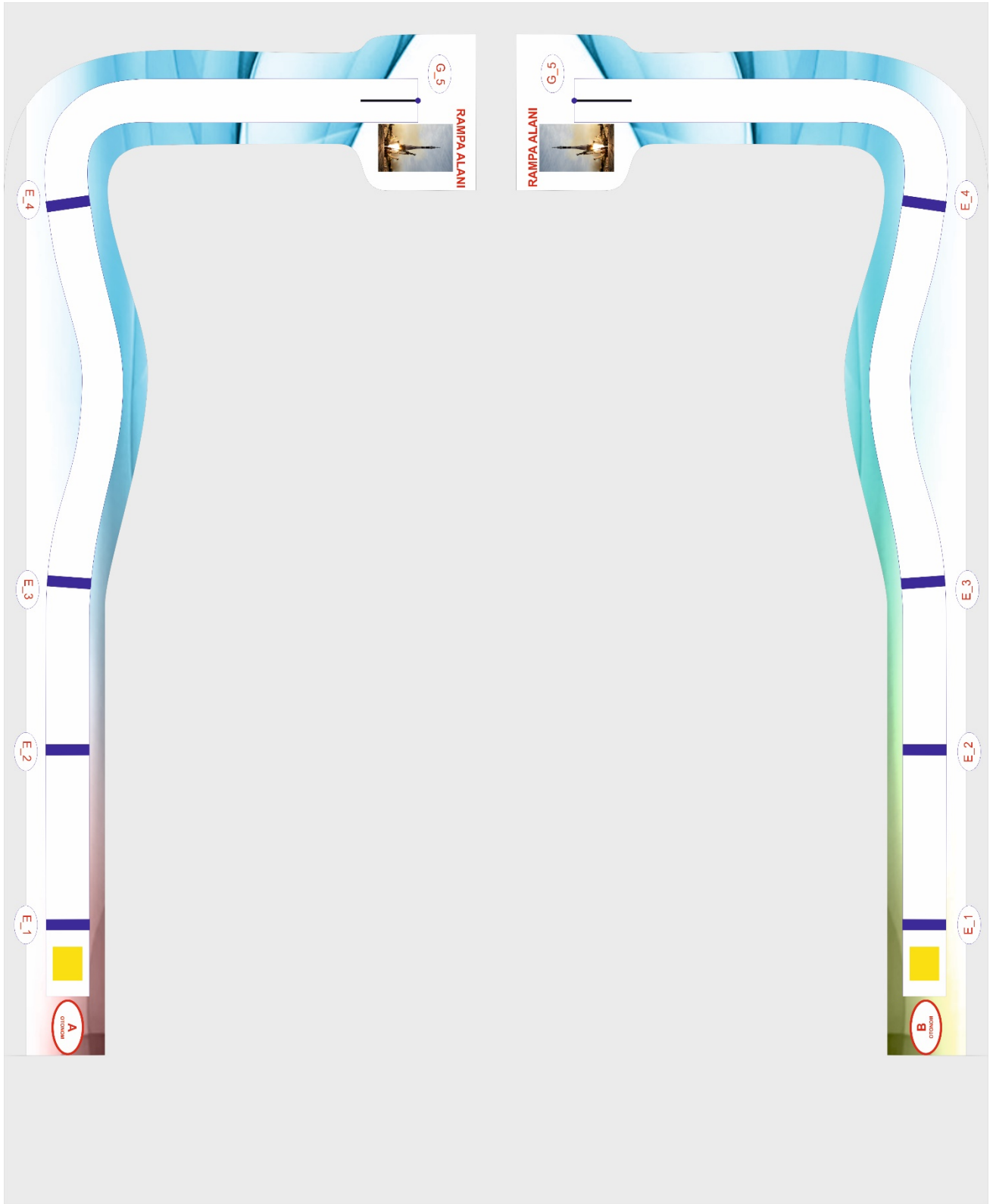


Figure-6 Top view of the autonomous robot playground on the platform

### FIRST STAGE (CONTROLLED ROBOT)

Before the start of the competition, the competing teams will place both robots at the starting places on the tracks and wait ready at the beginning of their robots. When the referee starts the stopwatch, the first robots will move and the competition will start.

Robots complete the following tasks with same order on their own tracks.

#### Tasks:

**Task 1:** The first robot will move from the starting point and pick up the task materials representing wheat in the G\_1 area,

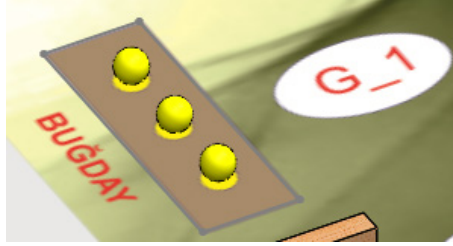


Figure-7 Task 1 materials in yellow colour

and will take it to the area representing the field and leave the mission materials in this area.



