

Silk Road

1 CONTEXT

In the ancient world, there were two empires (red team and blue team) on both sides of the continent, and they both needed to trade with others countries on the continent. Thus, there are two trading routes between the two empires and other countries: Silk Road.

Now the two empires send a caravan and a ship to each other. The caravan will trade inland and go over the mountains and the ship will cross the ocean, sell goods to countries along the way and get their treasure boxes as gifts. After traveling the other countrises, the caravan and the ship will arrive at the other empire, and finally return to their homeland with treasures and build a pagoda which symbolizes civilizations and prosperity.

2 OBJECTIVE

Your team will design and build two robots to transfer goods to the other countries and get treasures from the other countries back to homeland to build a treasure pagoda. The object of the game is to score points by trading goods and building pagoda.

3 GAME FIELD

1. The game will be played on a rectangular map consisting of sea and a continent (Figure 1). There are steps for the land route. The sea route is close to the coast.
2. There are two starting areas on both left and right sides. Each starting area has two square zones for placing robots before starting, square A for land robot and square B for sea robot. The square A is also used for building the treasure pagoda later. Each team has two warehouses used to store total 30 goods (table tennis balls).
3. There are three countries between two empires. Each country has two trading zone, one inland and one close to the sea. Each trade zone has two scoring zones for two teams. Between two scoring zones, there are towers where the treasures placed on the top. The treasures are wood boxes with different color for

different countries and empires, and the size is $50 \times 50 \times 50 \text{mm}^3$. In addition, the red and blue empires have the scoring zone and a treasure for each other.

