



2008 rules for Eurobot Junior

PAGE 1 OF 29



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This year robots are going to help the planet : they are going to produce clean energy! They are well placed to know that all of us need electricity. But in order to not worn out the resources of the nature, they will have to create systems using the renewable energies. They will have to look for water in order to activate dams, rise wind turbine facing the wind and position solar panel facing the sun.



INDEX

1. PRESENTATION.....	3
2. AIM OF GAME.....	4
3. PLAYING AREA AND GAME ACTIONS DESCRIPTIONS.....	5
3.1. PLAYING AREA.....	5
3.2. STARTING ZONES.....	6
3.3. HYDRAULIC ENERGY.....	7
3.4. WIND ENERGY.....	11
3.5. SOLAR ENERGY.....	13
4. ROBOTS.....	14
4.1. AUTONOMOUS PART (AP).....	15
4.2. ROBOT AND AP DIMENSIONS.....	16
4.3. POWER SUPPLY.....	17
4.4. COMMAND SYSTEM FOR THE ROBOT	18
4.5. CABLE.....	18
5. MATCHES.....	19
5.1. IMPLEMENTATION	19
5.2. THE MATCH.....	20
5.3. COUNTING OF POINTS.....	21
6. MEETING.....	22
6.1. APPROVAL.....	22
6.2. QUALIFICATIONS.....	22
6.3. FINALE PHASE.....	23
6.4. QUALIFICATION FOR EUROBOT JUNIOR FINAL.....	23



1. PRESENTATION

Eurobot Junior is opened to the young people from 7 to 18 years old (or until the last year of high school) forming a club, a group of friends or in a school structure (pupils, schoolchildren or high school students). Their aim is to allow young people to be the actors of their learning and to put into practice knowledge and know-how, by participating in a playful and friendly event.

A team is a group of young people who made a robot for the contest. A young person can only be a part of a single team, **even if teams belong to the same structure**, but we encourage the sharing of experiences between the teams. The project can be supervised by an adult (teacher, parent, animator, and so on) but the robot must be conceived and built by the youngs of the team.

One structure (club, school, etc.) can supervise and register several teams, in compliance with the conditions of registration. The detailed participation conditions are joined to the index card of inscription available on the Web. The acceptance of these conditions is required to validate your registration.

Eurobot Junior has as vocation to take place in a friendly and sportive spirit. As in any match, the decisions of referees are without appeal, with the exception of an agreement between all the parties.

EUROBOT JUNIOR WILL CONGREGATE TEAMS SELECTED ON THE NATIONAL FINALES IN FRANCE, BELGIUM, AND MAYBE IN OTHER COUNTRIES.



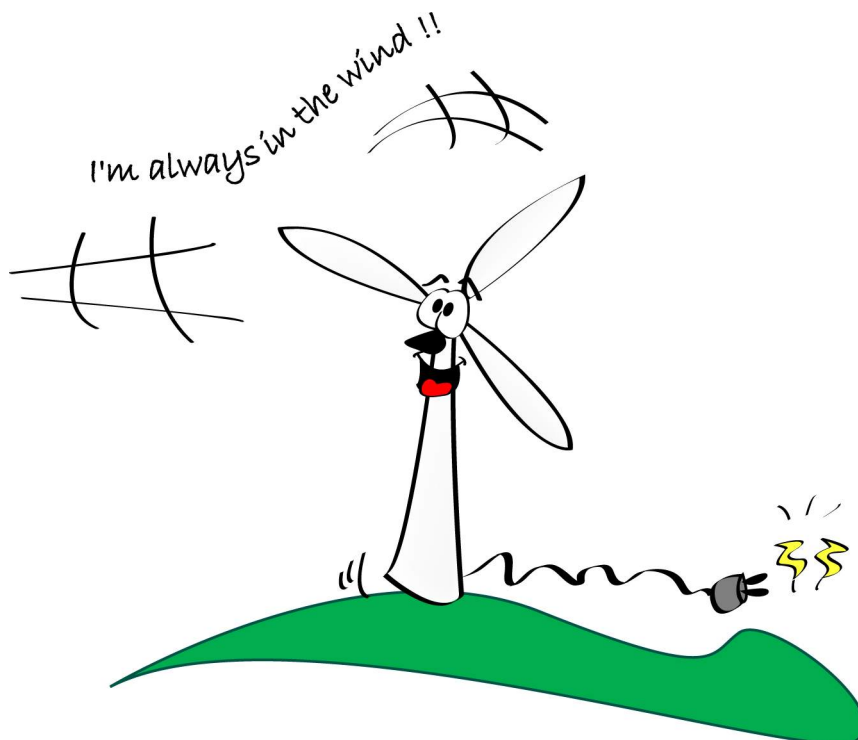
Some news things have been added through these pages, so read very carefully the rules from the first to the last page in order to take knowledge of the differences against the lasts years!



2. AIM OF GAME

The robots have to activate renewable energy systems in order to produce the most electricity as possible :

- **hydraulic energy**, water kept in lakes must be freed to draw away the turbines of a dam at the bottom of a river : robots have to open the doors of lakes to liberate the blue table tennis' balls and aim them up to the dam thanks to the river.
- **Wind force**, wind is the necessary source for the functioning of wind turbines : robots have to put wind turbines in front of the wind.
- **Solar energy**, bright intensity of the sun is going to be transformed into electricity : robots have to turn solar panels facing sun.





3. PLAYING AREA AND GAME ACTIONS DESCRIPTIONS

Important Notice:

Organizers commit themselves in respecting the best accuracy in the realization of the playgrounds. However, margins of +/- 2% compared to playground dimensions and of +/-20% compared to game elements size will be reserved. Any complaint concerning these margins shall not be recorded. The eventual modifications of this information will be indicated in a complementary document (Frequently Asked Questions) diffused to every teams.

WARNING: these margins are not applicable to robots' size constraints.

3.1. Playing area

The playing area is a rectangular plane, 3000 millimeters long and 2000 millimeters wide, made up of two wooden pieces (2000mm long, 1500mm wide each), inclined of 10% towards the public. It is painted in green color. (Please refer to appendix). A wooden edge, painted in black, is 50 mm height from the playing area's floor. This edge is outside of the table and thus does not enter in the playground's dimensions.

The starting zones are rectangles located against the edges on both sides (see §3.2). The wind turbines are apart from the playground and the other elements constituting renewable energies are laid out according to diagrams' in appendix.



All dimensions of the playing area as well as the positioning of variable components are indicated in the sketches provided **in appendix only.**

3.2.Starting zones

They are located on the edges of the table and are represented by a painted square of the team's colour (yellow at right, red at left, seen by the public, see 1st page).

Before starting, main robot and its autonomous part (see 4.1) shouldn't be out of the limits of the starting zone. In case of an AP (Autonomous Part) following line, it is authorized to place the sensor part of the AP at starting of the white line, out of the zone. But the rest of the AP need, as the top rule, to be in the starting zone.