Figure-8 Area for the placement of Task 1 materials

After completing the task, he will go to the RF box area and take the box at the RF\_1 point from where it is located;

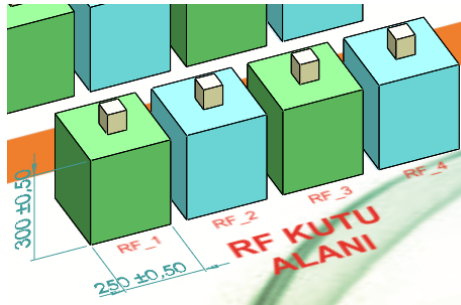


Figure-9 RF box area and task materials

And will bring the material to RF area malzemeyi RF alanına getirecek



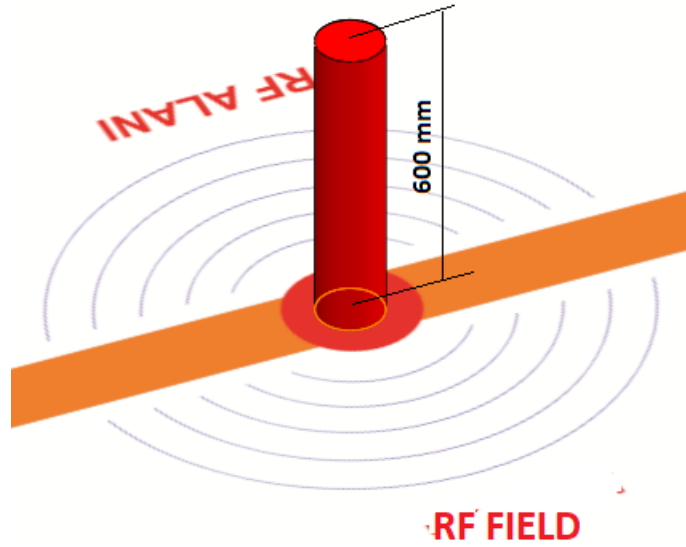


Figure-10 RF task area

and will open door E\_1 in front of the second robot.

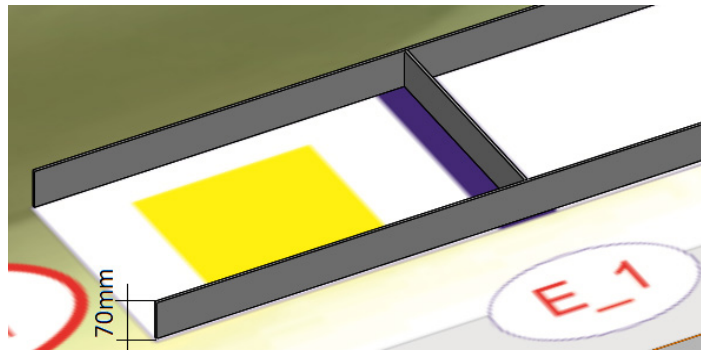


Figure-11 Second robot start point

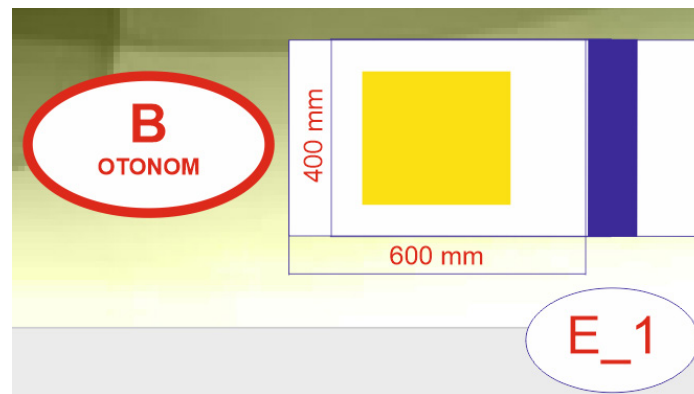


Figure-12 Second robot starting point dimensions (top view)

Kapının açılması ile ikinci robot otonom olarak sarı renkli alandan hareket edecek ve E2 engelini görünce çarpmadan duracak.

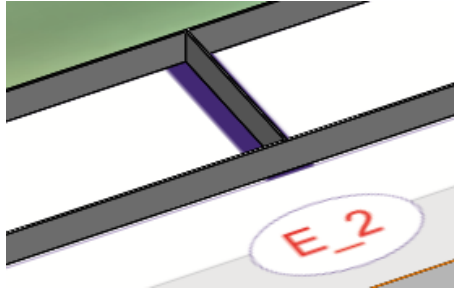


Figure-13 finish point for Second robot

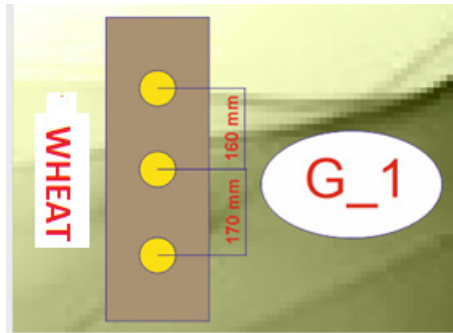


Figure-14 Area dimensions for Task 1 materials (top view)

