

# CONTEST RULES

## CONTEST NAME

### **Indiana Robot!**

Treasure hunt is always exciting! However, what can be considered “*treasure*” for you? Love? Peace? Health? Knowledge? Faith? Freedom? Let’s hunt all of them together...

## SUMMARY

The match’s objective is to collect as many treasures as possible. Each team will build three machines: two ground machines and one boat. The ground machines will collect the treasures – love, peace, health, knowledge, faith and freedom – in the most balanced way. Machine 1 can collect from the very start. However, machine 2 is lost! It must get the map in the cave, deliver in the boat and, then, it will decide: should I help my partner or should I attack my enemy?

## FIELD STRUCTURE

The field is illustrated in Figures 1 and 2. It is divided into:

- Level 1 – treasure area: 2800 x 2100 mm rectangular area (0 mm height).
- Ramp: 1000 mm length for 100mm high.
- Level 2 – cave: 2800 x 450 mm rectangular area (300 mm height).
- River: 300 x 2000 mm water field.
- Quicksand in the Level 1 - it is made of polystyrene small balls. This is the place where *silver balls* are!
- 6 *treasure chests* (chests 1 to 6) in the lateral – ground machines 1 and 2 can deliver in these chests.
- 1 *treasure chest* (chest 7) at the end of the river – only the boat can deliver in this chest.

## STARTING AREAS

Each side of the field has three starting areas: two ground areas (300 x 300 mm) and one in the river - harbor. Mandatory initial positions for machines and sail boat are represented in Figure 1. If any team decides to build only one ground machine, it should use the initial position 2.

## MATCH

Two teams in each match and 200 seconds time limit. First 20 seconds only autonomous machines can move!

## SCORE

Teams score points as treasures are delivered in the *treasure chests*. The match is composed by two main goals:

1. Ground machine 1 can catch treasures and deliver in the treasure chests from the beginning, respecting the first 20 seconds of autonomy;
2. Ground machine 2 must find the map, deliver in the boat and, then, it is free to invade opponent area or help Machine 1;



Both, treasure and map should be delivered in a stable way, which means, they should be stabilized inside the treasure chest/boat.

Treasures are distributed in the field, as illustrated by Figure 1. Treasures are represented in the most different ways, whose geometries are detailed in Table 1. Material in the field not represented in Table 1 is just for decoration and is not valid for score.

If the boat with the map reaches the end of the river, the team scores 20 points. If the boat delivers the map into chest 7, then, the team scores 30 points. Remember that map transportation to chest 7 can be done *only* with sail boats, which can only be loaded in the harbor.

Representation	Score
Map (White) 	Map in the cave, that must be delivered in the boat and the machine is released for other tasks.
Sapphire (Blue) 	PVC pipe with 40 mm of external diameter, 200 mm high. For each sapphire delivered in the treasure chest team scores <b>5 points</b> .
Gold (Golden) 	Golden tennis ball. For each gold delivered in the treasure chest team scores <b>2 points</b> .
Emerald (Green) 	Green tennis balls. For each emerald delivered in the treasure chest team scores <b>1 point</b> .
Silver (Silver) 	Silver tennis balls. The team does not score; however, the opponent team loses all treasures in the equivalent treasure chest.*
Ruby (red) 	Red cubes 45x45x45 mm <sup>3</sup> . For each ruby delivered in the treasure chest team scores <b>4 point</b> .

Table1. Detailed geometry of field components.

\* However, the team can still put a silver ball to invalidate the opponent points in that chest.

If the team has at least one treasure in each chest means *balanced treasure*, and the team scores +10points. At least two treasures in each chest, the team scores +20points, and so on... Important to emphasize that:

- even those chests invalidated by silver balls must have the correspondent number of treasures to receive these additional points. However, treasures in that chest do not score;
- silver balls do not count to receive these additional points.

### SIZE AND WEIGHT MACHINES LIMITS

At the start of the competition, machines 1 and 2 must fit unconstrained within a 250x250x300(height) and 250x250x250 mm<sup>3</sup>, respectively. Total mass of machines, including boat, should be no bigger than 10 Kg. Sail



boat fit unconstrained within a 250 mm cube, with no weight restriction; but it should not touch the bottom of the river.

## FOUL

If any foul condition below is recognized by the judge, the team will be disqualified.

1. Anything but the map is delivered in the boat or chest 7;
2. Anything is delivered in the opponent's baskets or sea.

Nothing outside the contest field perimeter may be used during the contest.

## PENALTY

If:

1. a team adopts a strategy that prioritizes damaging the opponent's machines;
2. machines touch any area other than the field;
3. machine 2 invades soil or airspace of the opponent team without leaving the map on the boat;
4. machine 1 invades soil or airspace of the opponent team;

it will be penalized by the judge, stopping immediately all of its ground machines for 15 seconds.