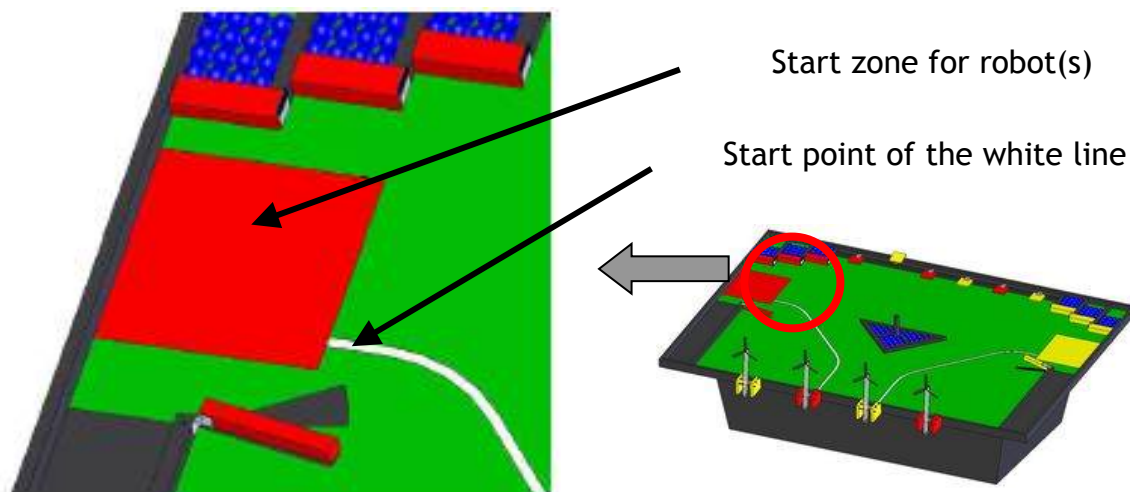


Figure 1 Starting zone

Team will be declared failed, in case of not the robot, nor the AP will have fully leaved the starting zone. (Only one of the two robots fully out of the zone is sufficient not to be failed, see 6.2).

The robots will have to set up renewable energies of the colour of their starting zone (either yellow or red) (**Figure 1**).



3.3. Hydraulic energy

Water, natural element, represents an important resource for the electricity production thanks to the force providing by the descent along the mountain slope. Robot will help in guiding this energy in order to provide electricity thanks to a dam.

a. Description of game elements and disposition at the beginning of game

For this action, robots will find on each side of the table two rivers surmounted by a mobile dam, three altitude lakes and one common lake.

- **A river** is represented by a black coloured rectangle near the table lateral border and a piece of wood (also black coloured too).
- **The mobile dyke** is placed near the river's entrance and can help to the water guidance during the lake opening. This mobile dyke is placed at the beginning with an unhelpful angle (value precise in appendix) guiding the balls to the table's centre and not in the river. The angular motion is 180° from the vertical position (*Figure 2*).
- **The 3 altitude lakes** are affected to both team and represent vats containing 16 blue table tennis' balls symbolising the water. The lakes are allocated to the team but the lost balls could be catch by the other team (a lost ball means a ball not entered in the river and staying on the playing area) (*Figure 3*).
- **The moving doors** keep water from the altitude lakes and are coloured with the team colour (yellow or red). In order to make easier the gripping, each door is equipped with a piece of steel and a hook side velcro (*Figure 5*).
- **The central common lake** is a triangle containing 38 table tennis' balls common to both team, 2 pieces of wood (symbolising rock) and a central mast (*Figure 4*).

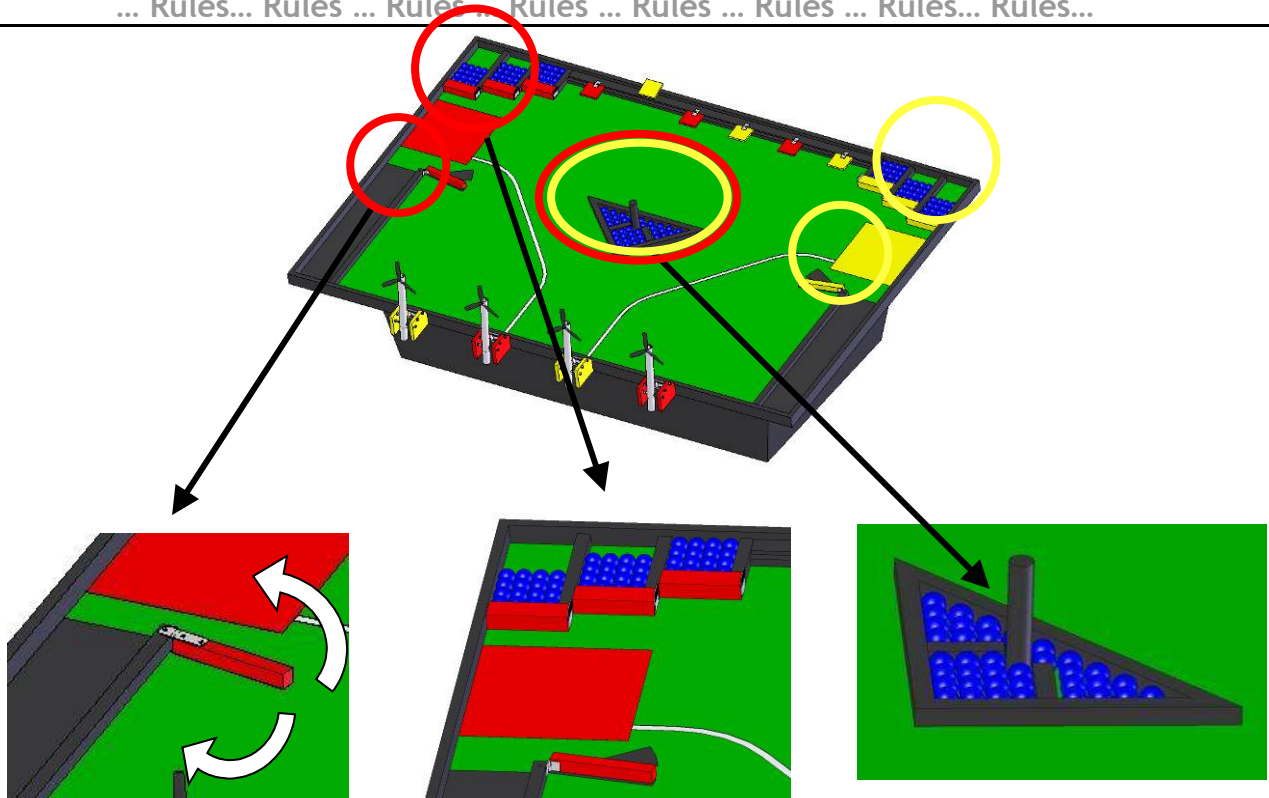


Figure 2 River and mobile dyke

Figure 3 The 3 altitude lakes

Figure 4 The common lake

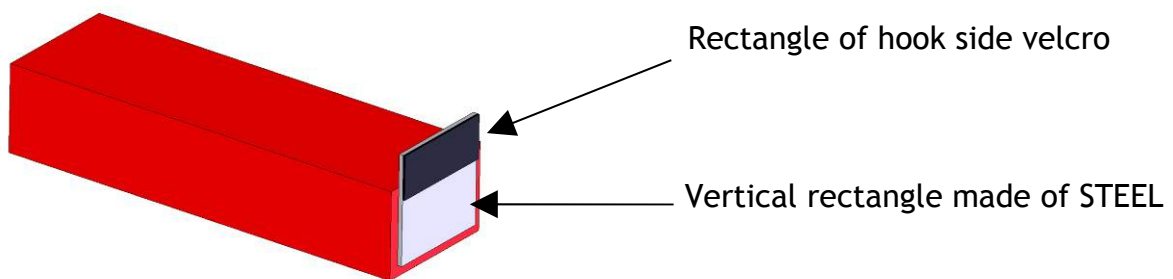


Figure 5 Mobile doors



b.Action and constraints

Action :

By opening the doors, each robot can release up to 48 table tennis' balls from altitude lakes. It also can release up to 38 balls from the common central lake. The robots have to bring all the balls up to the entrance of the river.



To be taken in consideration, balls have to be placed in the river. A ball is validated when the vertical projection is in contact with the river (*Figure 6*). Each ball gives 1 Watt.