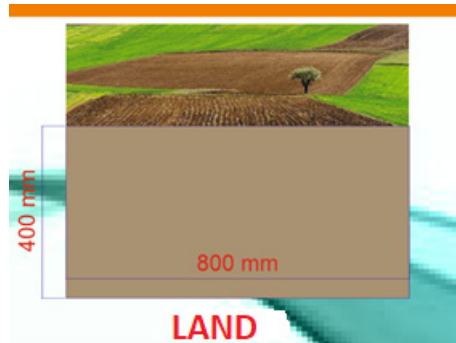


Figure-15 Dimensions of the area where the materials for Task 1 will be placed (top view)

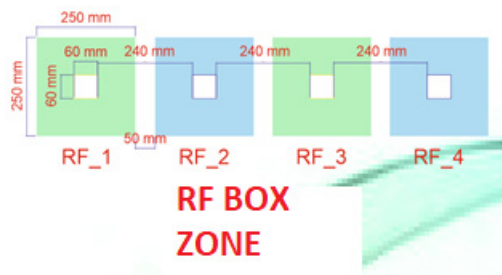


Figure-16 Dimensions of the area where RF boxes will be taken(top view)

### Task 1 Materials:

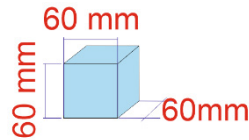
**Wheat:** It will be represented with 3 tennis balls .

(The International Tennis Federation (ITF) declares the official diameter to be 65.41-68.58 mm. Balls must be between 56.0 and 59.4. Yellow and white are the only colours approved by the United States Tennis Association (USTA).



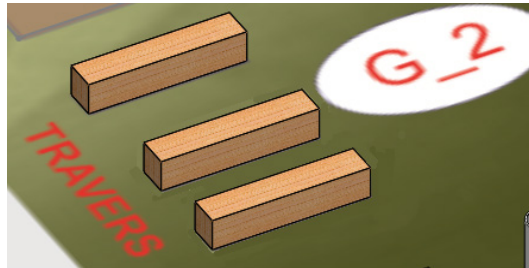
*Figure-17 Task 1 material*

**RF box:** The box shall be 60 mm in width, 60 mm in length, 60 mm in height, 60 mm in height and shall be made of pine wood and the outer surface shall be covered with blue foil.



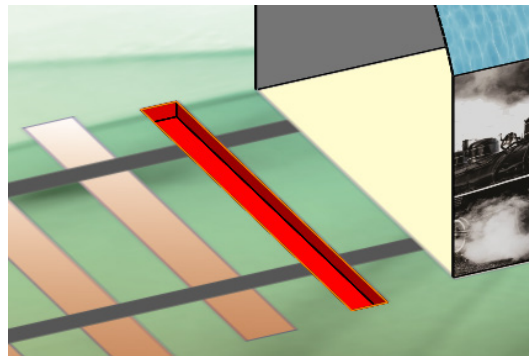
*Figure-18 RF blue box dimensions*

**Task 2:** The first robot will pick up the task materials in the G\_2 area, representing the sleepers laid between the railway tracks to stabilise the rails,



*Figure-19 Brown colored Task 2 materials*

will take them to the area representing the railway and leave task materials in the red coloured place in this area.



*Figure-20 Area for placing Task 2 material*

After complete railway with missing travers, robot pass through tunnel,



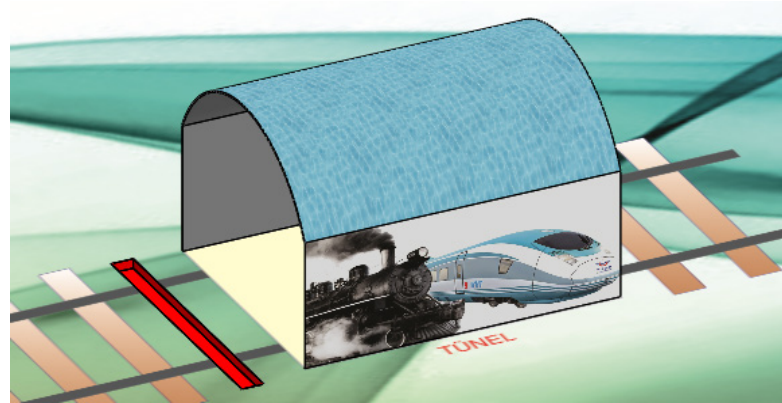


Figure-21 Tunnel which first robot passes through

It will go to the RF box area, take the box at the RF\_2 point, bring the material to the RF area and open the E\_2 door in front of the second robot. With the opening of the door, the second robot will move autonomously from its location and stop without crashing when it sees the E3 obstacle.

### Task 2 Materials:

Travers: The box; width 50 mm, length 250 mm, height 50 mm and will be made of poplar wood and the outer surface will be covered with brown foil. The red coloured area at the tunnel entrance where the sleeper materials will be placed is 50 mm deep.