## WINNER DETERMINATION

1. Team with the highest score in the end of the game;
2. In case of a tie, the team which delivered the *map* in the chest 7 wins;
3. When the judge recognizes a foul by the opponent side;
4. When the judge recognizes a second penalty by the opponent side;
5. When the opponent team does not respect 15 seconds of penalty;
6. When the opponent team does not respect 20 seconds of autonomy;
7. In case of none of the conditions above determine the match winner, the winner is determined by the weight of the machines: wins the team with the lighter machines set (including sail boat).

## LIMITATION

Machines are to be manufactured only with material and parts included on the kit, except following:

1. Bolts, nuts, washers and adhesives available in the workshop (it is not allowed to be used as structural elements);
2. Vinyl tape used as an electric insulator;
3. Grease;
4. Solder for connecting wire;
5. Nonfunctional decorations;
6. Additional purchased materials below R\$200,00 in total.

## ENERGY SOURCES

The energy allowed in the contest is,

1. Potential energy;
2. Elastic energy by deformation of springs;



3. Electrical energy provided from control unit for ground machines.
4. Eolic energy provided by axial fan for sail boats.

### REMEMBER...

1. Teams will be disqualified when their machines appear to contain a potential safety hazard;
2. Contestants have 90 seconds to set up the robots and the controller unit and, after the match, team should remove the machines immediately;
3. Contest facilities destruction disqualifies the team;
4. Strategies aimed at solely destroying or damaging the opponent robots are not in the spirit of the contest, and will not be allowed;
5. Robots may not soil the playing field or an opponent machine with grease;
6. Chemical processing of any component of the kit is not allowed.

*Any dubious rule interpretation will be discussed among instructors, who will issue a final decision.*

Each team can use two Futaba controls, however, cell phones, tablets and computers are free.