4. The detail diamensions and views are given in Figure 1 - 6.

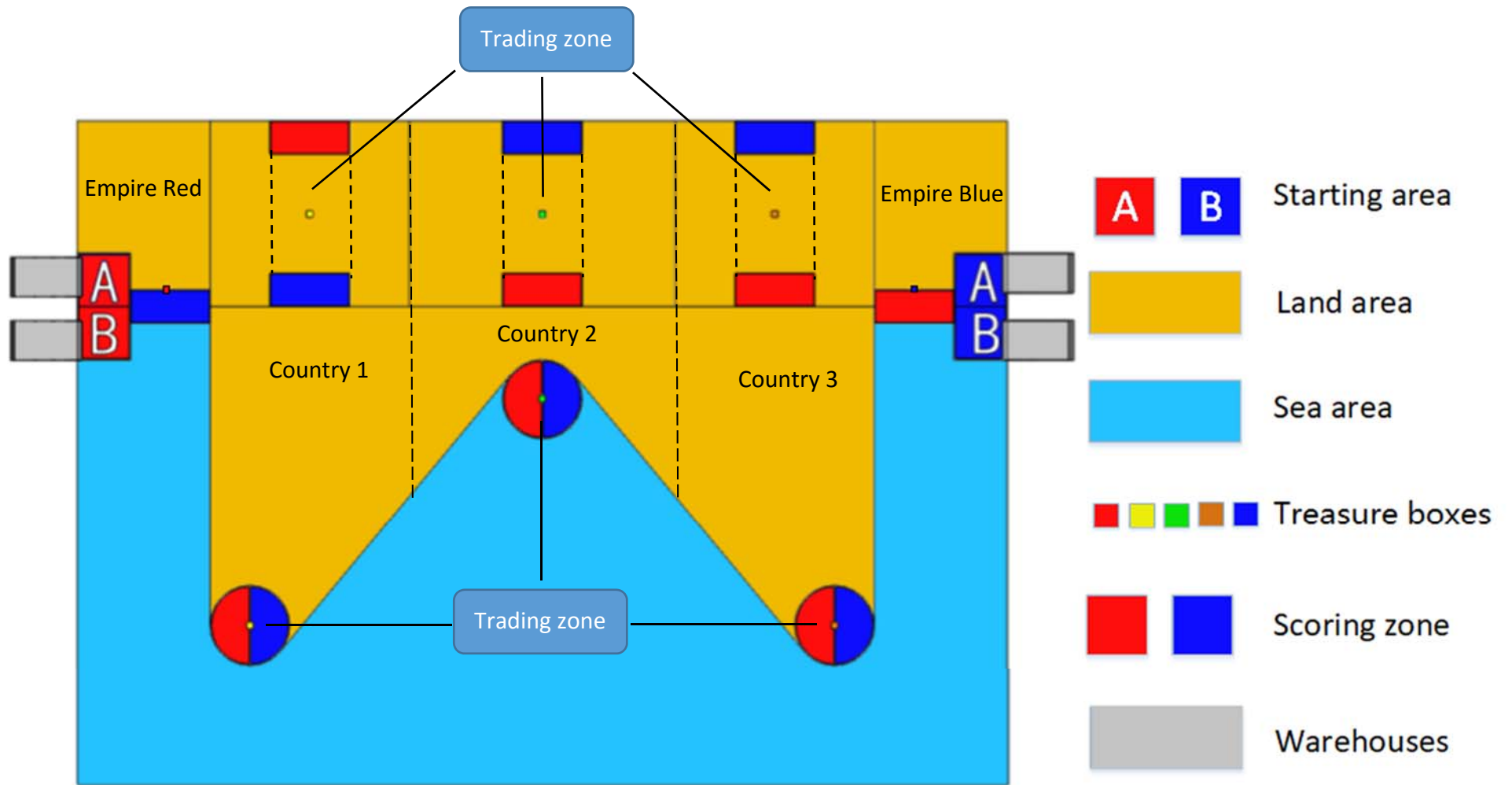


Figure 1. Field Layout

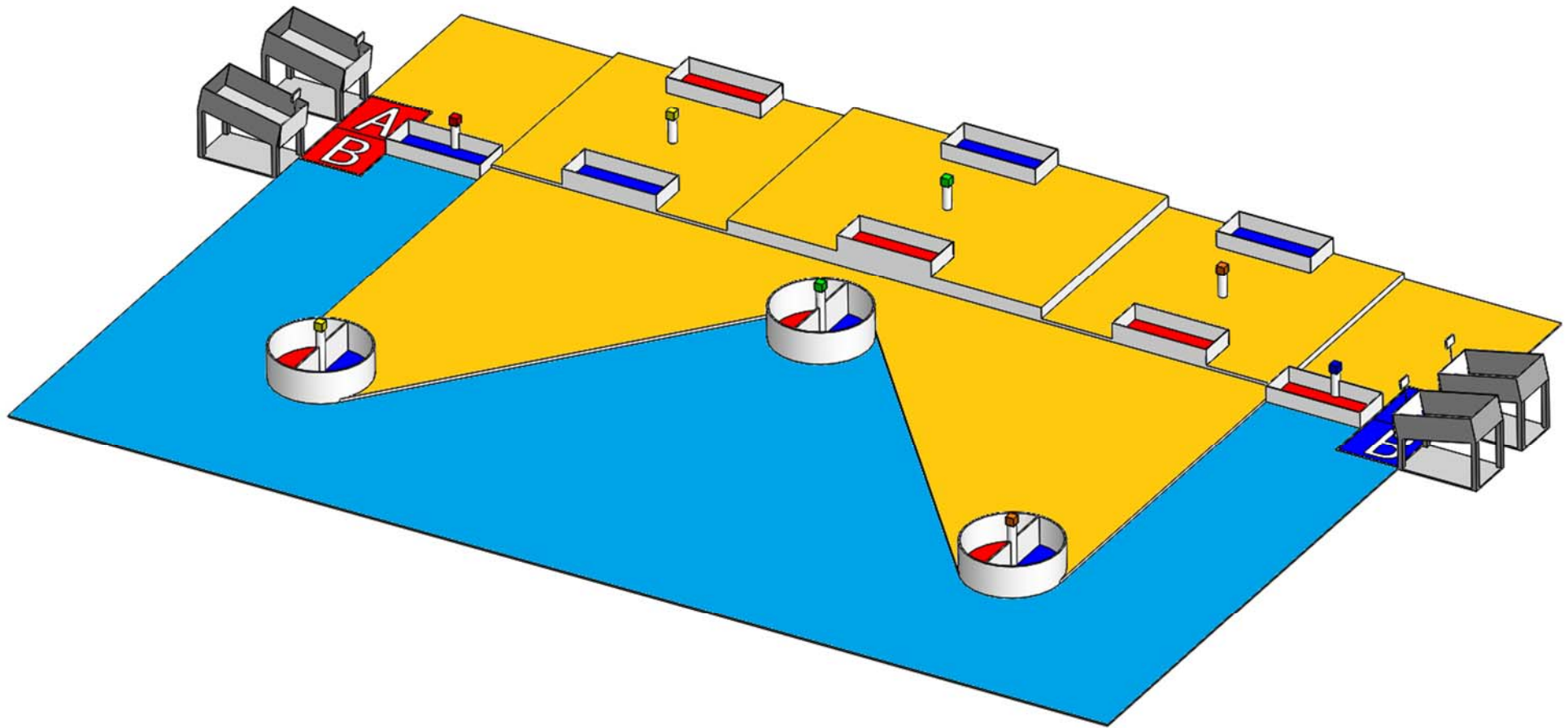


Figure 2. Rendering of Game Field

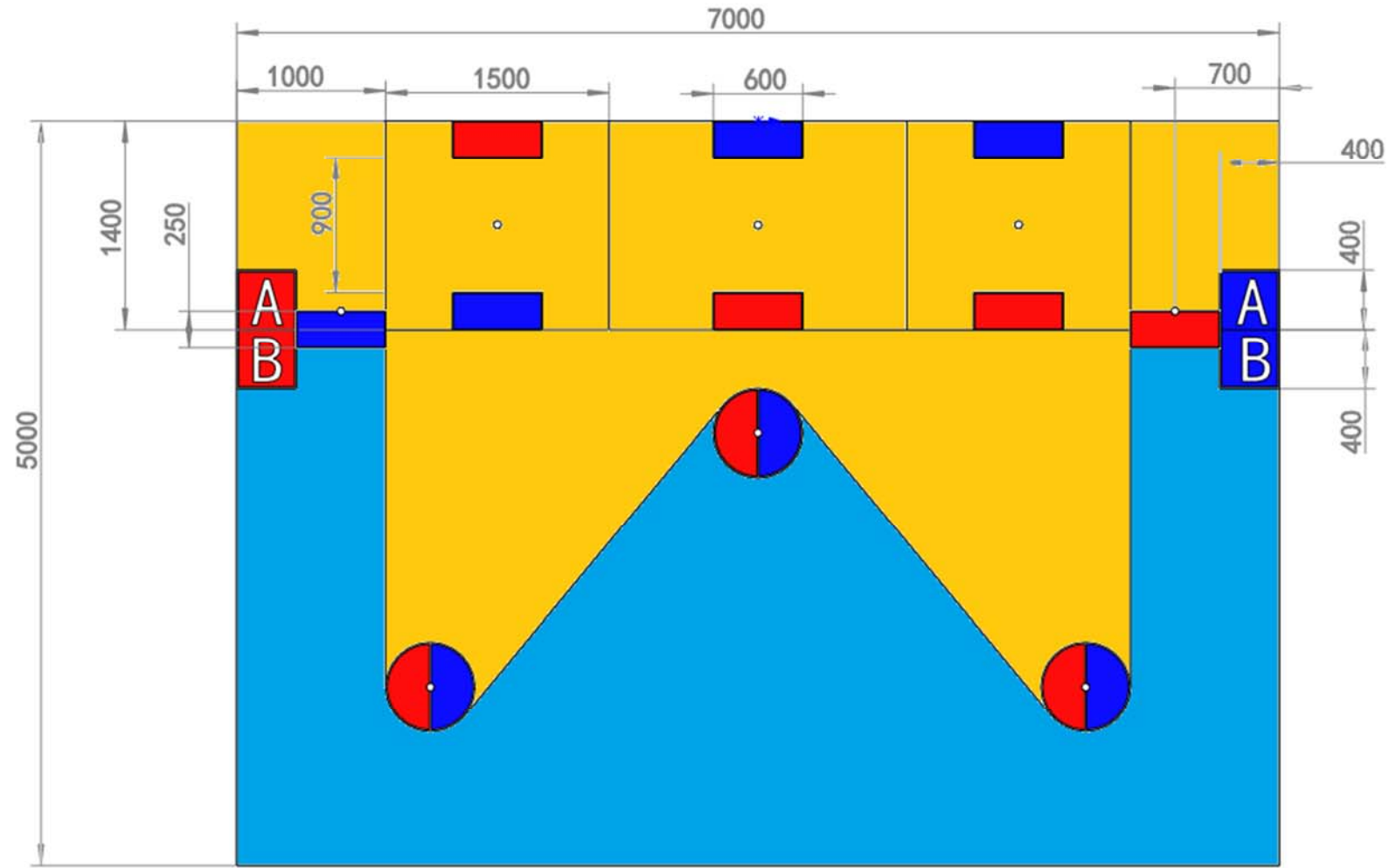


Figure 3. Top View of Game Field