Figure-22 Task 2 brown box material dimensions

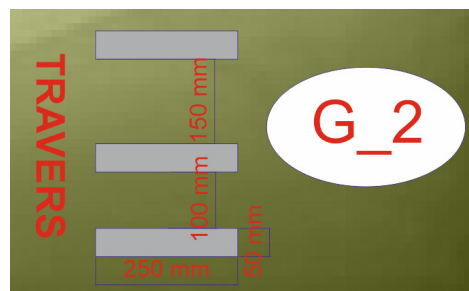
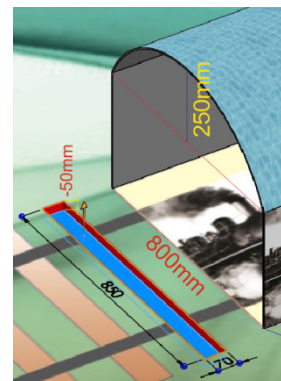
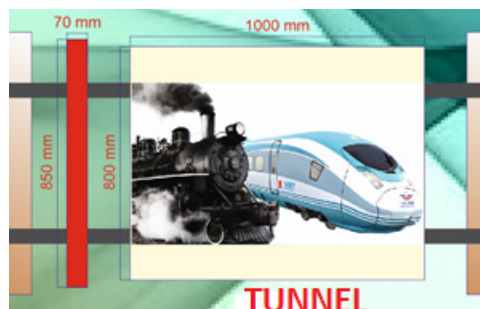
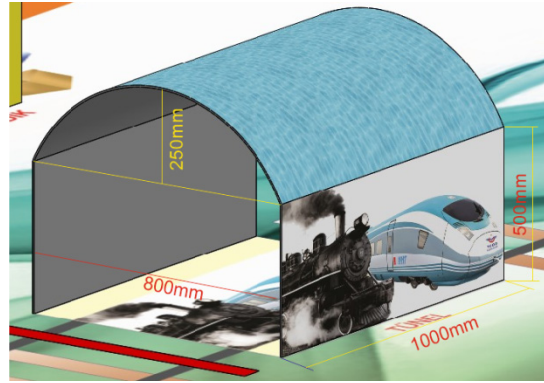


Figure-23 Task 2 materials area dimensions (top view)



*Figure-24 Task 2 dimensions of the area where the materials will be placed (top view)*



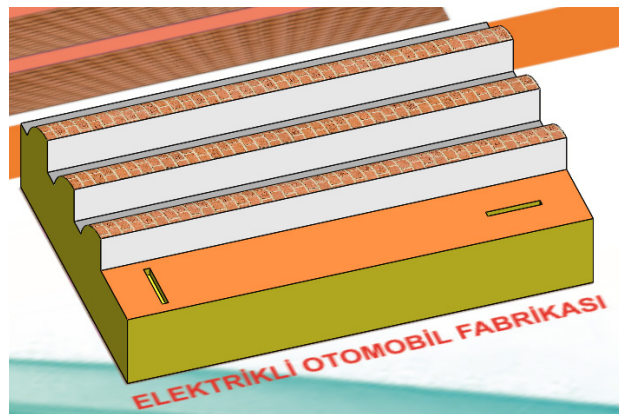
*Figure-25 Tunnel dimensions*

**Task 3:** The first robot will pick up the task material representing the electric car logo in the G\_3 area,



*Figure-26 Logo of electric vehicle Task 3 material*

He will pass through the tunnel to the area representing the Electric Car Factory and place the mission material in one of the places numbered 1 or 2 on the roof of the factory building in this area.



*Figure-27 Area for placing Task 3 material*

After placing the logo on one of the places on the roof, the robot will go to the RF box area and pick up the box at RF\_3 and bring the material to the RF area and open the E\_3 door in front of the second robot. With the opening of the door, the second robot will move autonomously from where it is located and will stop without crashing when it sees the E4 obstacle.

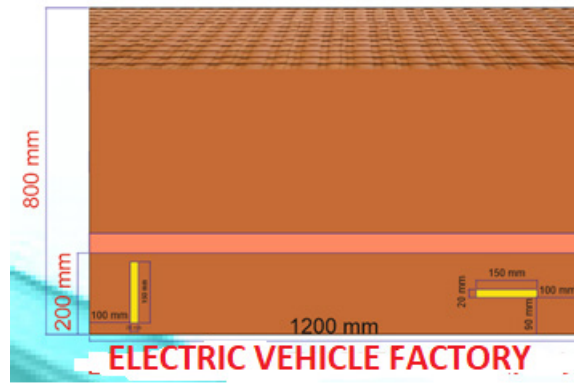


Figure-28 Roof dimensions where the task 3 material will be placed (top view)

