



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

15th INTERNATIONAL MoNE ROBOT CONTEST

ADVANCED LINE FOLLOWER ROBOT CATEGORY RULES

INTERNATIONAL
MoNE
ROBOT
CONTEST



LINE FOLLOWER ROBOT CATEGORY RULES

Objective

Line follower robots are designed to be able to follow white line on black ground or vice versa autonomously. They are commonly used to carry goods from one place to another in industry. It is just enough to draw only lines on ground of plant to do this. The most important points for line follower robots are correct program, hardware control and speed.

In this category, autonomous line follower robots try to finish courses in shortest time and faultless by following white line on black ground or black line on white ground.

- At qualifying race, aim is to finish the course in best time and with minimum penalty points and to take place in ranking list of first 32 robots.
- At final race, aim is to finish the course earlier than its rival.

ROBOT DIMENSIONS

Robot has maximum 400mm length, 300mm width and 100mm height.

Final and Qualifying Track Information

1. Lines are indicated as white color on black ground and vice versa.
2. Tracks which have 400mm width, 5mm thickness are made by black opaque PVC foam. Joints between parts that made up the track are covered with black opaque foil.
3. Lines on black ground are made by using white opaque foil through the middle of the track with 20 ± 2 mm width.
4. There is a U shape wall made by transparent flex material on the part of track which has no white line. In this part, white stript foil 20mm above the ground and 50mm width is used.
5. There is a horizontal circular part on the track.
6. For qualifying race, start line is placed 500mm far from the front edge of track.
7. Sensors of chronometer 10mm above the ground are placed on the edges of start line
8. There are four sub start points which are called 1,2,3 and 4
9. Sub start points are shown representatively at figures in this guide.
10. Sub start points will be placed at the competition day. Their exact positions were not given on the figures of track dimensions.
11. There will be two elimination tracks in the contest area as to be symmetrical to each other. So they are called track-A and track-B

