



_____THEME & RULES



ABU ROBOCON 2015
YOGYAKARTA – INDONESIA

“ROBOMINTON: BADMINTON ROBO-GAME”

1. **THEME AND RULES**

The motif of this contest theme is badminton's doubles game. The highlight of this game is how the two robots hit and hit back shuttle by collaborating each other. The longer the rally continues the more exciting the game becomes. The robot with unique way of hitting shuttle can be entertaining. The audience will be enthralled if the robot made an eye-opening jumping smash. We are looking forward to witnessing exciting matches of unique robots built by the young budding engineers in Jogjakarta, Indonesia.

2. **ABOUT SAFETY**

- 2.1. Please abide by the rules of the safety guidelines defined by the participant's university or country.
- 2.2. Participants must pay adequate attention to safety when designing and building robots so that they don't harm anyone (other teams, organizing committee, audience and so on) in the venue.
- 2.3. Team members must wear helmet and protective goggles and shoes during the game.
- 2.4. When using a laser beam, it must be less than class 2 laser.
- 2.5. Not only in the construction period of the robots but also all time in the test-run and practice phase, please take effective safety measures such as wearing gloves and clothes to protect limbs and that don't get caught by robots easily.
- 2.6. Please attach emergency button on the robots.
- 2.7. Never practice/test robots alone so that members can immediately respond to an accident.
- 2.8. In order to avoid major accident by design mistake or reconstruction of the robot or over-current to a circuit or short circuit of the battery causing fire, please carry out following;
 - 2.8.1. Use wiring with adequate volume and fuse.
 - 2.8.2. Work apart from inflammables.
 - 2.8.3. Don't do unauthorized remodeling of the battery.
 - 2.8.4. Use adequate batteries designated by the battery manufacturer.
- 2.9. In addition to above, various dangerous events could be triggered by the unique features of each robot. Please take effective safety measures according to the characteristics of an individual robot.
- 2.10. Please take safety measures so that a single malfunction or miss operation doesn't cause a serious accident.

3. TEAM MEMBERS

- 3.1. Each team comprises of four members consisting of three students, one instructor and pit crews, all from the same university, polytechnic or college.
- 3.2. Team members and pit crews must be enrolled in their university, polytechnic, college at the time of the international contest. Postgraduate students are not eligible to participate in the contest.
- 3.3. All the robots that will participate in the contest must be designed and constructed by the team members and pit crews.
- 3.4. Only three student team members are permitted to participate in the contest.
- 3.5. The maximum of three pit crews are allowed to adjust robots in the pit area and carry robots to the contest field.

4. FLOW OF THE GAME

- 4.1. The first server will be decided by a lottery before the game.
- 4.2. Each team must preload six shuttles that will be provided by the referee. Teams can decide how many shuttles to preload to each robot.
- 4.3. Setting time
 - 4.3.1. With the referee's sign, teams will be given a minute of setting time before the game.
 - 4.3.2. The power source of the drive system of the robots must be switched off until the setting time begins.
 - 4.3.3. Teams can set their robots anywhere in their side of the field.
 - 4.3.4. During the setting time, maximum of three team members and three pit crews are allowed to prepare for the game.
 - 4.3.5. The team will be given 6 shuttles. The shuttles must be loaded to the robots during the setting time, within 15 seconds from the previous points are confirmed to the next service is delivered. The team can decide how many shuttles to load to robot(s).
- 4.4. Service
 - 4.4.1. Service will be delivered by both teams taking turns.
 - 4.4.2. Service must be delivered within five seconds from the referee's whistle.
 - 4.4.3. Service can be delivered by any of the two robots.
 - 4.4.4. When delivering a service, a part of the robot must be in contact with the right side of the service area (including the border line) of its own zone. (Refer to Fig.1)

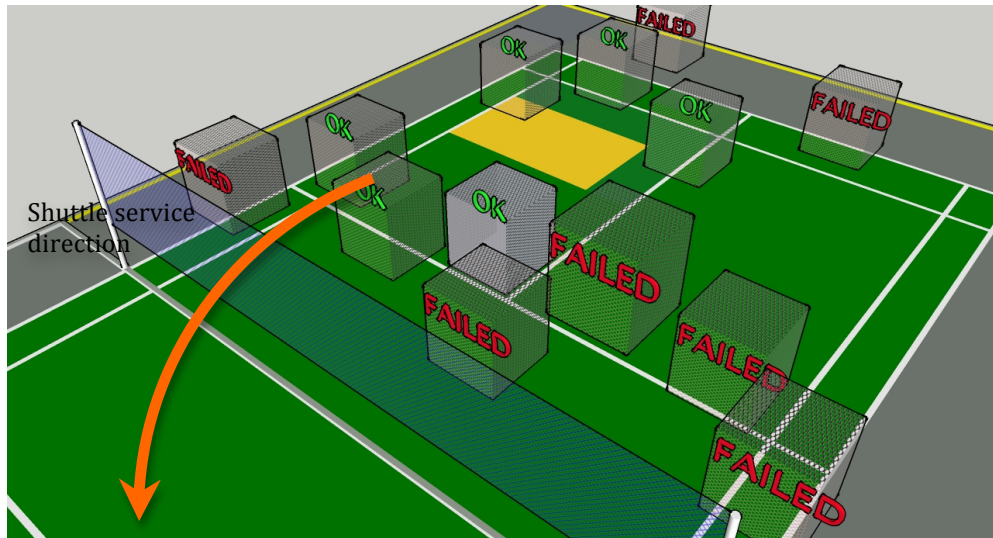


Figure 1: The legal (OK) and the illegal (FAILED) Robot's positions for service.