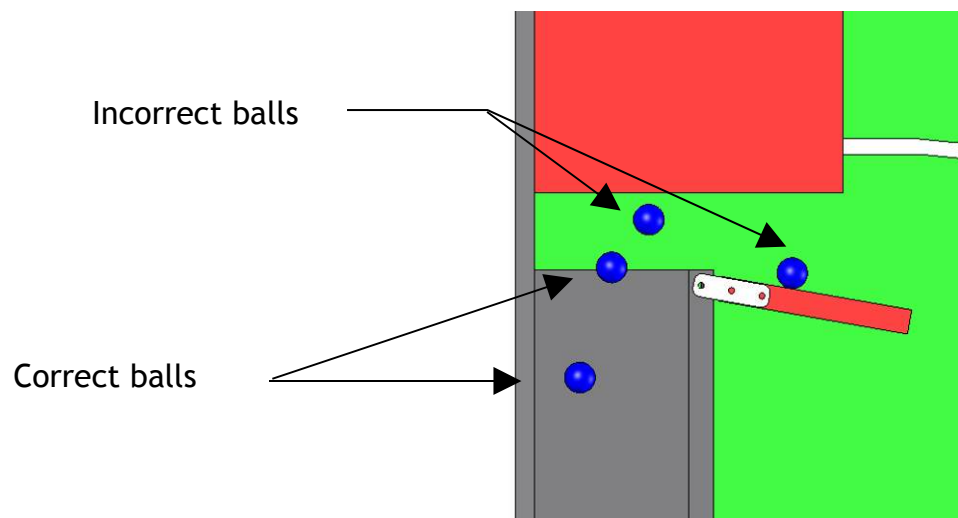


Figure 6: Balls validation in the river



Cooperation's action :

A robot can move the mobile dyke of the other team to help to improve "the hydraulic energy action". This action will be validate if the mobile dyke is placed in contact with the black area on the playing area (*Figure 7 and 7b*).

The cooperation gives a 10 Watts bonus.

The cooperation action is allowed if both teams approve this action before the game and if the referee is warned in order to observe and validate the action.



PAGE 10 OF 29

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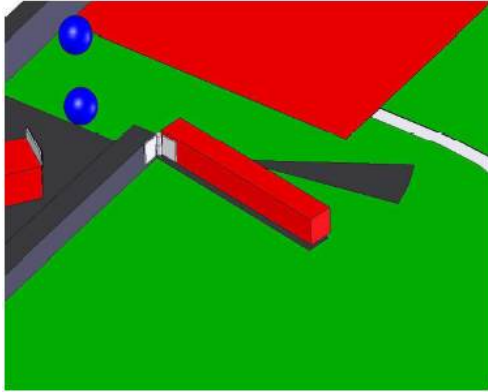


Figure 7: starting position of the dyke

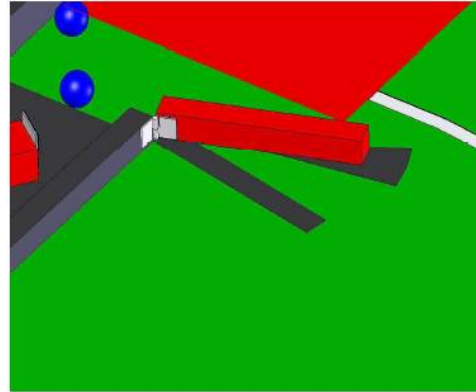


Figure 7 bis: Validated position

Constraints:

Only the balls passing the entrance of the river will be taken in account. In case of non-respect of this rule, the team will have a penalty.

Remark: Team, who wants help, will risks the failure of the action if the second team does a bad operation. That's why, the 2 teams would have to talk, before the start of the match, about their robots' capacities and the possibility of playing the cooperation. The teams, who play the match, have to both agree.



A robot may not push the mobile dyke of the other team. If it happened, it has to put back immediately in order to allow the other team to complete the action. If the clumsiness is not corrected, the responsible team will receive a penalty. EXCEPT for the cooperation (look at the upper condition).

- The whole water is allocated to both teams.**

It is possible to get the balls lost by the other team during the opening of the lake's doors. EXCEPT FOR THE FOLLOWING SITUATION!

- A robot cannot open the other team's lakes.**

If a robot opens one of the other team's lakes, it won't take profit from getting the balls even if the balls fall down at the bottom of the playing area. If some balls are absorbed by the robot during this incident, it have to take out the absorbed balls immediately. A penalty will be given if a ball is lost at the bottom of the playing area.

- A robot cannot cruise into the river and the central common lake.**

(Please refer to the river description).

3.4.Wind energy

Wind force is used to produce electricity. The robots will have to rise wind turbines in order to place them facing the wind.

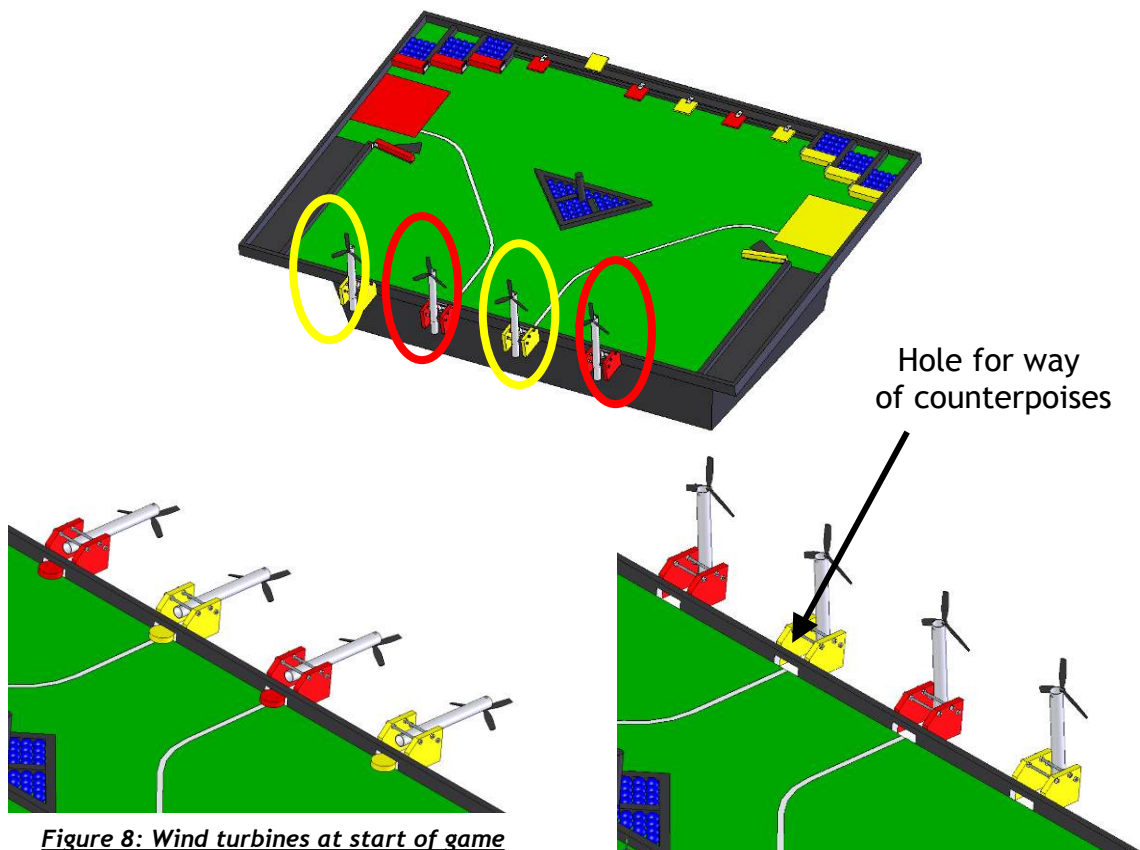


Figure 8: Wind turbines at start of game

Figure 9 : Wind turbines after passing of counterpoises

a.Description of game elements and disposition at the beginning of game.