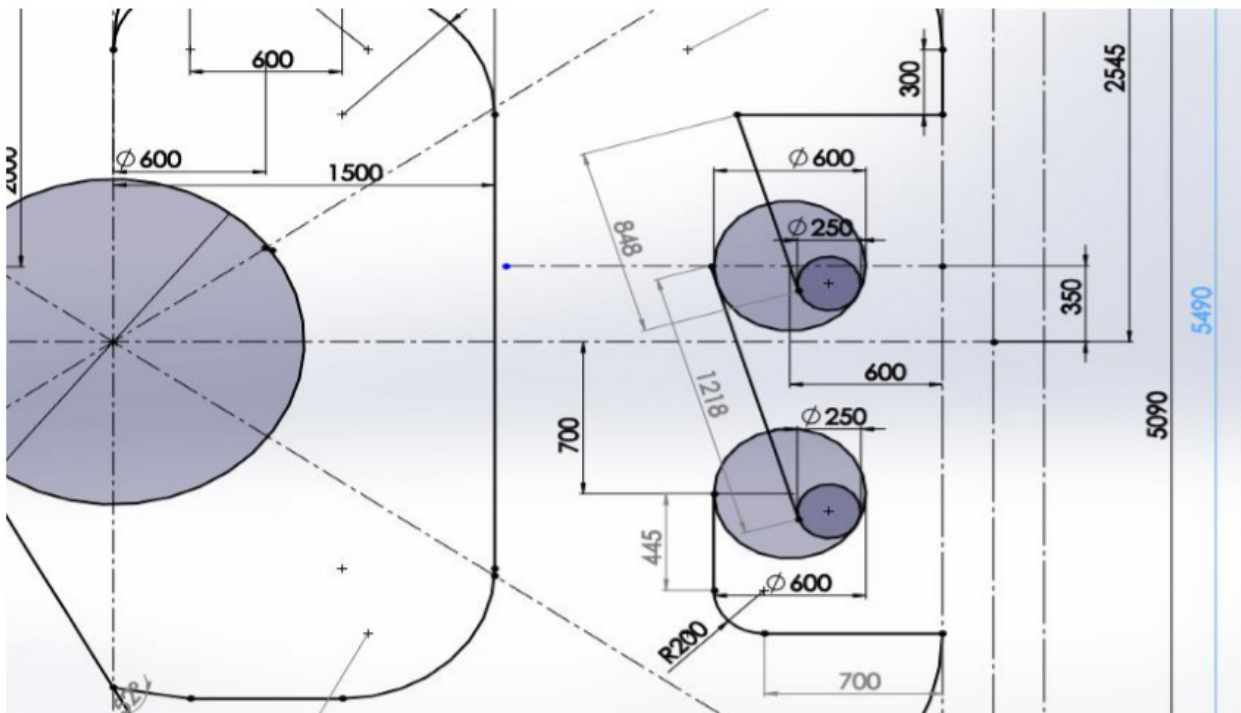


Figure 5 Qualifying/Final tracks dimensions-c

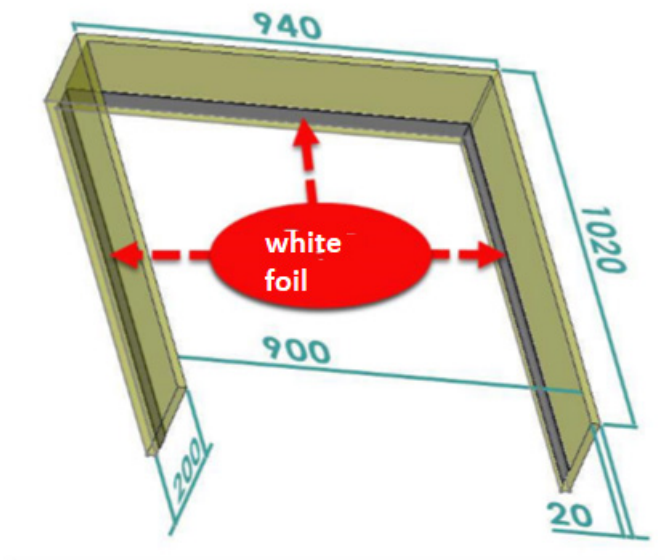


Figure 6: Transparent U wall dimensions

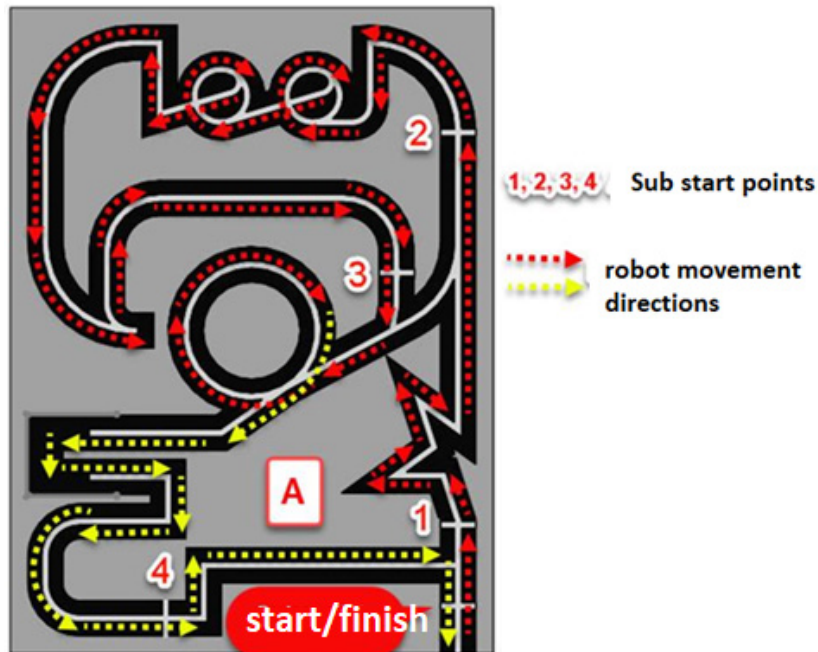


Figure 7 :Line tracer robot movement directions

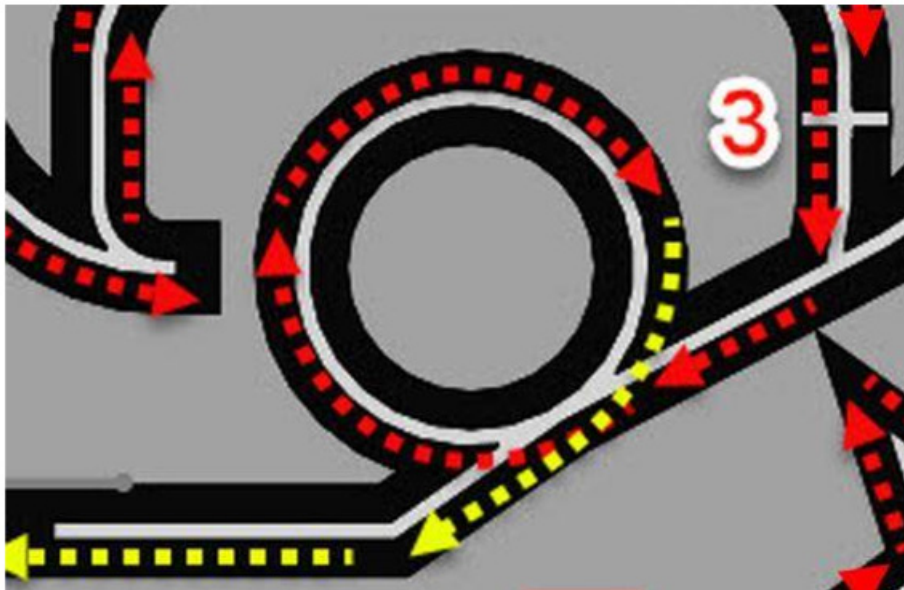


Figure 8: Circular road

Qualifying Race

1. Each robot will run one by one. The order of competitors is determined by computer. Which track will be used by robots is also determined according to process. (Track A or Track B)
2. Robots complete one lap on the track.



3. Race will be held against the time.
4. There will be sensors placed to determine lap start and end. When the robot passes through the starting line, chronometer will start by the help of sensors.
5. Time penalty (10sec) is given to the robot which couldn't start and the robot takes the starting position again. The robot has 3 rights for starting. (for each unsuccessful start will be punished separately with 10sec time penalty)
6. Robots have to move to the directions shown at figure 7.
7. In the event that the robot goes off the road (the body of the robot descends from the black road completely on the white background), the robot continues the competition by leaving the robot behind the sub starting line specified according to the point from which it left with the referee's signal. In the meantime, the time continues to run.
8. If the robot goes off the road between the start/finish line and the sub start line numbered 1, the competition is continued by placing it behind the start line numbered 1. (This situation is considered as going off the road.)