- 4.4.5. When delivering a service, the robot must drop the shuttle vertically using free-fall. The position to drop the shuttle must be in the space above of right side of the service area (including the border line) of its own zone. (Ref to Fig.2)

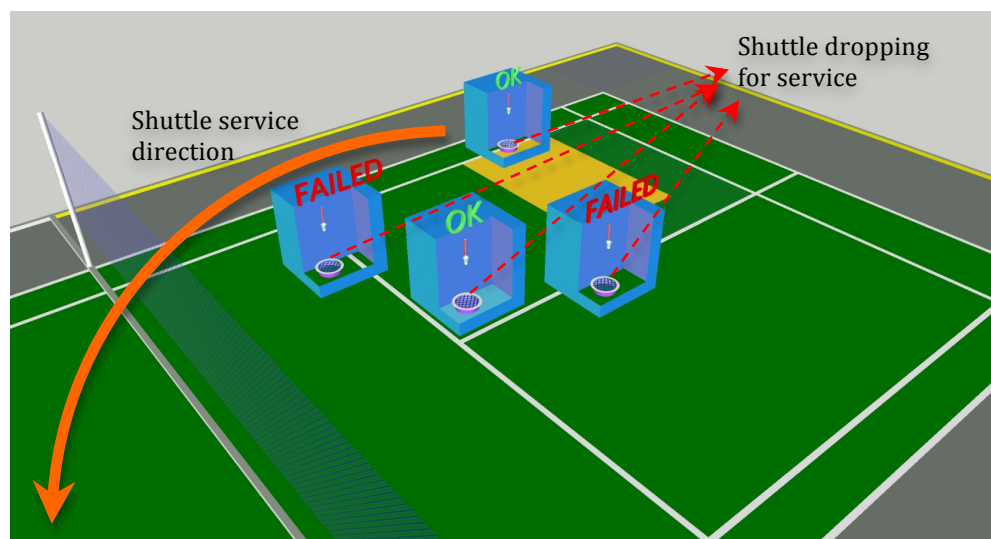


Figure 2: The legal (OK) and the illegal (FAILED) shuttle dropping for service.

- 4.4.6. The robot that delivers a service must hit the base of the dropped shuttle with a racket. (Refer to Fig.3)

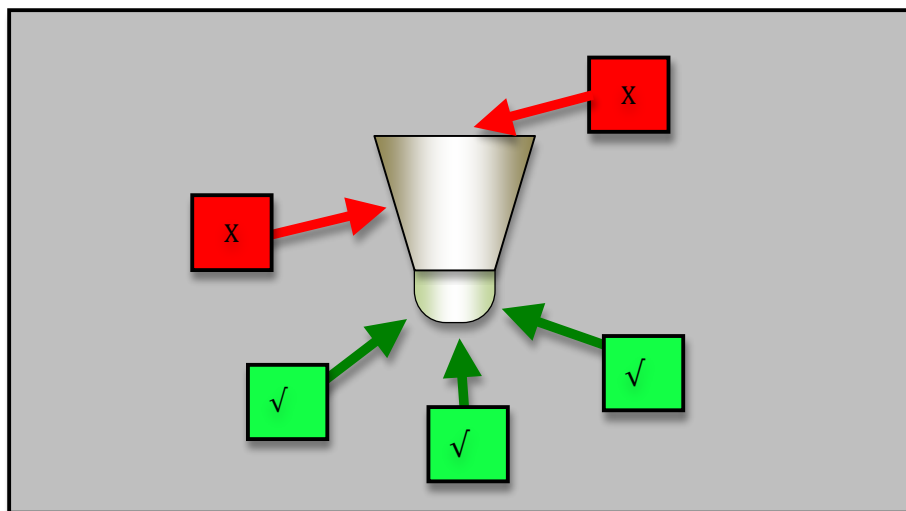


Figure 3: The legal (✓) and the illegal (X) shuttle hitting positions for service.

- 4.4.7. At the moment when the robot delivers a service, the area from shaft to head of the racket must be facing downward lower than horizontal.
- 4.4.8. The racket and the shuttle can come in contact only once per service.