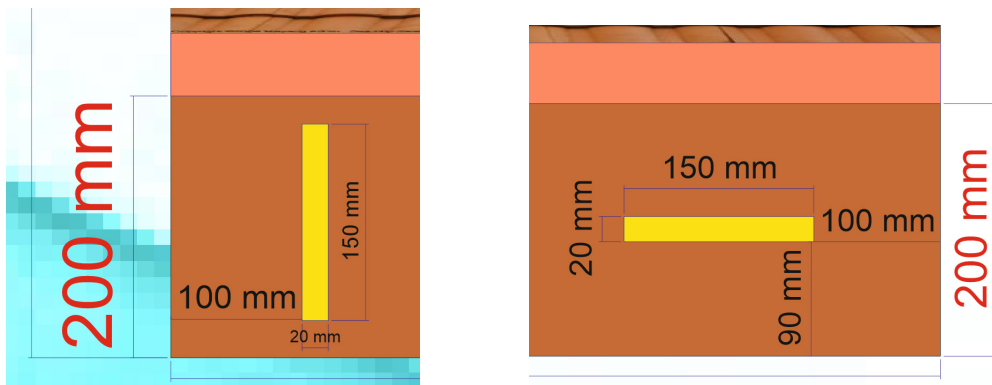


Figure-29 Measurements of locations 1 and 2 on the roof where the Task 3 material will be placed (top view)

### Task 3 Material:

**Elektrikli Vehicle Logo:** Logo; width 12 mm, length 100 mm, height 280 mm and will be made of poplar wood and the outer surface will be covered with white foil. The task material shall be located on an 18 mm yellow coloured background.

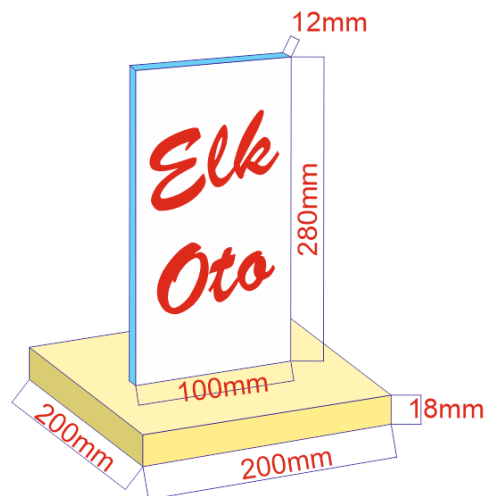
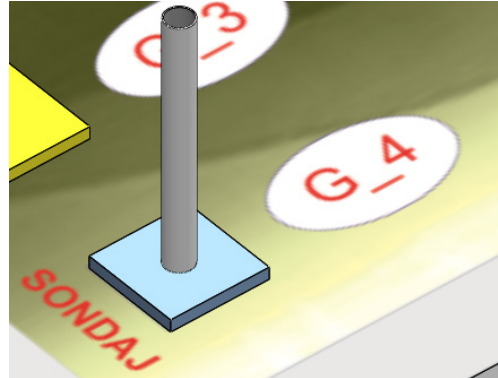


Figure-30 Task 3 Electric vehicle logo dimensions



**Task 4:** The first robot will take the task material representing the drill pipe from the G\_4 area,



*Figure-31 Gray colored Task 4 material*

to an area filled with water and representing a natural gas drilling site.



*Figure-32 Water pool which Task 4 will be placed in*

will insert the task material into the borehole in this area. After the pipe is inserted into the borehole, the robot will go to the RF box area and take the box at the RF\_4 point and bring the material to the RF area and open the E\_4 door in front of the second robot. With the opening of the door, the second robot will move autonomously from its location and move to the space shuttle launch ramp area at G\_5 and stop to climb up to the pipe obstacle there.



*Figure-33 Launch ramp for second robot*

#### **Task 4 Material:**

**Drill Pipe:** It shall be grey coloured, 50mm\*500mm Pvc waste water pipe with a thickness of 2.2mm. The duty material will be located on 18mm blue coloured ground riser.