9. If the robot goes off the road anywhere between the sub start line no. 1 and the sub start line no. 2, it will be placed behind the start line no. 1 and the competition will continue. (This situation is considered as going off the road.)
10. If the robot goes off the road anywhere between the sub starting line numbered 2 and the sub starting line numbered 3, it is placed behind the starting line numbered 2 and the competition is continued. (This situation is considered as going off the road.)
11. If the robot goes off the road anywhere between the sub starting line numbered 3 and the sub starting line numbered 4, it is placed behind the starting line numbered 3 and the competition is continued. (This situation is considered to be off the road.)
12. If the robot goes off the road anywhere between the sub starting line numbered 4 and the start/finish line, it is placed behind the starting line numbered 4 and the competition is continued. (This situation is considered to be off the road.)
13. If the robot hits the wall in the U-shaped transparent wall section and continues on its way, the robot is given a penalty time of 20 seconds. (This situation is not considered as going astray.)
14. If the robot hits the wall in the U-shaped transparent wall section and gets stuck or cannot pass this section, the robot is placed behind the starting line number 3 and the competition continues. (This situation is considered to be off the road.)
15. If the robot passes in the opposite direction without making a complete lap on the large circular track, the robot is not intervened; the robot continues its movement, but the robot is penalised 100 seconds. (See Figure 8)
16. In cases where the robot is considered to be off the road, the robot is penalised 15 seconds off the road.
17. In case the robot goes off the road for the 5th time, the robot is disqualified.