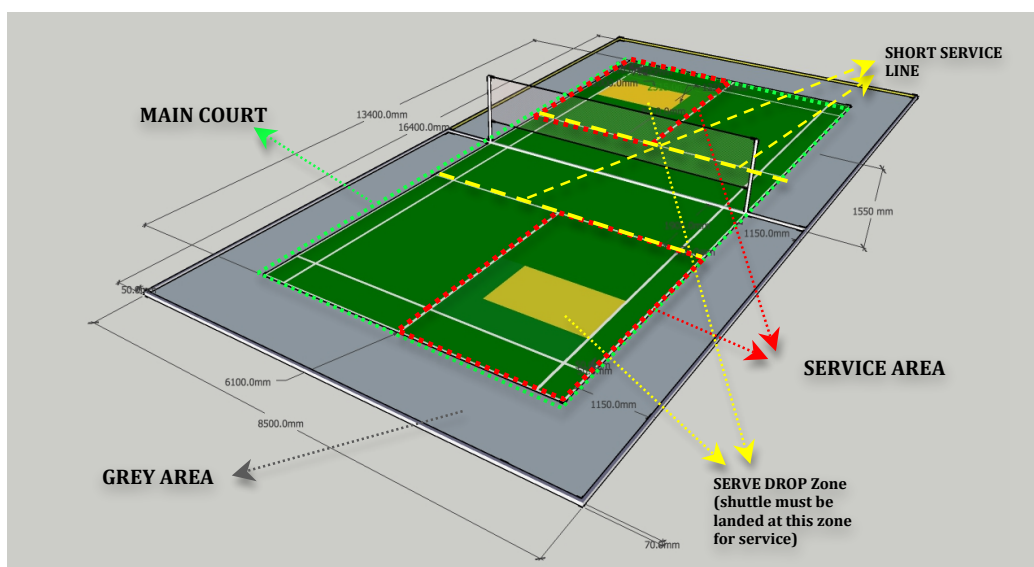


Figure 4: A perspective view of contest field (court).

- 4.4.9. The shuttle that has been hit must travel over the net (without touching the net) and land on the opponent team's serve drop zone (Refer to Fig.4). However it doesn't apply if the opponent team hits back the shuttle or the shuttle should come into contact with the opponent's robot (if operated by cables, including the cable and its operator).

- 4.4.10. The robot(s) that will receive service must stand behind the short service line until the robot receives the service.
- 4.4.11. The robot shouldn't come in contact with the short service line.
- 4.4.12. The robot shouldn't enter the space above the net side.

4.5. Scores

- 4.5.1. When the conditions mentioned under '4.4.1-4.4.12 Service' are achieved and the shuttle lands on the serve drop zone (including border line) of the opponent team or if the shuttle should come into contact with the opponent's robot (if operated by cable, including cable and its operator), the team will gain score.
- 4.5.2. If the team failed to achieve the conditions mentioned under '4.4.1-4.4.12 Service', the service ends in failure and opponent team will gain score.
- 4.5.3. Excluding service, if the shuttle hit by the racket lands in the opponent's court (including border line, refer to Fig.5) or comes into contact with the opponent's robot (if operated by cable, including cable and its operator) the team will gain score.

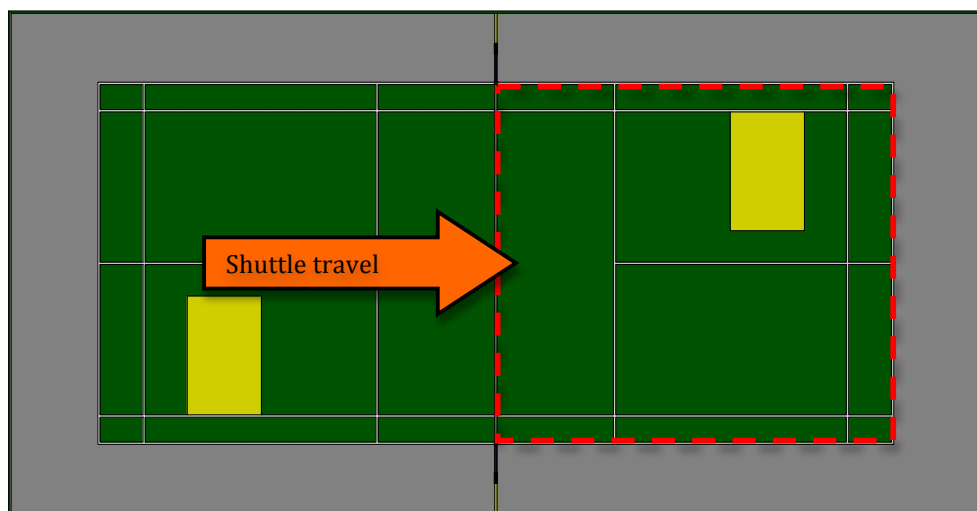


Figure 5: Legal landing area of shuttle hit (indicated by red dash-line)

- 4.5.4. If the shuttle hit by the racket doesn't land on the opponent's court, (including border line, refer to Fig.5) opponent team will gain score.
- 4.5.5. If the same robot hit the shuttle twice, opponent team will gain score.
- 4.5.6. If the A robot and B robot of the same team hit the shuttle consecutively, opponent team will gain score.
- 4.5.7. The opponent team will gain score if the team cannot set the robot

to deliver next service within 15 seconds from the referee blows the whistle after the previous score has been confirmed. In this 15 seconds, team members are allowed to enter the contest field and touch their robots including to maintain the preload shuttle(s) that should be loaded.

4.5.8. If the team should committed act of violations mentioned in the rulebook, opponent team will gain score.

4.6. Win and loss of the game

4.6.1. The team which gains 5 points first will win the game.

4.6.2. If the score reached draw of 4-4, the team which scores 2 points first will win the game.

4.6.3. If the score reached draw of 6-6, the winner will be decided by the following order;

4.6.3.1. The team which hit greater number of shuttle when the team gained score.

4.6.3.2. The team with higher successful rate of services.

4.6.3.3. The team with less number of warnings.

4.6.3.4. To be decided by the judge panel.

4.7. Timeout

4.7.1. Each team can take 1 timeout per game.

4.7.2. The duration of timeout is 30 seconds.

4.7.3. Teams cannot take timeout while the service is being delivered and point is yet to confirm.

4.7.4. Timeout can be taken only if the team said to referee 'Timeout' and the referee grants it.

4.7.5. During timeout, both teams are allowed to enter the field and touch their robots including maintaining the preload shuttle(s) that should be loaded.