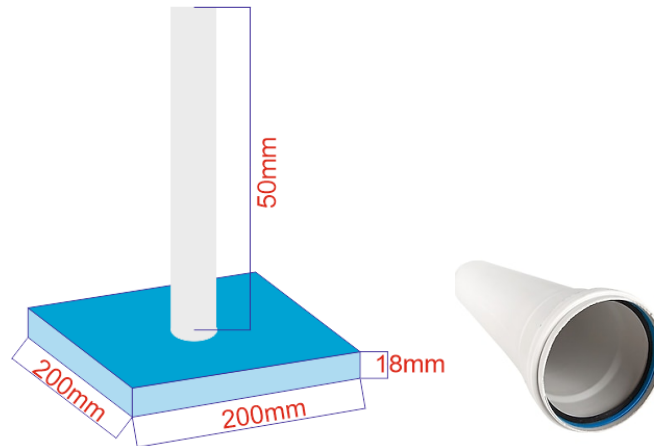


Figure-34 Task 4 PVC pipe dimensions

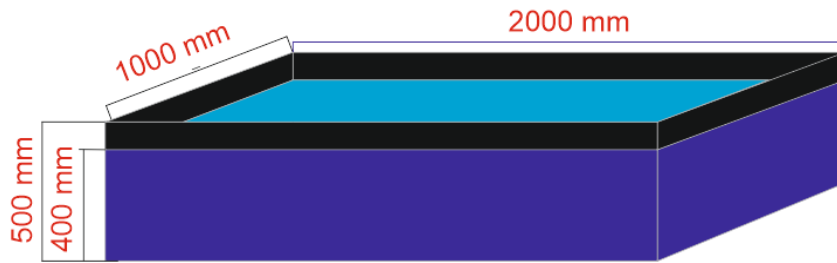


Figure-35 Water pool dimensions

## SECOND STAGE (AUTONOMOUS ROBOT)

### Tasks in tracks:

**Task 5:** The second robot will hold on to the pipe representing the ramp with its own means and climb until it passes the blue, yellow and red coloured line on the pipe and stops without hitting the top point.

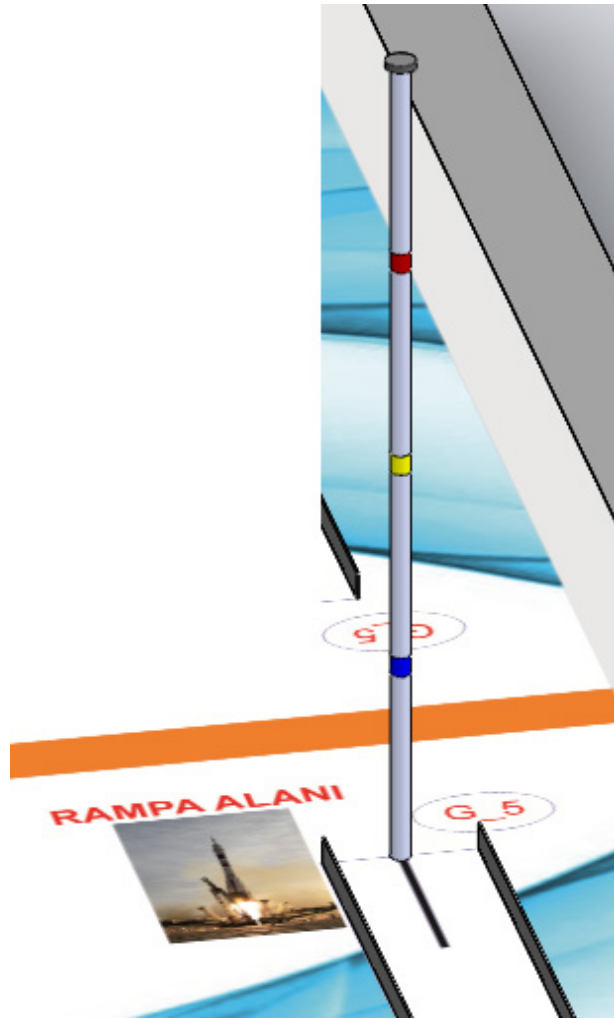


Figure-36 Task 5 launch ramp

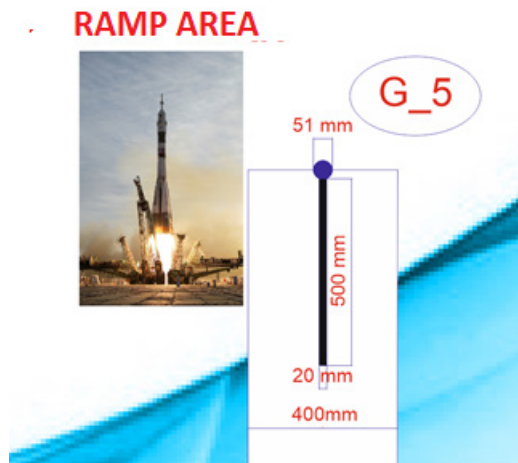


Figure-37 Task 5 launch ramp access dimensions

#### Task 5 Material:

**Climb stick:** Pipe, outer diameter 51mm, height 1600mm, thickness 2mm, made of iron and painted with grey anti-rust paint. Every 400mm from the ground, a 40mm colour band will be drawn





to determine the level. There will be a 100mm diameter safety barrier at the top of the pipe to prevent the robot from falling.