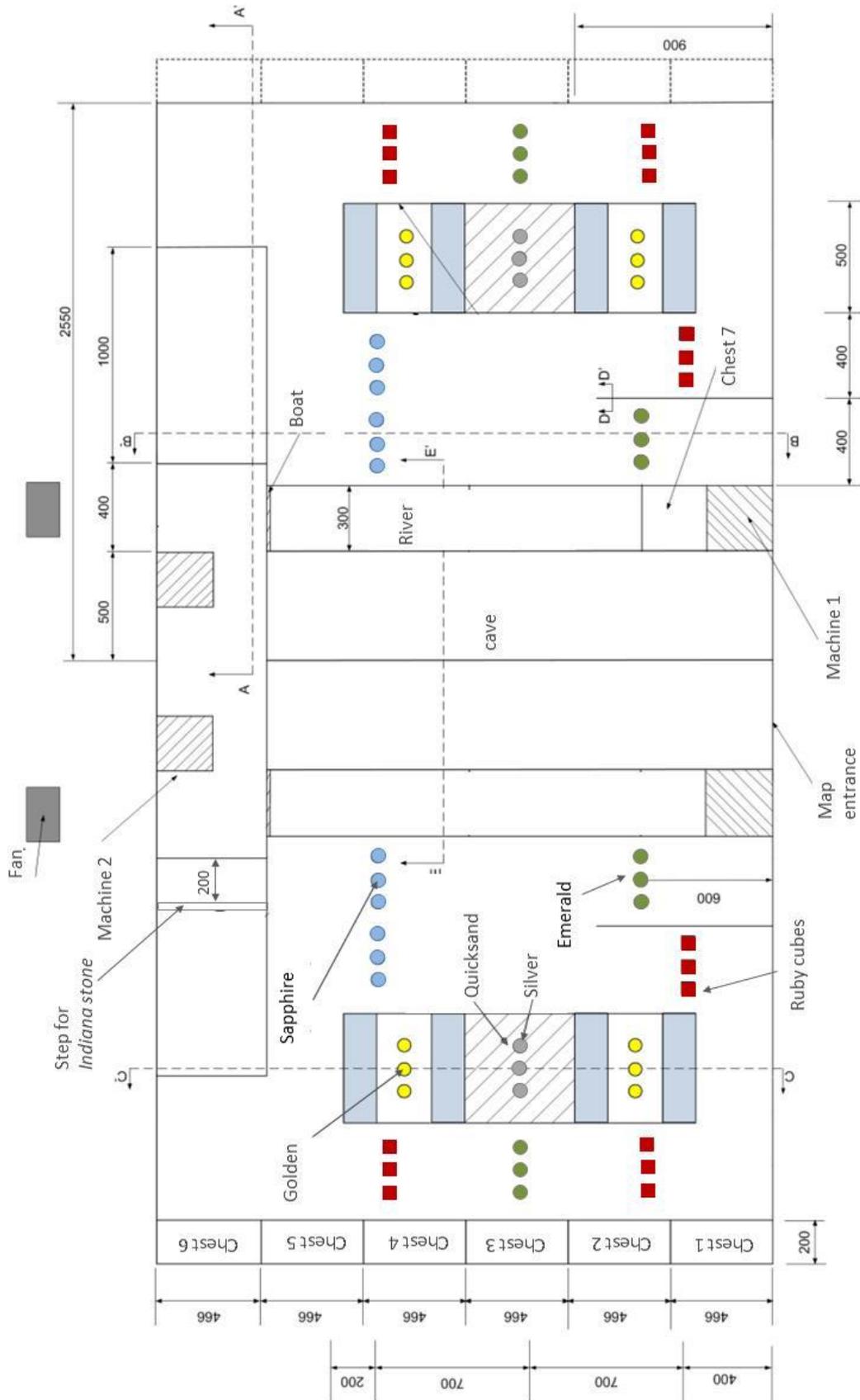
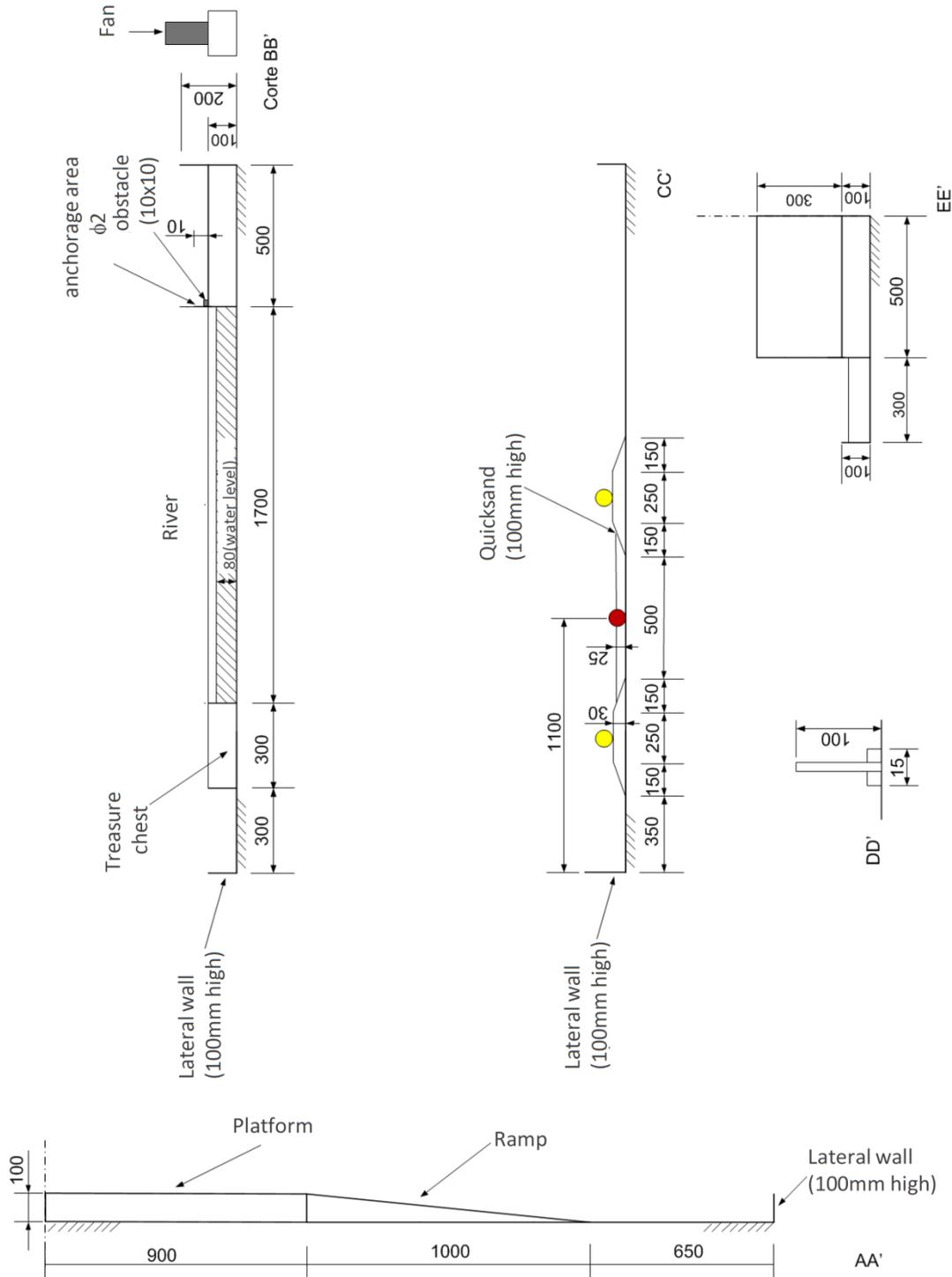


FIGURE 1. FIELD OF IDC 2013.



**FIGURE 2. DETAILED GEOMETRY.**