4.7.6. After timeout is finished and referee blows whistle, the team must deliver a service within 5 seconds.

5. **CONTEST FIELD**

5.1. The contest field is rectangle of 8,500mm×16,400mm and it is surrounded by a wooden fence. Inside the field, badminton's doubles court will be laid.

5.2. The height of the net from the surface of the court is 1,524mm in the middle, 1,550mm on the sideline of the doubles court.

5.3. The same net and support pole used in badminton game will be used.

5.4. As for details of the field and materials, please refer to attached sheet.

6. ROBOT

- 6.1. Each team must make two robots.
- 6.2. Robots can be manual or automatic.
- 6.3. Robots cannot be separated.
- 6.4. Operation of the robots
 - 6.4.1. Team must operate their robots from outside of the contest field.
 - 6.4.2. The maximum number of robot operator is two.
 - 6.4.3. The robots can be operated by wire or wireless. But only one robot can be operated via cable.
- 6.5. Wireless communication
 - 6.5.1. The method of wireless communication is limited to following;
 - 6.5.1.1. Bluetooth (IEEE802.15.1x After Ver2.0x No indication of class),
 - 6.5.1.2. IR ray,
 - 6.5.1.3. sound, sonic wave,
 - 6.5.1.4. visible radiation.
 - 6.5.2. Basic rules for wireless communication
 - 6.5.2.1. Please follow the guidelines of the Contest Committee
 - 6.5.2.2. The use of wireless/radio wave device which will affect on other teams and run of the contest is prohibited.
 - 6.5.2.3. The use of wireless communication systems other than under '6.5.1' is prohibited.
 - 6.5.2.4. Please use wireless devices that comply with the law of the participating country and host country.
 - 6.5.3. The two robots of the team are allowed to communicate. However the method of communication must be mentioned under 6.5.1.
 - 6.5.4. Wireless control could cause troubles in actual use. Please take necessary measures against interference to promote smooth run of the contest.
- 6.6. The maximum dimension of a robot when fully extended excluding the racket must fit in a cylindrical tube with diameter of 1,200mm and height of 1,500mm.
- 6.7. The weight of each robot must be under 25kgs. However, if the robot is controlled by cable, the weight of the cable and controller will be included in the total weight.
- 6.8. There is no limit in the number of rackets that each robot can hold.
- 6.9. Robot must not jump using propellers.
- 6.10. The two robots must fit in the robot box with dimension of 1,600mmW

X 1,000mmD X 1,400mmH for shipping.

- 6.11. The voltage source used in the robot must not exceed 24 volts.
- 6.12. It is allowed to operate robot using compressed air filled in PET bottle and so on. However it must be under 6 bar of compressed air.
- 6.13. It is strictly prohibited to use dangerous energy source such as high pressure gas and explosives.
- 6.14. When using a laser beam, it must be less than Class 2 laser and used in a way that will not harm anyone in the venue, equipments and contest field.
- 6.15. Robots must be designed in the way that the rubber (or similar) bumper surroundings come in contact first with the object in case of a crash.

7. STANDARD OF THE RACKET

- 7.1. Please use the commercial product racket that has been made based on the regulations set by the Badminton World Federation.
- 7.2. The purchased racket shouldn't be transformed. However, the handle of the racket or shaft can be remodeled so that it won't be detached from the robot during the game.
 - 7.2.1. When remodeling, please take safety measures so that the racket doesn't fly away or the shaft doesn't come off.
 - 7.2.2. Please attach the racket using plural methods in case one fixing should be broken the racket doesn't fly away.

8. STANDARD OF SHUTTLE

- 8.1. Please use the class one official shuttle of the World Badminton Federation.
- 8.2. The shuttle used in the game must fall 530-990mm before the back boundary line when it is hit by underhand stroke with full strength from the back boundary line.
- 8.3. Because the flight characteristics differ according to the season and area, great variety of shuttles are available in the market. Please use shuttles that meet requirement under '8.2' from the practice phase.

9. VIOLATIONS AND DISQUALIFICATION

- 9.1. The following actions will be regarded as violations and 1 point will be given to the opponent team.
 - 9.1.1. Team member or robot (including racket) to enter opponent's field (including its space above) after the service is delivered and before the point is fixed.