4 wind turbines are on the front face (public) of the playground in horizontal position at the beginning of match (*Figure 8*). There are two wind turbines by team identified by the colour of counterpoise

- The wind turbines are PVC tubes. They swivel (between horizontal and vertical position) and are overcome of a false or motorized aircraft propeller.
- Wooden counterpoises are painted in the colours of teams and connected to the wind turbines by a cable to allow them to swing by using gravity.



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Counterpoises are similar to pucks used in the rules 2007. They are made in wood and weight around 70 grammes.

- A white line leaving the departure area up to the second wind turbine is proposed for possible autonomous parts able to follow a line (*Figure 10*). Be Careful ! The realization of an Autonomous Part is optional !

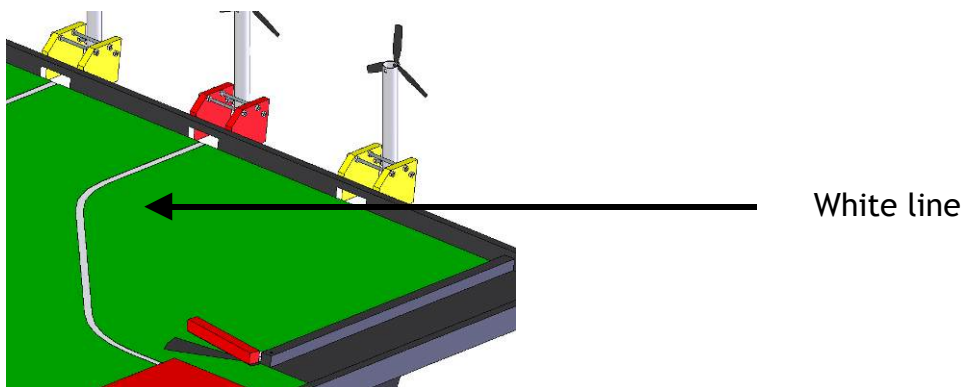


Figure 10 line for line following robot

b.action and constraints

Action:

Each robot will have to push its counterpoise outside the table through the slit in order to permit its wind turbines to stand in front of the wind.



It is the passing of counterpoise through the slit that will be recorded in case of dysfunction of the wind turbine. This action brings 20 Watts by counterpoise.

constraints :

- Two counterpoises of the same colour cannot be changed. Due to the cable which links them in the wind turbine, change counterpoises will cause knots !!!
- A part of the robot should not interact with the hole. A robot which interacts with the hole envisaged for the passage of counterpoise risks to block either the wind turbine mechanism or the robot.
- Robots don't have to move a counterpoise of the wrong colour. If a robot moves by awkwardness a counterpoise of the wrong colour, he must replace it immediately otherwise the team will get a penalty if there is detriment for the other team.

3.5.Solar energy

The sunlight is another source of natural energy used to provide electricity: Robots will rotate solar panels face to the sun to allow the photovoltaic conversion mechanism.

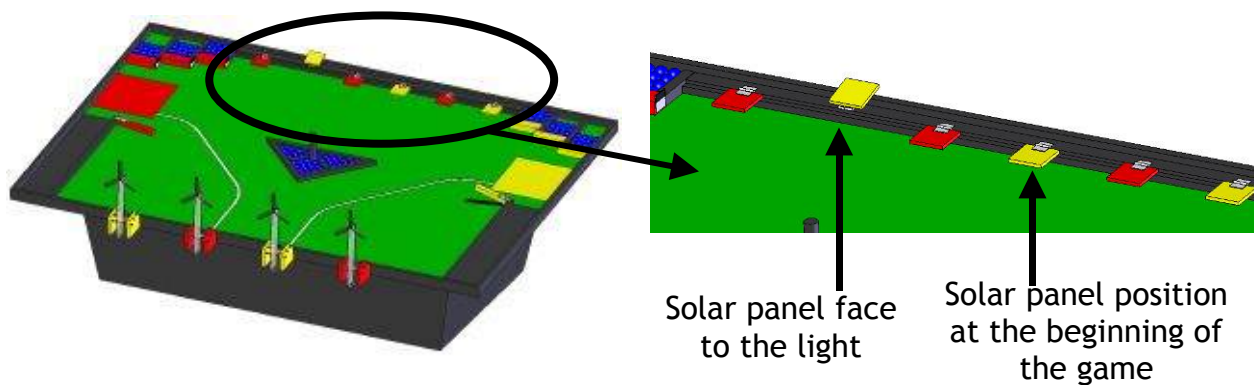


Figure 11 Solar panels

a.Description of game elements and disposition at the beginning of game.

6 solar panels are little square pieces of wood. They are attached to a long piece of wood thanks to a hinge and are placed in horizontal position oriented to the center of the playground (*Figure 11*).

The solar panels are painted in the team colour and placed alternately (Red, yellow, red..).

b.Actions and constraints

Action:

Robots have to turn up the solar panels corresponding to the colour of the team. A gap between the playground and the solar panel is let in order to make easier the gripping.



A solar panel is validated when it is completely turned up and in contact with the back border of the playing area. This action brings 20 Watts by solar panel turned up.

Constraints :

- A robot cannot turn a solar panel of the colour of the other team



4. ROBOTS

Each team cannot homologate more that a single robot and a single autonomous part (AP).

An autonomous part can play only with the robot with which it was conceived and approved. We cannot re-homologate it with another robot.

Teams have to build the robot and its system of piloting (or of command). These two parts are connected by a cable which allows to supply the robot with electricity and to pilot it.

A robot or its autonomous part (cf. 4.1) does not have to block the opposite robot or the opposite autonomous part. In case of voluntary action of this type indicated by the referees, the team can be punished (cf. 5.4).

A robot does not have to cause voluntarily damage to the opposite robot, or to the playing area.

Any action aiming at preventing the good progress of the game will be sanctioned.

4.1. Autonomous part (AP)

The robot has the possibility of releasing an autonomous part. Attention, this one does not have to remain voluntarily immovable in the objective to block the game, and its departure does not have to require any human intervention once the match is started.