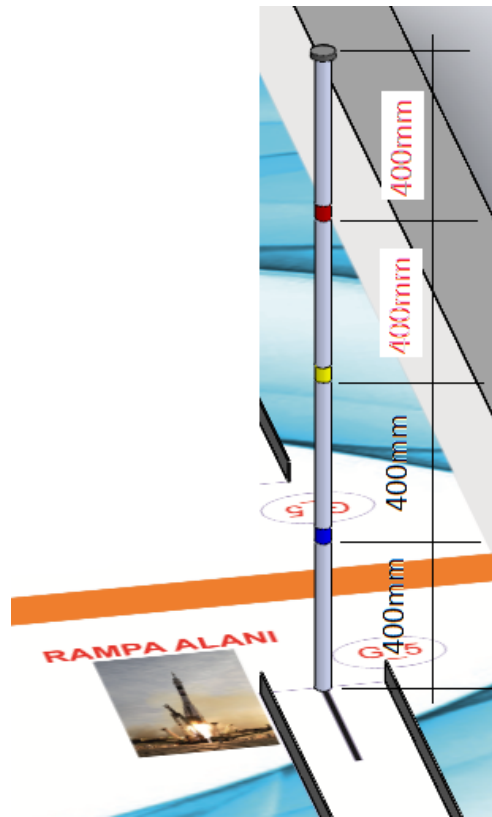


Figure-38 Task 5 launch ramp dimensions



### THEMATIC COMPETITION GENERAL RULES

1. Each team has two robots and two members. A Robot can not be used for more than one team.
2. Any equipment or material used on robots must not have characteristics cause to injury audience, competitors and damage to platforms. Water, oil, inflammable liquids or gases and dangerous chemical materials are not allowed.
3. Maximum two team members can stand inside the competition area but only one can stand on the platform while the team competing.
4. Total weights of robots should be maximum 30kg. (include all hardware and equipments such as power supply etc.)
5. **First robot will be wireless controlled.** It is not allowed to use wired controlled robot.
6. It is not allowed that any intervention to robots by wired, wireless or infrared etc. until it finishes the tasks.
7. Power supplies of robots should be maximum DC24 V.
8. Competitor has to be ready inside the competition area within 5 minutes when they are invited to race. If the competitor requests extra time because of the reason about failures on robots, extra time maximum 10 minutes will be given to competitor just one times. In this case, next competitor will start to competition. This rule (extra 10 minutes) will be applied only in first and second stages but not in quarter, semi final, final competitions.
9. Team A and B will start racing at the same time.
10. Once the chronometer starts, it isn't stopped until the end of race. If chronometer inside competition area is broken, judges will continue with handy stopwatches.
11. First robot will take all materials from their places with its own mechanism.
12. The second robot will move from its position if the obstacle doors in front of it are opened. If the door is not opened, it will wait motionless.
13. If the first robot successfully completes the tasks and the second robot crosses the red coloured line on the launch ramp in the G\_5 launch area and climbs to the top of the ramp, the stopwatch will be stopped by the referee and the competition will be completed.
14. Time: It is 13 minutes. In this time:
  - a. In case the first robot fails any of the tasks, upon the request of the competitor and the approval of the referee, the task that could not be completed will be skipped, but the relevant RF box in the RF box area will be removed by the first robot and taken to the RF area, the door barrier in front of the second robot will be opened and the competition will continue with the next task. In this case, a time penalty will be applied for each unsuccessful task.
  - b. In case the competitor wants to pass to another task without succeeding in one task, he/she must definitely succeed in the second task. If the competitor wants to move on to the third task without succeeding in the second task (in case of failure of two tasks in total), the time addition penalty will be applied again and the competition will be terminated by the referee.
15. If first robot drops the box, second competitor will take the box and put it on starting point. Then first robot will take the box from this location and continue the racing.



16. Manual intervention to robots (except judge's warning and other cases explained above) is forbidden. If it is happened, it is assumed that last task was not completed and it will be repeated from starting point.
17. Robot will end the game when it makes turning on the lights of Assembly building.





## SCORING

### COMPLETING ALL TASKS

**600 Points**

#### GAINED POINTS:

The first robot picks the 1st wheat from area G_1	10 points
The first robot picks the 2th wheat from area G_1	10 points
The first robot picks the 3th wheat from area G_1	10 points
The first robot drops the 1st wheat in the field	10 points
The first robot drops the 2nd wheat in the field	10 points
The first robot drops the 3th wheat in the field	10 points
First robot picks up RF_1 box from RF box area	10 points
The first robot reads the box in the RF field and opens the E_1 door	20 points
The second robot reaches the E_2 door and stops without crashing	20 points
First robot to take the 1st traverse from area G_2	10 points
First robot to take the 2nd traverse from area G_2	10 points
First robot to take the 3rd traverse from area G_2	10 points
The first robot leaves the 1st sleeper on the railway track	10 points
The first robot leaves the 2nd sleeper on the railway track	10 points
The first robot leaves the 3rd sleeper on the railway track	10 points
First robot to pass through the tunnel	30 points
First robot picks up RF_2 box from RF box area	10 points
The first robot reads the box in the RF field and opens the E_2 door	10 points
The second robot reaches the E_3 door and stops without crashing	10 points
First robot to get the logo from G_3 area	20 points
First robot through the tunnel	10 points
First robot to place the logo on the roof of an electric car factory	20 points
First robot picks up RF_3 box from RF box area	10 points
The first robot reads the box in the RF field and opens the E_3 door	10 points
The second robot reaches the E_4 door and stops without crashing	10 points
First robot picks up drill pipe from area G_4	40 points
First robot through the tunnel	10 points
The first robot installs the drill pipe on the ground in the drilling area	50 points
First robot picks up RF_4 box from RF box area	10 points
The first robot reads the box in the RF field and opens the E_4 door	10 points
Second robot reaches the launch pad in area G_5	10 points
Second robot grasping the launch pad	30 points
The second robot climbs and reaches the blue coloured place	40 points