18. During the competitions, the robot that leaves its own track area and enters the opponent's track area is disqualified.
19. At the end of the ranking competitions, the ranking is made with the total time of the robots to finish the competition.
20. Total time = [(Stopwatch time + sum of penalty times)].
21. Starting from the robot with the lowest total time, the ranking is announced.
22. In total time equality, the robot with less penalty points has priority over the other.
23. If the equality is not broken again, the weight of the robots is checked, the lightest robot is considered the winner.
24. If the equality is not broken in the above cases, the ages of the competing students are taken into consideration. The robot of the team with the youngest age takes priority in the ranking.
25. The first 32 robots at the end of the qualifying race get right to join qualifying and final competitions.

Elimination And Final Races

1. In the qualifying and final competitions; there is a 1200mm wide, 200mm high, white coloured automatic gate at the start/finish lines of the two tracks.

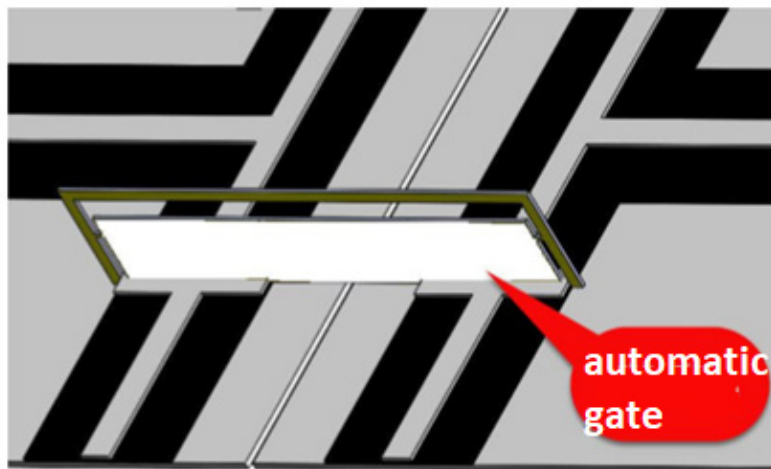


Figure 9 Automatic Gate 3D view for Elimination & Final race

2. Elimination and final competitions will be held in the form of robots placed in front of the automatic door, and the robot that finishes the track first after the referee opens the automatic door will go to the next round. Which robot will compete on which track is determined by computer draw.
3. In order to determine the robot that finishes the track first in the elimination and final competitions; the track letter of the robot that first passes the start/finish line will light up and give a warning.