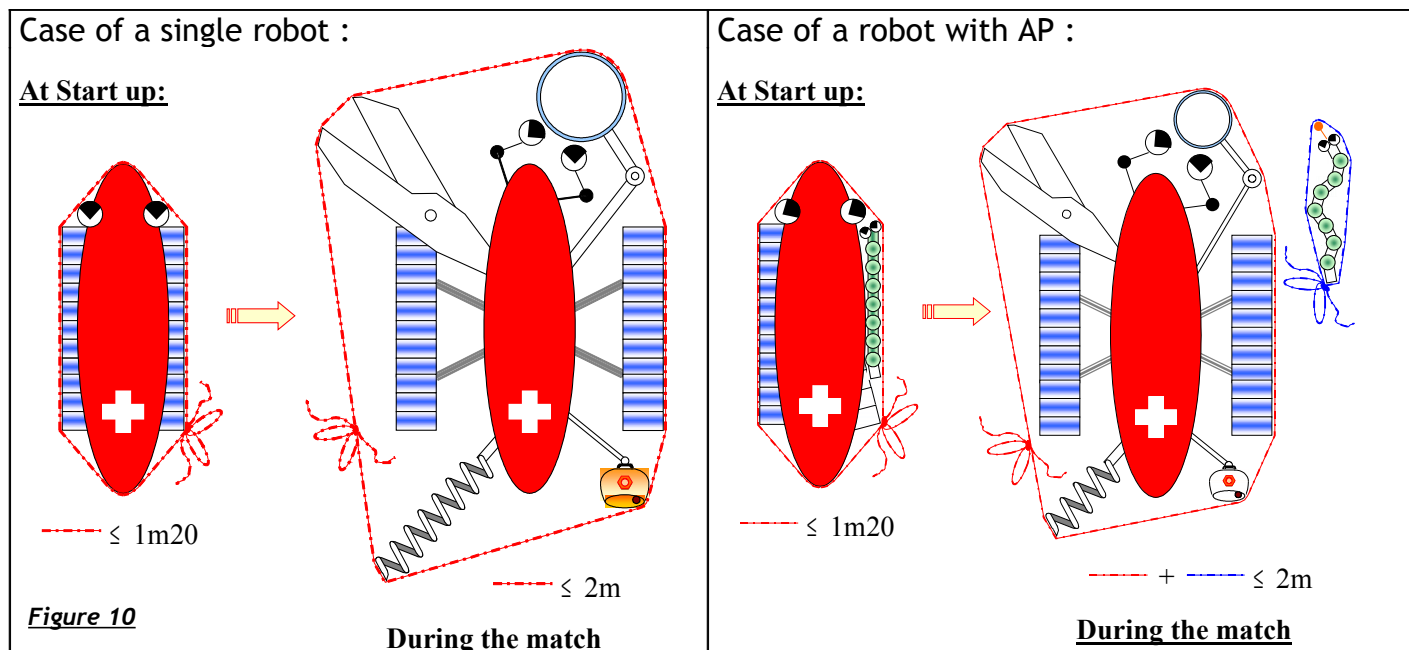
A robot containing in its dimensions its power supply (battery) and its intelligence (no remote control) is considered as autonomous.

The autonomous part can realize all the authorized actions of game as soon as it is separated from the robot. It has to have no connection between the robot and the AP there, except for the signal for departure.

The construction of an autonomous part is optional.

4.2. Robot and AP Dimensions

Perimeter of the robot is measured as shown on this bitmap:



The perimeter of the whole robot and its AP does not have to exceed 1200 mm at the start of the match. The sum of the perimeter of the group robot + AP totally spread does not have to exceed 2000 mm during the match.

The height of the robot and the PA does not have to exceed 400 mm at first and during the matches.



In both configurations of departure, the group does not have to overtake of the starting zone. An exception is granted for the parts of robots enabled to follow the line (consult the chapter 3.2 for the conditions and the definition of the starting zone).

The robot and the PA have to consist of united elements some with the others (and cannot thus contain and put down parts or elements on the playground).



4.3. Power supply

The source of energy passed on in the robot by the cable is only electric. The authorized maximal voltage is 13,8 V (measured between 2 wires of the cable and the robot).

This power supply is not supplied in the daytime with the competition. On the other hand, the teams have access to the sector (E.D.F. 220V/50Hz, French plug in France need adapter!) and can use batteries (they must be waterproof and with a maximal tension of 13,8V).

Attention! The supply systems must be easily transportable.

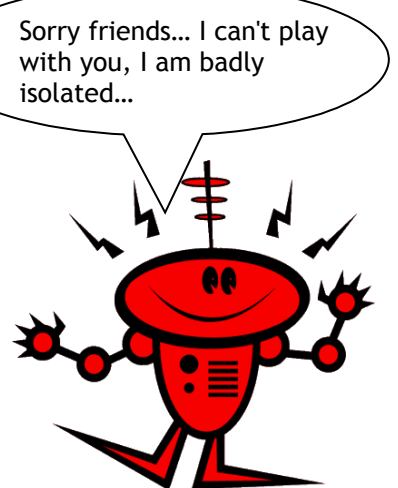
Teams can go up / lower walking/stairs by going towards the scene where take place the matches.

All the potential power supplies stored in the robot are authorized (batteries, springs, compressed air, gravitational energy...), except sources of energy operating with chemical reactions as combustions or pyrotechnic processes, which are forbidden for safety reasons. Furthermore, the use of corrosive products is forbidden and the projections of liquids are not admitted.

Systems with compressed air (pneumatic systems) do not have to exceed a pressure of 4 Bars and a product Pressure x Volume of 80 Bars x Liter, according to the current law.

In a general way, all systems aboard robots has to respect the current laws; in particular, the elaborated systems have to put in danger neither the team, nor the organizers, nor the public, as well on the stands as during the matches.

Generally, any system considered dangerous for the audience shall be refused. It is notably forbidden to use power supplies having bare details under voltage (battery clips must be covered!).





4.4.Command system for the Robot

Every team has to have a command desk, activated by a single pilot.

The system of command is a case allowing controlling the electric devices of the robot. It is connected with the robot only by electric cable. Quite other system of communication of the robot with the outside during the matches is forbidden.

4.5.Cable

The electric cable connecting the robot with its system of command is not supplied;

It must be conceived and realized by every team, according to its needs.

The cable has to have a minimal length of 5 metres for reasons of mobility of the robot on the playground. It is maintained in the air by the co-pilot by means of a pole supplied by the organizers.

During the match, the co-pilot does not have to interact in the piloting nor in the regulations of the robot (voltage of power supply for example).

The cable must not be used to drive the robot, or help it to set up right in case of reversal at the risk of penalty.



5. MATCHES

The matches have duration of 90 seconds.

Only 2 persons by team are authorized to go on scene (and behind scene) to compete for the matches: The driver and the co-pilot for the match.

5.1. Implementation

At Start-up of the meeting, the elements of the playing area and the playing area itself are settled according to the indications given onto the plans of the appendix (see bottom).

At the arrival on the playing area, each team has 3 minutes to proceed to the implementation of its robot and the possible autonomous part. The system of command is placed near the playground.

It is asked to reduce at least the whole necessary equipment for the implementation of the robot (a single power socket can be supplied for each robot).

A robot which is not ready at the expiration of this delay is declared failed for the match. Attention, the opponent robot will have to play its match alone on the playground and need to mark points to be declared victorious. (see 6.2)

When 2 robots are in place, the referee asks the participants if they are ready. No contesting can be made on the arrangement of the elements of game after the beginning of the match.



5.2.The match

Attention: for the final phases, also read the part 6.3 too.

At the signal of the referee, each robot is started up and then evolves under the control of the pilot.

On no account it is allowed to touch robots, AP, elements and playground during the match.

In case of absolved requirement, the referee can however authorize an action. Any manual intervention on a robot, an AP, an element or the playground, without explicit authorization of the referee, provokes the elimination of the team for this match (failed).

No element taken out accidentally of the playground can be there put back before the end of 90 seconds. At the end of the meeting, the pilots stop robots and AP, which are then removed from the playground by the referee. The referee gives then the result of the match. The winner is the one who has most watts. The other team is declared losing (see left 5.3). Before leaving the gaming table, both teams have to validate the result of the match. This last one is then irrevocable.

In case of situation with difficulty arbitration, the referees save themselves the decision to replay or not the match. If both teams marked 0 point during the 90 seconds of game, the result of the match will be a double defeat.

We consider as being failed a robot and an AP not going completely out of the starting zone during the match (see left 3.2) or further to a decision of refereeing.



5.3.Counting of points

This year, this is not points but Watts which will be counted. Winning team will be the one which will have the most electrical power.