The second robot climbs and reaches the yellow coloured place	40 points
The second robot climbs and reaches the red coloured place	30 points
Passing the red coloured place and stopping without hitting the top of the ramp	20 points

**PENALTY POINTS:**

Manual intervention on the first or second robot	-10 point
If autonomous robot hits the gate	-30 point
Not finish in 13 minutes (for each additional minute)	-10 point
(when stopwatch shows up 15:00:00, judge ends the competition and declares the time and total marks of team.)	-20 point

**TIME PENALTY:**

Manual intervention to robots	+30 sn
If robot skips the task without completing (for each task)	+300 sn

**DISQUALIFYING RESULTS:**

**1. Using wired control**

2. If any team tries to control robot with wireless, infrared etc. ,
3. At least one of the situations specified in Article 2 of the General Rules of the Themed Competition occurs before or during the competition
4. If the teams act behaviours which don't respect to the spirit of fair play before, after or during the competition
5. If the teams don't obey the rules and instructions of judges.
6. If the robots damage the platforms during the competition. (by using any kinds of liquits/gases which are inflammable or any dangerous chemical substances, etc.)
7. If different competitors use same robot / robots ( when judges determine such case, both teams will be disqualified.)
8. The competition will be terminated if the first robot fails its task and fails to perform the RF task related to the task and fails to open the obstacle door in front of the second robot.

**COMPETITION STRUCTURE**

The Themed Robot Competition will be held on different days as the first and second round competitions. The first round refers to the ranking rounds in which all competitors will compete; the second round refers to the ranking rounds in which the top 20 competitors in the first round will compete and the teams that will qualify for the quarter-finals will be determined. Quarter-final, semi-final and final competitions will be held according to the elimination procedure.



### **FIRST STAGE QUALIFYING RULES**

The competitions will start by drawing lots. **All competitors will compete against themselves in the first round against points/time and will endeavour to be among the first 20 teams to qualify for the second round.**

#### **Firstly;**

- The ranking of the completion of the track and the tasks on the track by the robots within the specified time (600 full points),
- Total points received,
- Total time to finish the course in case of equality,
- If the equality is not broken, the total weight of the robots is the lighter one,

will be considered successful.

\*The competitor's score and finishing time are announced in max 5 min. later than the end of the competition.

### **SECOND STAGE QUALIFYING RULES**

According to the ranking at the end of the first round, the first 20 teams will qualify for the second round.

The competition order of the teams in the second round (according to point/time ranking) will be determined by lot. All competitors will compete against themselves in the second round against points/time and will strive to qualify for the quarter-finals.

#### **Firstly;**

- The ranking of the completion of the track and the tasks on the track by the robots within the specified time (600 full points),
- Total points received,
- Total time to finish the course in case of equality,
- If the equality is not broken, the ranking will be made by taking into account the lighter of the robots in terms of total weight.

\*The competitor's score and finishing time are announced in max 5 min. later than the end of the competition.

### **QUARTER FINAL RULES**

Top 8 team according to second stage results will go to quarter final.

The competition order of the teams in the quarter-finals (in point/time order) will be determined by lot.

#### **Firstly;**

- The order of completion of the track and the tasks on the track by the robots within the specified time (600 full points),
- Total points received,
- Total time to finish the course in case of equality,
- If the equality is not broken, the total weight of the robots is the lighter one,





will be considered successful and will be entitled to participate in the semi-final.

\* The competitor's score and finishing time are announced in max 5 min. later than the end of the competition.

### **SEMI FINAL RULES**

The 4 winning teams at the end of the quarter-finals (in point/time order) will qualify for the semi-finals.

The pairings of the semi-final teams will be made **according to point/time order**

The 1st ranked team will face the 4th ranked team and the 2nd ranked team will face the 3rd ranked team.

The order of the competition will be determined by lot.

#### **Firstly;**

- The ranking of the completion of the track and the tasks on the track by the robots within the specified time (600 full points),
- Total points received,
- Total completion time of the course in case of equality,
- If the equality is not broken, the total weight of the robots is the lighter one,

will be considered successful and will be entitled to participate in the final.

\* The competitor's score and finishing time are announced in max 5 min. later than the end of the competition.

### **FINAL RULES**

The two winner teams at the end of the semi-final (in point/time order) will qualify for the final. The defeated teams will compete for 3rd and 4th place according to the final rules before the final competition.

Teams that are qualified for the final will face each other.

#### **Firstly;**

- The ranking of the completion of the track and the tasks on the track by the robots within the specified time (600 full points),
- Total points received,
- Total time to finish the course in case of equality,
- If the equality is not broken, the total weight of the robots is the lighter one,

will be considered successful and will be declared first.

\* The competitor's score and finishing time are announced in max 5 min. later than the end of the competition.