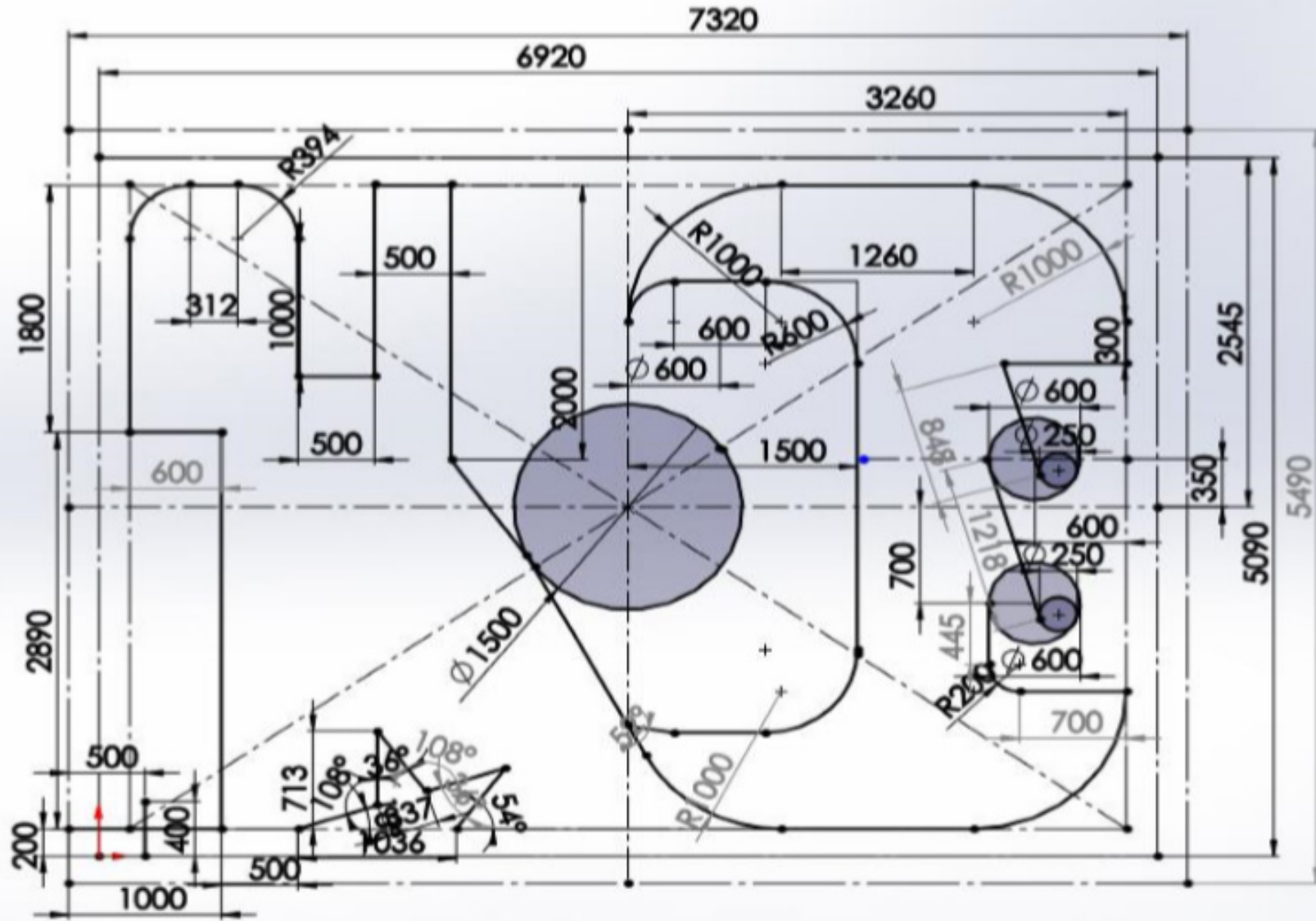


4. In the elimination and final competitions, robots must complete the track in the specified direction.
5. In the elimination and final competitions, the robot that cannot start when the automatic door opens, waits for the other robot to pass the sub starting point number 2; then continues the competition by making a manual start at the starting line.
6. In the elimination and final competitions, the robots that pass the circular road directly without turning, are placed by the competitor behind the starting line numbered 3 again with the referee's signal and the competition continues.
7. In the elimination and final competitions, the robots that hit the U transparent plexi wall in the elimination and final competitions and remain stuck and immobilised in this section are placed back behind the starting line number 3 by the competitor with the referee's signal and the competition continues.
8. In the qualifying and final competitions, the robot that completely leaves the track is disqualified, and it is taken to the next round without waiting for the other robot to complete the track.
9. The robots that finish first as a result of the races in pairs from the last four robots will go to the final competition; the eliminated robots will go to the third and fourth competitions.