- 9.1.2. Team member and robot (including racket) to touch opponent's robot.
- 9.1.3. Robot (including racket) to touch net or its support pole.
- 9.2. The following action will lead to disqualification and the opponent team will win with score of 5-nil.
 - 9.2.1. Repeating the act in 9.1.1 twice.
 - 9.2.2. Racket is detached from the robot.
 - 9.2.3. Damaging the contest field.
 - 9.2.4. Team or someone related to the team to omitting interference radio wave.
 - 9.2.5. Changing the shape of the shuttle intentionally.
 - 9.2.6. An act against fair-play spirit

10. OTHERS

- 10.1. For any other behavior not specified in the rules, please follow referee's decision.
- 10.2. Any amendments to the rules by the Contest Committee will be announced and updated as the FAQ on the official website.
- 10.3. All robots must pass dimension, weight and safety check in order to take part in the contest.
- 10.4. There will be extra lights in the field for recording the event for TV broadcasting.
- 10.5. On the previous day of the contest, all teams will be given a time slot by the Contest Committee for test run at the actual contest field. Teams must show all the function of the two robots.
- 10.6. When requested by the Contest Committee, participating teams must submit information on their robot (such as mechanism and function) in the form of video and so on. The Contest Committee will verify whether each robot is made in accordance with the rules through screening the videos in advance of the shipment of the robots.

11. QUESTIONS REGARDING THEME AND RULES

- 11.1. Questions regarding contest rules shall be addressed by email to following person in English:

Dr. Endra Pitowarno

Electronic Engineering Polytechnic Institute of Surabaya - INDONESIA

Tel: +62315947280 ext. 4179

Mobile: +628123030162

Email: epit@eepis-its.edu

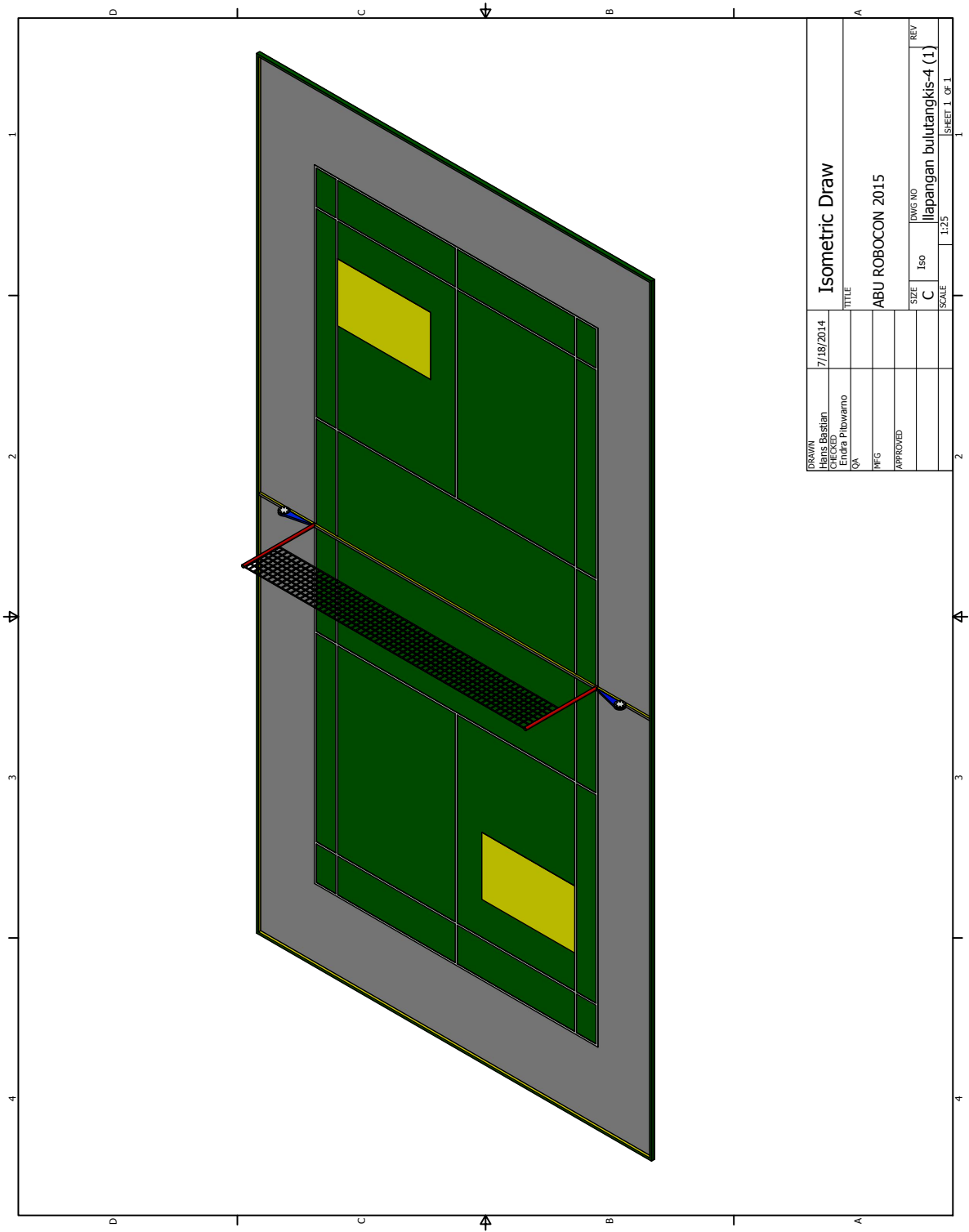
APPENDICES

A. Materials and Colors of Contest field

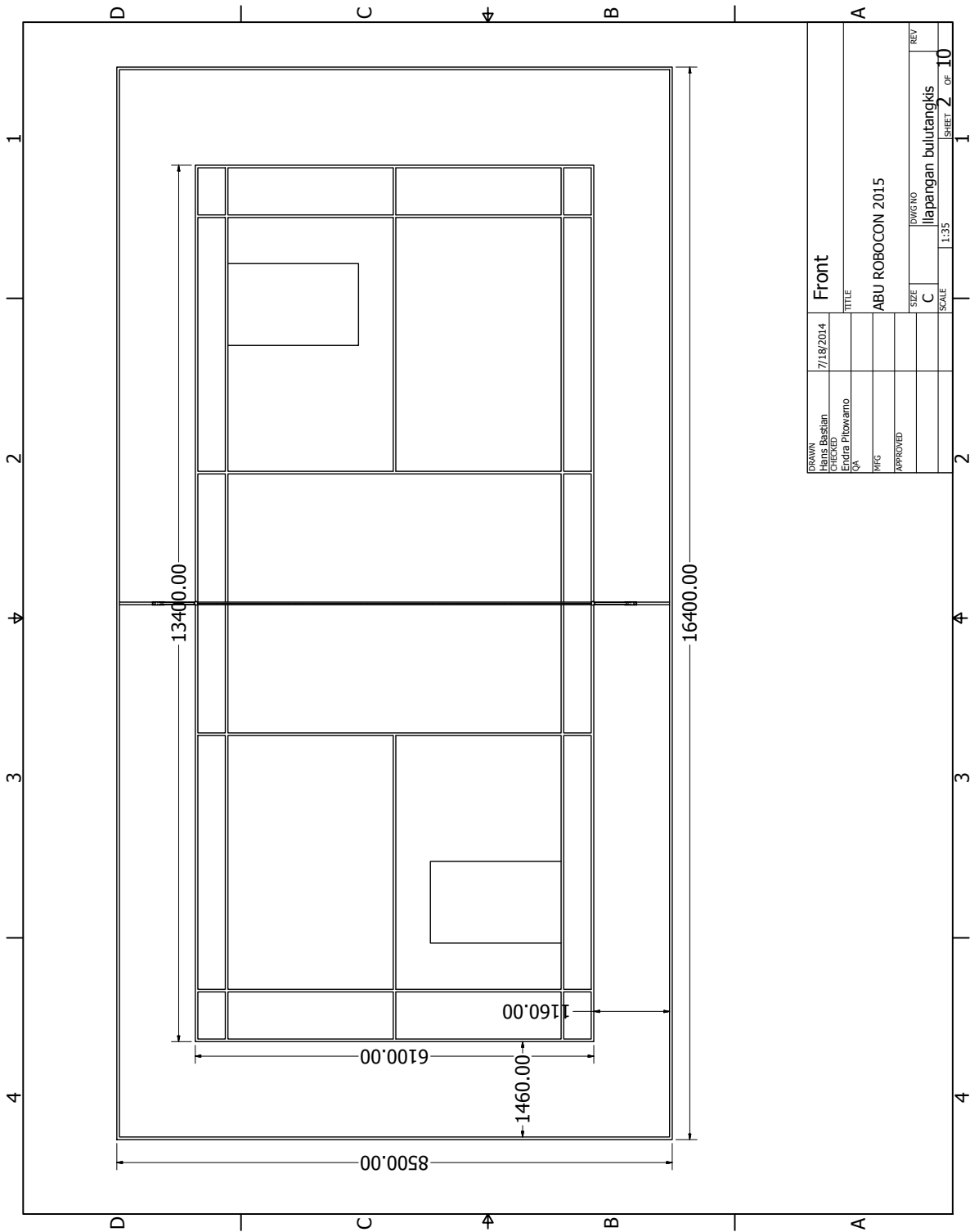
No	Description	Material	Color		
1	Serve Drop Zone (yellow)	painted plywood	R=255	G=255	B=0
2	Main court (dark green)	painted plywood	R=0	G=102	B=0
3	Grey Area (grey)	painted plywood	R=160	G=160	B=160
4	Fence	painted plywood	R=160	G=160	B=160
5	White lines	painted plywood	R=255	G=255	B=255
6	Net & Pole	Standard badminton Net & Pole			
Note: please use thick plywood (min. of 20mm) and non-shiny wall paint.					