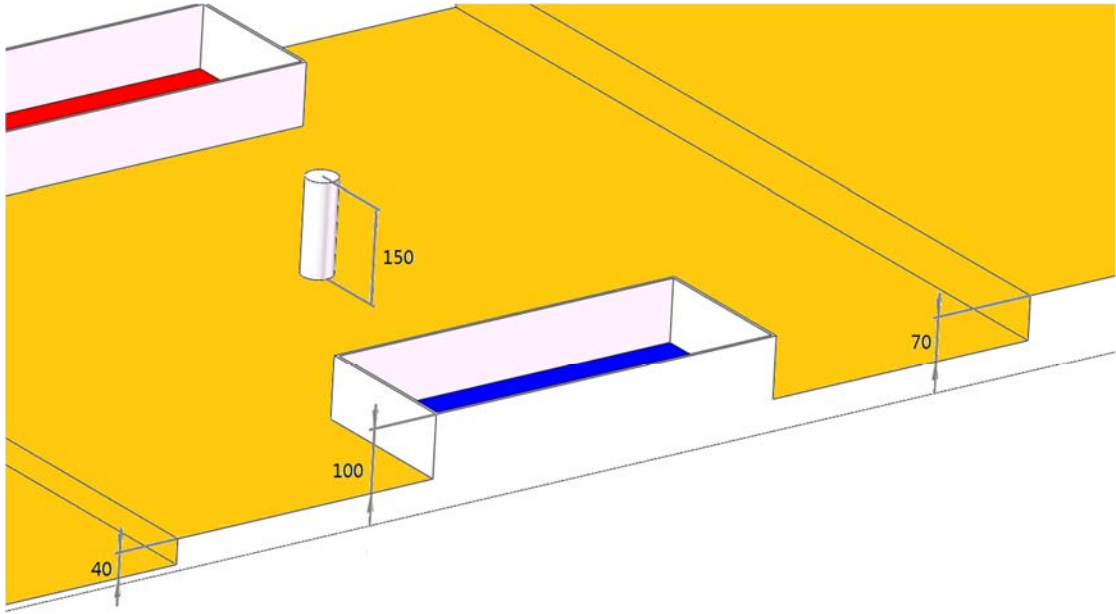


Figure 4. Scoring Zone and Tower Inland

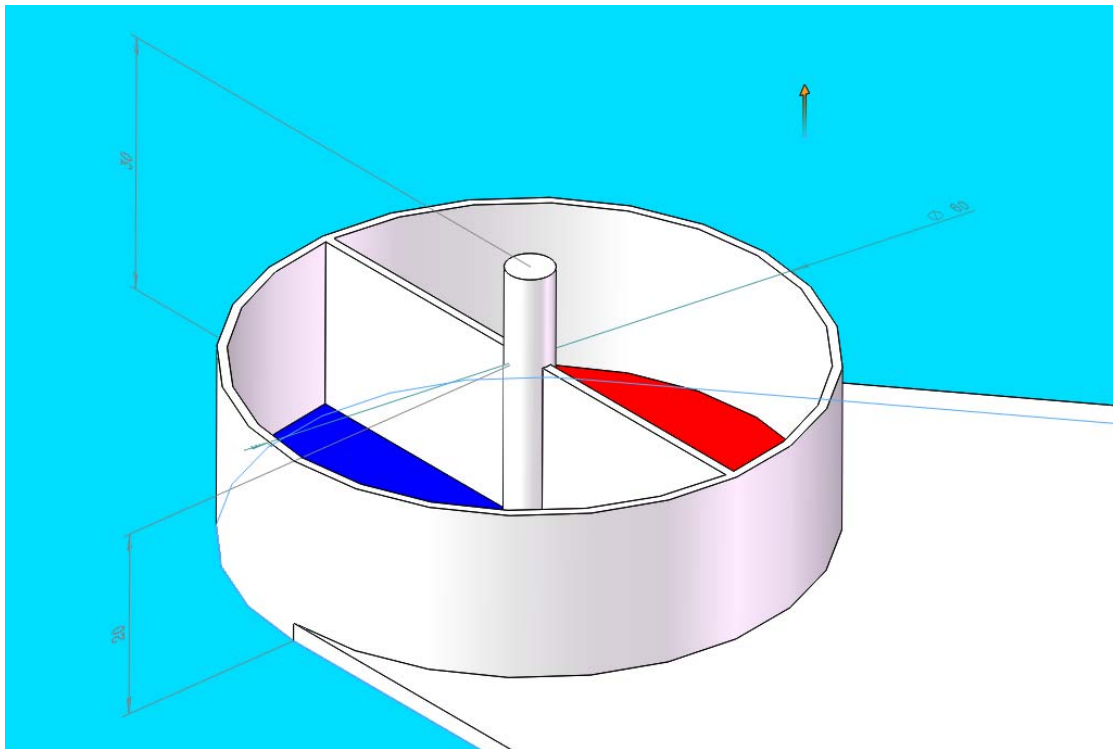


Figure 5. Scoring Zone and Tower at the Coast

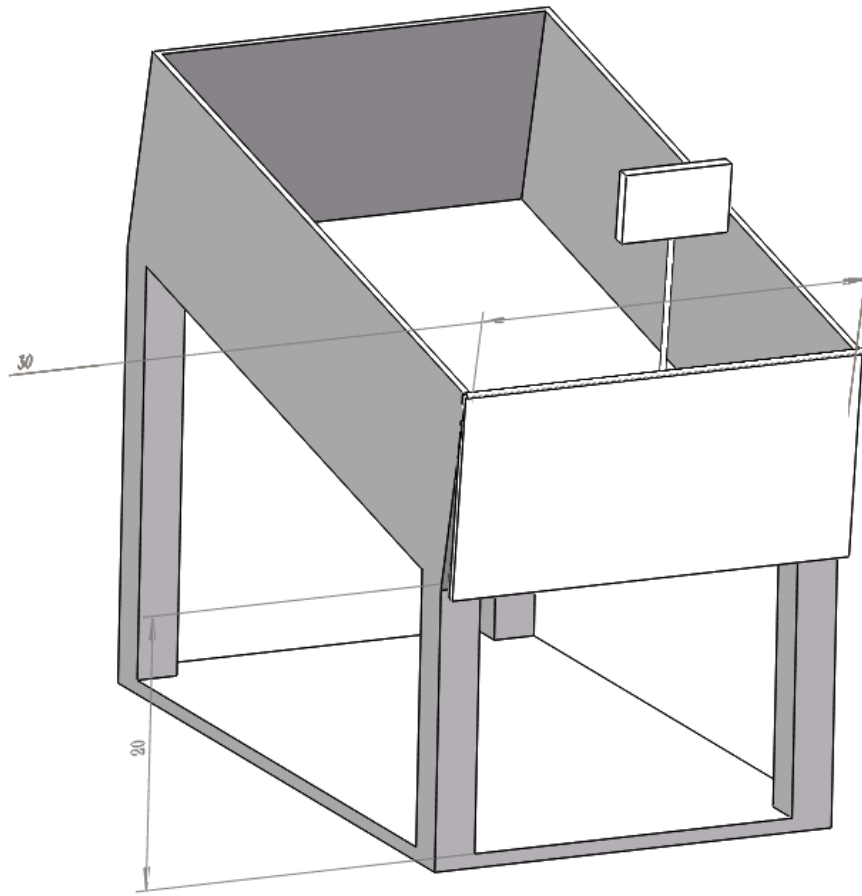


Figure 6. Warehouse

4 RULE:

Rules that are not expressly prohibited are permitted. The IDC referees and staff have the final interpretation of any ambiguous rule or new situation not specified in this document.

4.1 ROBOTS

Each team is allowed to have a maximum of 2 robots, one for land robot and one for sea robot. The field has 2 zones (A and B) in the starting area for each team. The vertical projection of the robot must be in the zone whose size is 400 x 400 mm², otherwise it is not allowed to enter the game. The height and weight of the robots are not limited, however the total number of DC motors and servo motors used in each team is no more than 8.