Other Rules

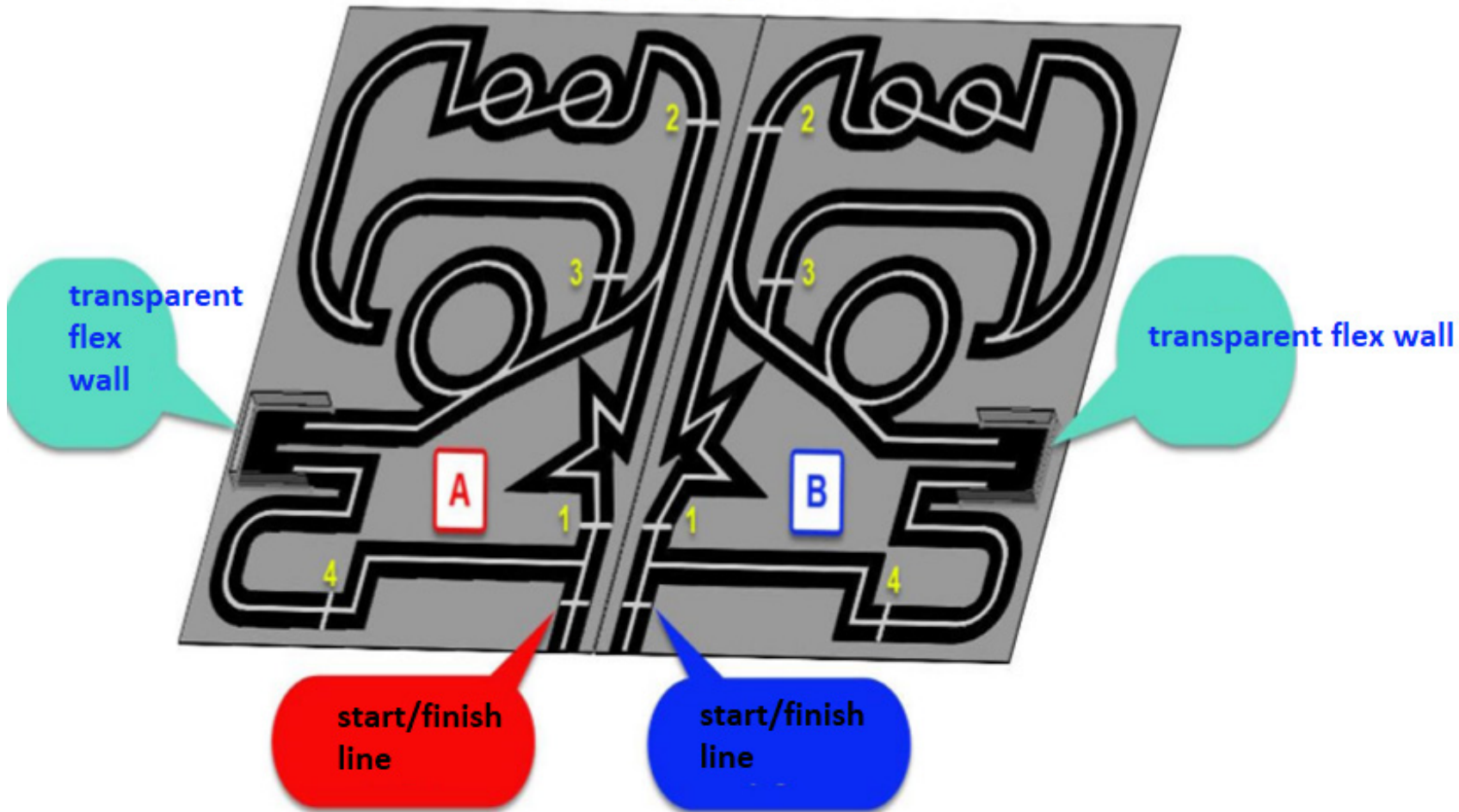
1. Any time for break or maintenance will not given.
2. It is not allowed to put any sign or mark permanently on the track or to damage it. Robots which damage the track will be disqualified.
3. Robots can use an energy source such as battery or battery pack. Flammable or liquid type energy sources are forbidden.
4. No any modification is allowed during the race except changing wheels and batteries. If physical changes such as changing body is determined, robot will be disqualified.
5. If QR code is dismantled, changed or damaged, robot will be disqualified.
6. If robot doesn't match with its photo, it will be disqualified.
7. If it is necessary to change electronic component, same component should be used on same place. QR code must not be damaged during this process. Otherwise, robot will be disqualified.
8. QR code must be stuck on robot body but not on detachable parts. Otherwise robot will be disqualified.
9. Track dimensions can be changed slightly without changing pattern
10. Any objections due to led panels, lights, camera flashes etc will be refused.

Competition organisation committee has rights to make all kinds of modifications about the rules of contest in case of necessities.





qualifying tracks



Elimination Course dimensions