At the end of the match, referees will count the Watts of each team in the following way (details on actions giving points in sections 3.3 to 3.5):

1 Watt by blue table tennis' ball
20 Watts by solar panel
20 Watts by couterpoise
10 Watts of bonus for valid cooperation

What power in real?

- ♦ Wind power develop from **500kW to 2.5MW** by wind turbine according to the size and the potential of the area
- ♦ Hydraulic power develop **100MW to 39GW** for the biggest dam in the world
- ♦ Solar power develops from **some kW to 12 MW** for the biggest solar power station in Germany !



Penalties

A penalty is a subtraction of 20 Watts from the result of the match and the general classification. A negative score will be rounded off in 0.



Reminder:

The penalties have for objective to compensate for damage after a possible incident during the progress of the game. A situation with penalty is considered as the non compliance with rules of the game, **this type of situation has to remain exceptional !!!** In case of repeat offence, by a team, of actions carrying in penalties or not allowed, the referees beware the right to declare the team fails. The committee of refereeing will be also attentive to the penalties distributed between several levels of meeting (region-nation-Europe).



6. MEETING

- National Final: in France, it will append at the end of March - beginning of April, 2007. It will allow considering 3 to 5 teams for European finale of Eurobot Junior.
- Eurobot junior is the last stage which gathers, always in the same friendly spirit, teams coming from various European countries.

For each of the meetings the progress follows the following phases:

6.1. Approval

•Pre-Approval :

Before the beginning of the meetings, robots and autonomous parts are subjected to the control of a referee who verifies their correspondence to the rules. The robot and the AP must be capable of showing easily the totality of their actions.

•Approval :

The robot and/or the AP have to, in 90 seconds, mark at least one Watt (by inserting a ball in the river, a weight in the hole or a solar panel of the right color). The robot, and the possible AP, are put in situation of match but without the presence of any opponent.

If the set constituted by the robot and the AP fills these conditions, it is declared approved.

6.2. Qualifications

During the phase of qualification, the approved teams will have the possibility of playing at least 3 matches.

On every meeting, each team wins Watts in the following way:

- For **victory**: number of Watts + **20 Watts** of Bonus
- For **equality**: number of Watts + **10 Watts** of Bonus
- For **Defeat**: number of Watts + **5 Watts** of Bonus
- For **Fail**: no Watt

A classification is established according to Watts accumulated to select the teams qualified for the final phase.



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It is also this classification which allows the selection of the teams admitted to participate in national finale.

In case of ex-aequo, the teams which win will be decided according to the order of the following criteria:

- The team which will have set up the most of wind turbine.
- The team which will have accumulated the most of watts by the water power.
- The team which will have set up the most of solar panel.

6.3.Finale phase

At the conclusion of the qualifying phase, the first 8 or 16 teams (According to the number of approved teams) establish the order of the matches of the final phase according to the plan opposite.

Reminder: in final phases, cooperation doesn't exist anymore. Each team need to move its own dyke.

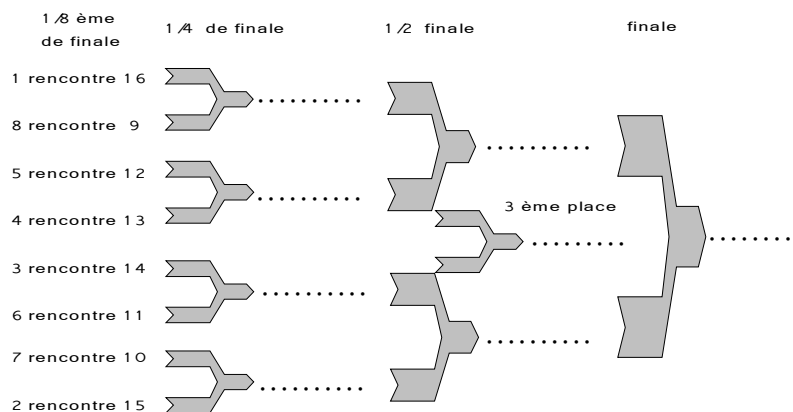


Figure 11

The meetings of the final phase are done with direct elimination.

In case of equality at the end of a match of final phase, it is the first team to have set up its two windmills which will be declared victorious.

Finale will deceive in two winning matches, as well during the regional meetings as during the national finales (France, Belgium, etc.) and Eurobot Junior.

6.4.Qualification for Eurobot Junior final

Each country participating in Eurobot Junior organizes a national meeting to determine the teams qualified for the European meeting.

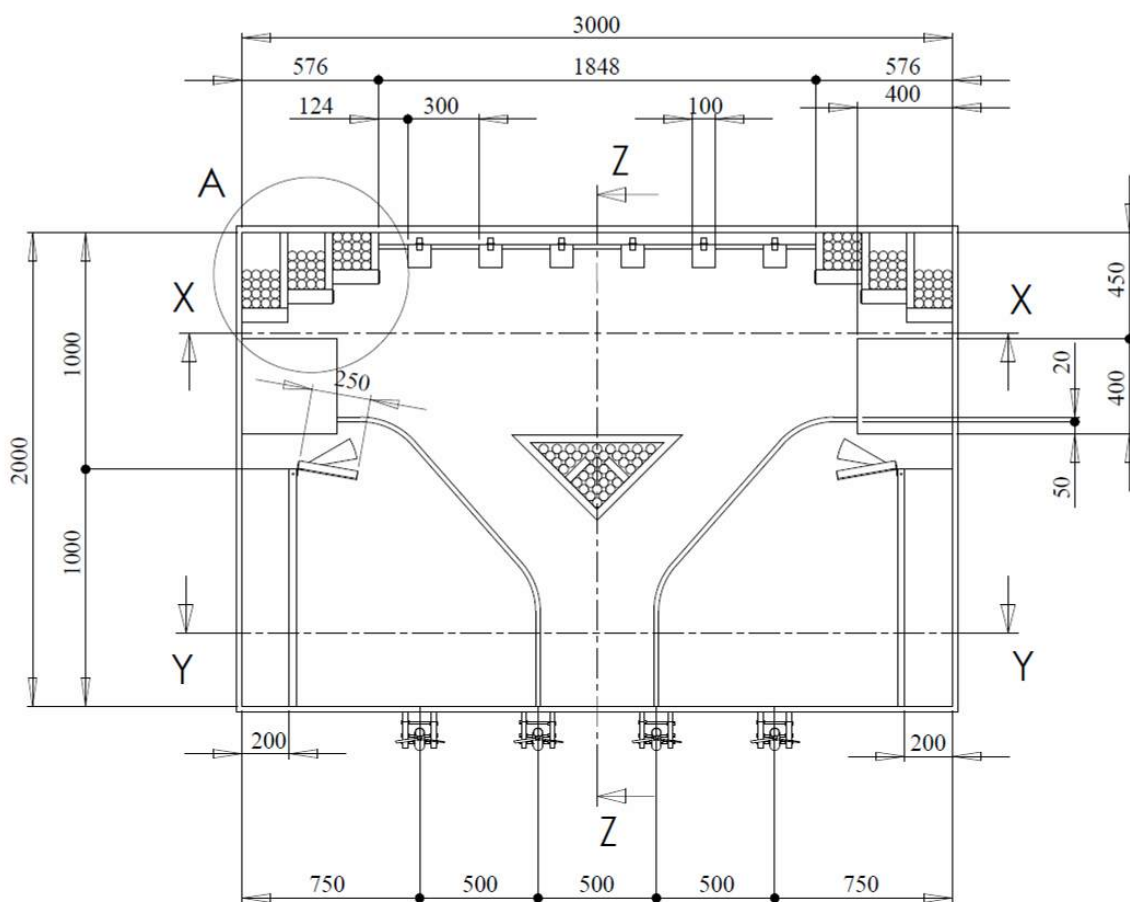
The first 3 teams at the conclusion of the finales (and not at the conclusion of the qualifying phases) will be qualified for Eurobot Junior finale.