Before the game, all the goods are placed in the warehouses, 2 empires and 3 countries' treasure boxes are on the tower. Each team has 30 goods, which can be placed in 2 warehouses. The team can decide how to place goods.

There are two teams in each game and the duration of the match is 240 seconds. For the first 20 seconds of the game, the remote controller is not allowed, and the robots make move autonomously. After 20 seconds, both two sides of the players can start remote control their own robots.

4.2 DURING THE MATCH

1. Robots can be operated in the corresponding area (the land or the sea) and are not allowed to touch the other area. Besides, robots can't touch or block the opponent's warehouse.
2. Only after placing at least one goods into the trading zone, the robot can get the treasure box from the trading area. It is forbidden to take out the goods from the opponent's scoring zones or place goods into the opponent's scoring zones. It is not allowed to cover the opponent's scoring zones.
3. Do not touch the robot unless the referee permits. Each team has only one chance to reset their robot. For example, when the robot falls down in the field, the team members can reset the robot in situ with the permission of the match referee.
4. Prohibit to impact and block the opposing robot.

5. If the scores of two team are the same, the one with higher level of the pagoda will win. If the level is also the same, two teams will play off for 1 minute.

5 SCORING

5.1 GOODS

To score, the team must transfer the goods from their own warehouse to other countries scoring area. The countries along the sea route or land route have their scoring areas and the points of the goods depends on the distance from the homeland (Table 1).

Table1. Points of the goods by distance

| Distance | Country 1 | Country 2 | Country 3 | Another empire |
|------------------------------|-----------|-----------|-----------|----------------|
| Points scored for each goods | 1 | 2 | 3 | 4 |

Up to 3 goods can be placed in each scoring area in land and by sea 5 goods maximum. In addition, the scoring area in the other empire can contain up to 5 goods. There is no score for putting in the opponent's scoring area. When the robot scores from all the countries and the other empire by one route (either land or sea), this means finish one silk road, the team get addition 10 points.

5.2 TREASURES

Getting treasures is not direct score. You should take them back to the homeland and use treasures with different color to build a pagoda. Levels of the pagoda can be used to times the total score (2 levels double the score, maximum 4 times the score). The level of pagoda is decided by how many different colors of treasure boxes used for the construction.

5.3 PUNISHMENT

1. During the match, any of the following behaviors will be deducted 5 points:
 - 1) Land robot touches the sea area.
 - 2) Sea robot touches the land area.
 - 3) Touch the pagoda built by others.
 - 4) Touch the opponent's warehouse.

- 5) Touch the opponent's goods in the opponent's scoring area.
2. Each team has only one chance to reset the robot manually while 5 points will be deducted.

比赛中禁止阻挡，冲撞对方机器人，否则将强制违规的机器人重启，并扣 5 分。如果情节严重，暂停比赛，由裁判进行判罚。

5.4 EXAMPLE

Red Team

Part 1: Score for Goods

| | <u>Country 1</u> <u>(1point)</u> | <u>Country 2</u> <u>(2 points)</u> | <u>Country 3</u> <u>(3 points)</u> | <u>Blue empire</u> <u>(4 points)</u> | <u>Finish one</u> <u>route</u> <u>(10 points)</u> |
|-----------------------------|--|---------------------------------------|---------------------------------------|---|---|
| <u>Land</u> <u>route</u> | <u>3 goods</u> | <u>3 goods</u> | <u>4 goods</u> | <u>1 goods</u> | <u>Finished</u> |
| | <u>$1 \times 3 + 2 \times 3 + 3 \times 3 + 4 \times 1 + 10 = 32$ points</u> | | | | |
| <u>Sea</u> <u>route</u> | <u>5 goods</u> | <u>4 goods</u> | <u>2 goods</u> | <u>6 goods</u> | <u>Finished</u> |
| | <u>$1 \times 5 + 2 \times 4 + 3 \times 2 + 4 \times 6 + 10 = 45$ points</u> | | | | |

Part 2: Punishment

-5 points for the sea robot touching the land area

Part 3: Pagoda

It is built by 2 yellow and 1 green treasure boxes

The level of pagoda is 2, so the total score can be doubled.

Final Score:

$(32 + 45 - 5) \times 2 = 144$ points