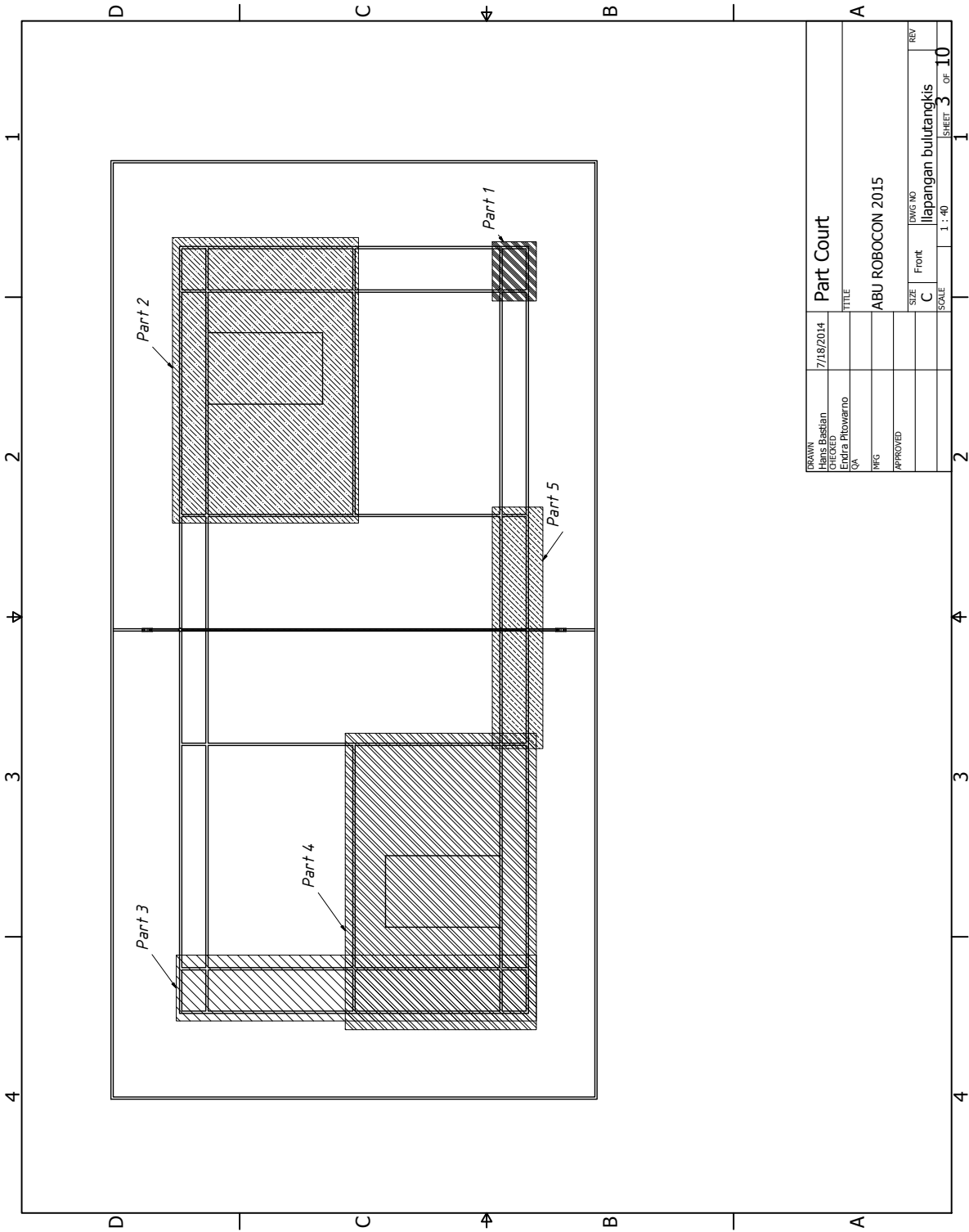
B. Contest field

(Note: All measures in millimeters)