If the organization allows it, one or two supplementary teams, chosen among the teams having received a Special Prize, will be considered in finale European.



APPENDIX

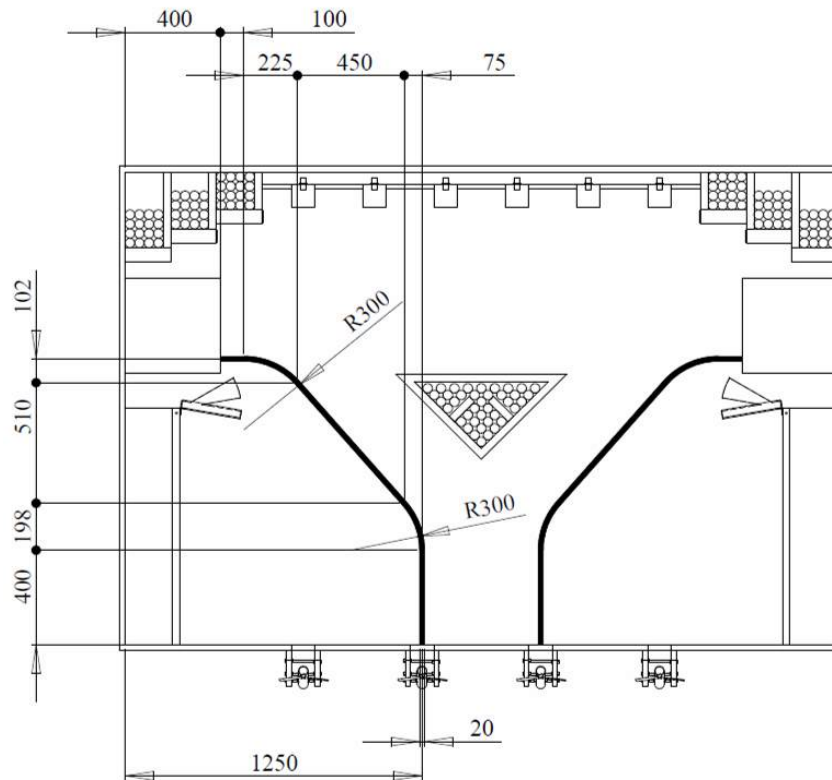
1.Plans



Top View 1



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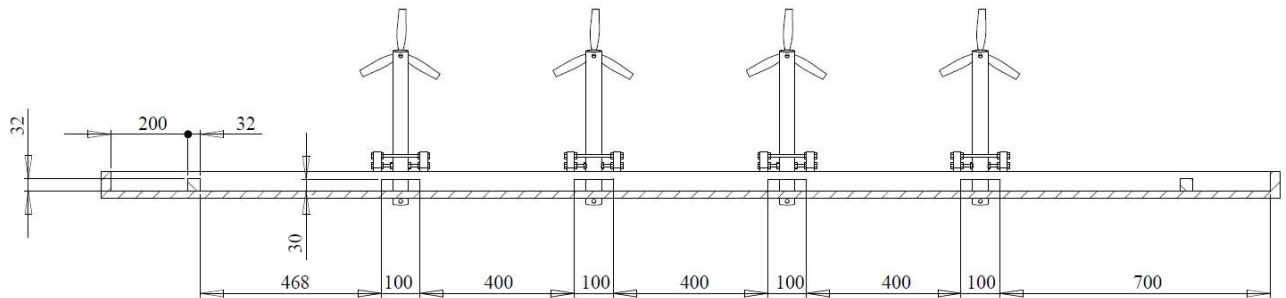


Cooperation Action



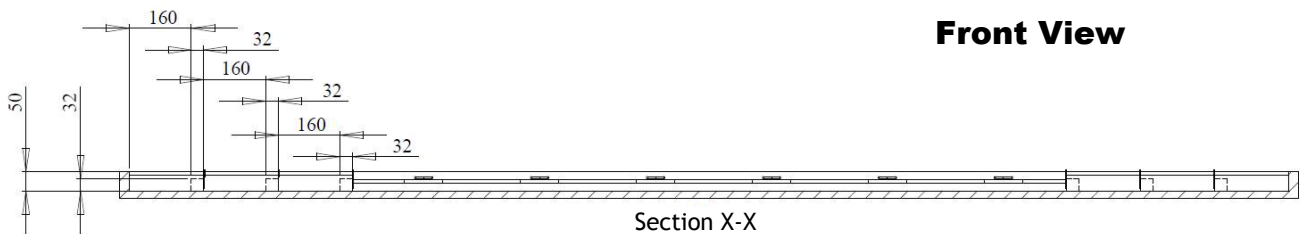
PAGE 25 OF 29

... Rules... Rules ... Rules ... Rules ... Rules ... Rules ... Rules... Rules...



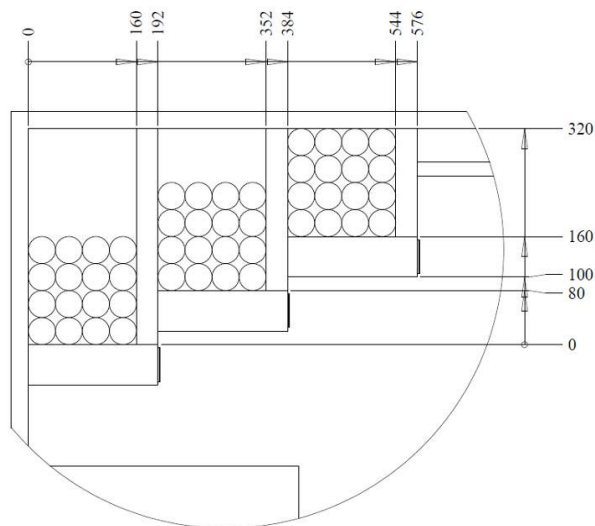
Section Y-Y
Scale 1 : 10

Front View

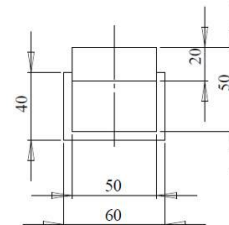


Section X-X
Scale 1 : 10

Altitude lake



Detail A
Scale 1 : 5

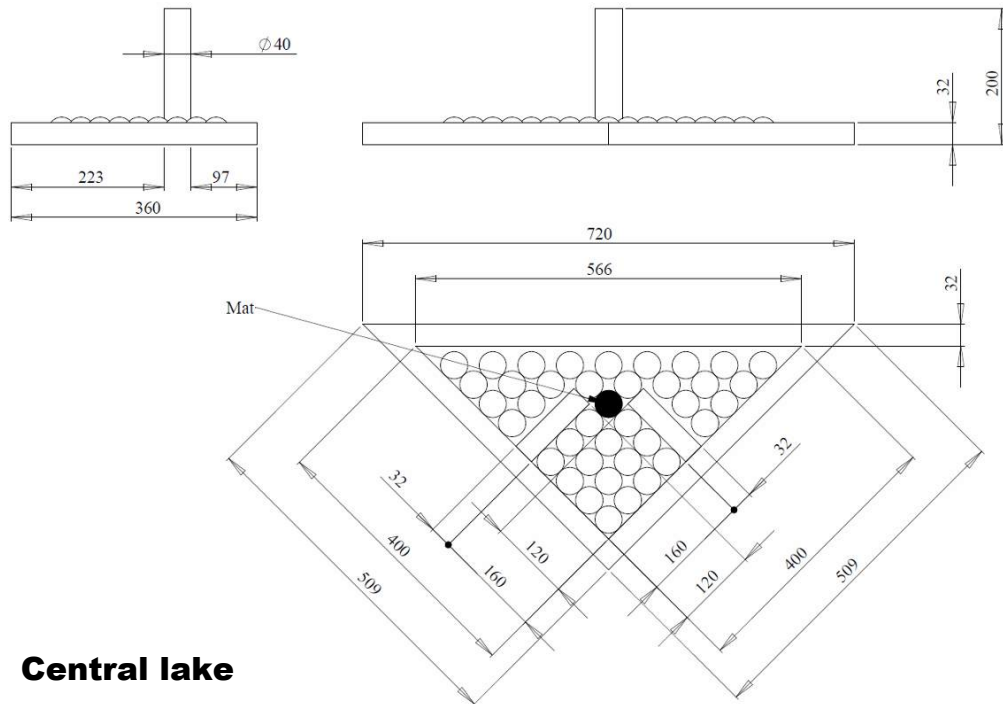


Mobile Door

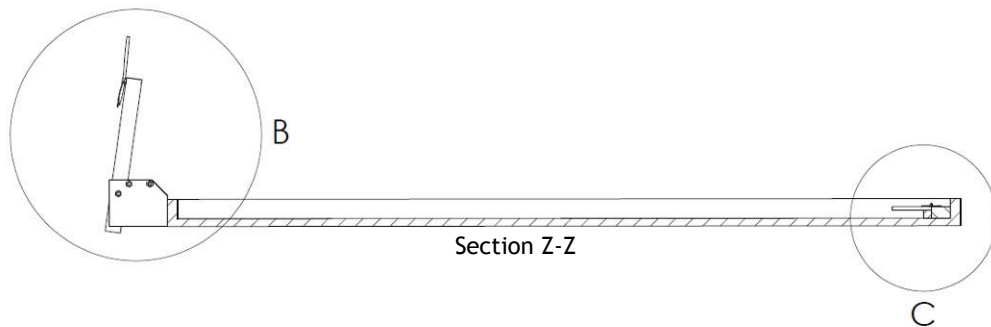


PAGE 26 OF 29

... Rules... Rules ... Rules ... Rules ... Rules ... Rules ... Rules... Rules...



Central lake

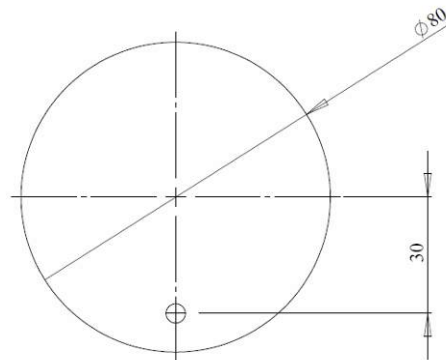
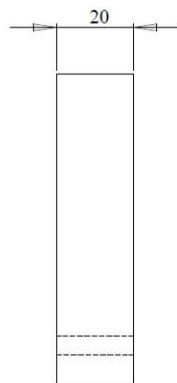


Solar panel system

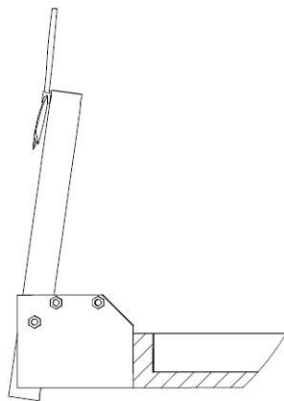
Detail C
Scale 1 : 2



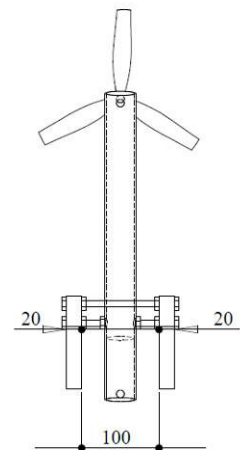
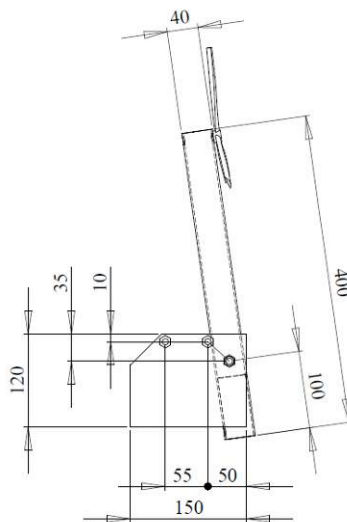
... Rules... Rules ... Rules ... Rules ... Rules ... Rules ... Rules... Rules...



Counterpoise



Detail B



Wind Turbine system



2.Paint References

	Colour	Type of painting	Reference
Playground (important for line-follower robots)	pepermint green	Satiny	RAL 6029
border and river	deep black	Satiny	RAL 9005
yellow elements	Cadmium yellow	Satiny	RAL 1021
red elements	fire red	Satiny	RAL 3000
ping pong balls	light blue	Satiny	RAL 5012

3.Security rules

You will find below a list of safety rules to be taken into account.
This list is not exhaustive and may evolve according to the current legislations.

As a general rule, you have to elaborate systems which answer criteria of manufacturing which do not put in danger your team as well

as the public as well on the stands as during the matches.

That is why we ask you to make sure that your systems are in accordance with the current legislation.

General precautions:

The road leading to gaming tables can contain staircases, notably during the access to the scene. The driver and the co-pilot are the only persons of a team authorized to enter on the scene and the back stage. The systems of supply and command must be easily transportable.

Embedded Voltage:

Every robot will have to correspond to the legal standards concerning the low voltage. The internal tension of the robots will not have to exceed 13,8 V.

To avoid any risk of fire, it is asked to pay a particular attention on the choice of supply leads, according to the intensity of the currents crossing them.

It is also strongly advised to protect the electric installation with a fuse, cabled in the closest to batteries.



PAGE 29 OF 29

... Rules... Rules ... Rules ... Rules ... Rules ... Rules ... Rules... Rules...

If the team chooses a supply by batteries, we remind that only waterproof batteries can be used. The batteries of car, truck are thus forbidden.

Systems with compressed air (pneumatic)

Any system under pressure will have to respect the current law according to the French General Council of Mines.

Reminder of the decree 63 of January 18th, 1943 and Order of July 25th, 1943:

- Maximal working pressure: 4 bars
- Tank maximum pressure x volume product: 80 bars x maximum liter.

Further information on:

<http://www.industrie.gouv.fr/sdsi/dgap/textes/1498-2.html>

Laser source

The usage of laser source is allowed on the condition of being able to justify its membership in the class 1. A laser of class 2 is tolerated if the laser spotlight can never cross the face of anybody in its normal functioning. The lasers of class 3 and 4 are totally forbidden.

Attention! Some low-cost laser pointing devices generate powers close to the laser of class 3. This is the reason why it is asked the corresponding documentary evidence indicating the membership in a class.



For all your questions and remarks, a referent of the refereeing committee will answer your questions on the forum of Planete Sciences in the Trophées 2008 section
<http://www.planete-sciences.org/forums/>
and eurobot-junior@planete-sciences.org

All the organization team of the Trophies of robotics wishes you a lot of fun and success in your realizations and gives you meeting quickly around a gaming table to activate the forces of the nature !

Robotically,

The refereeing committee of the Trophies of robotics and Eurobot Jr.

This file is a translation of the official Eurobot junior rules, you can find the original file there (in french):

http://www.planete-sciences.org/robot/trophees/docs/Reglement_T2008.pdf