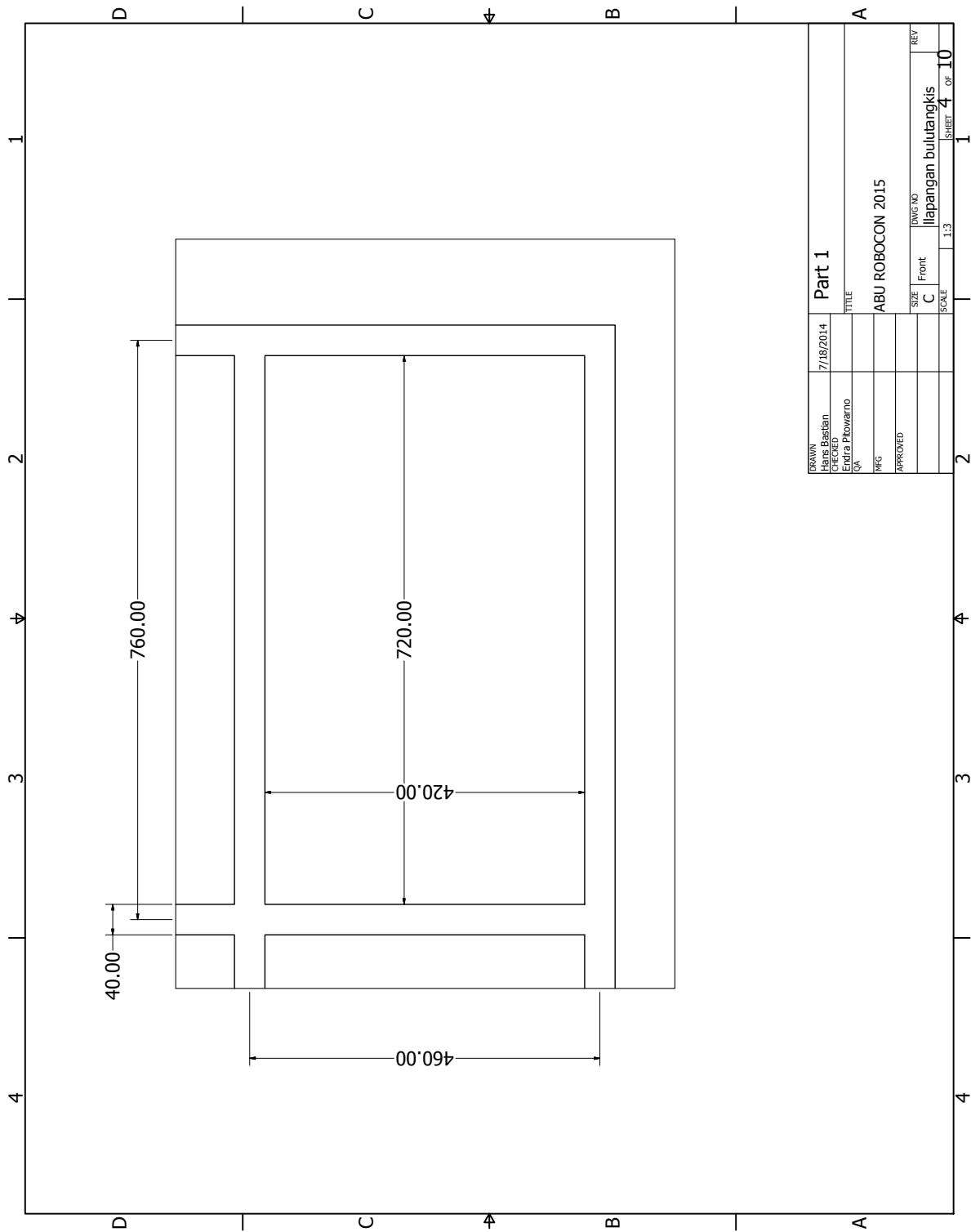


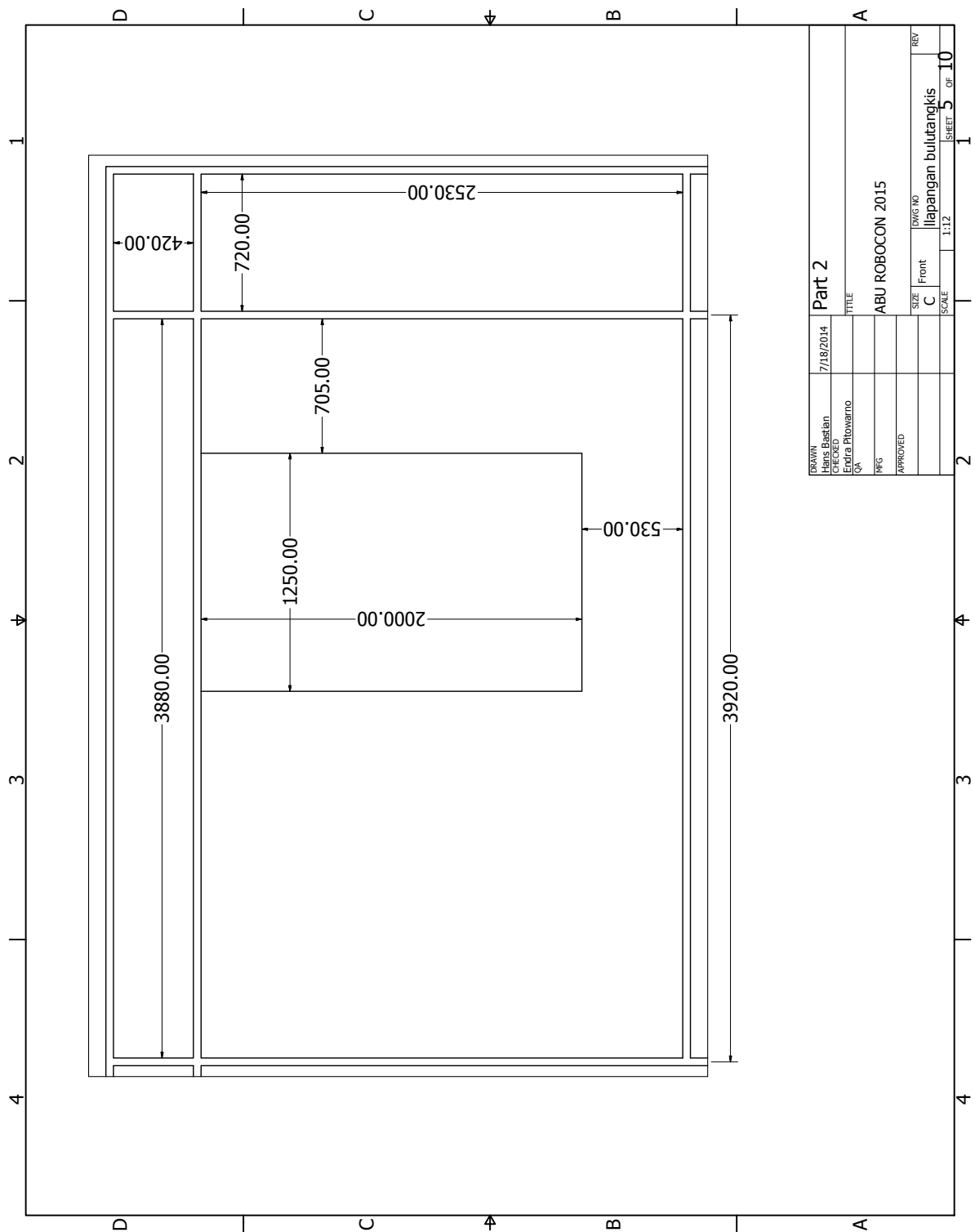


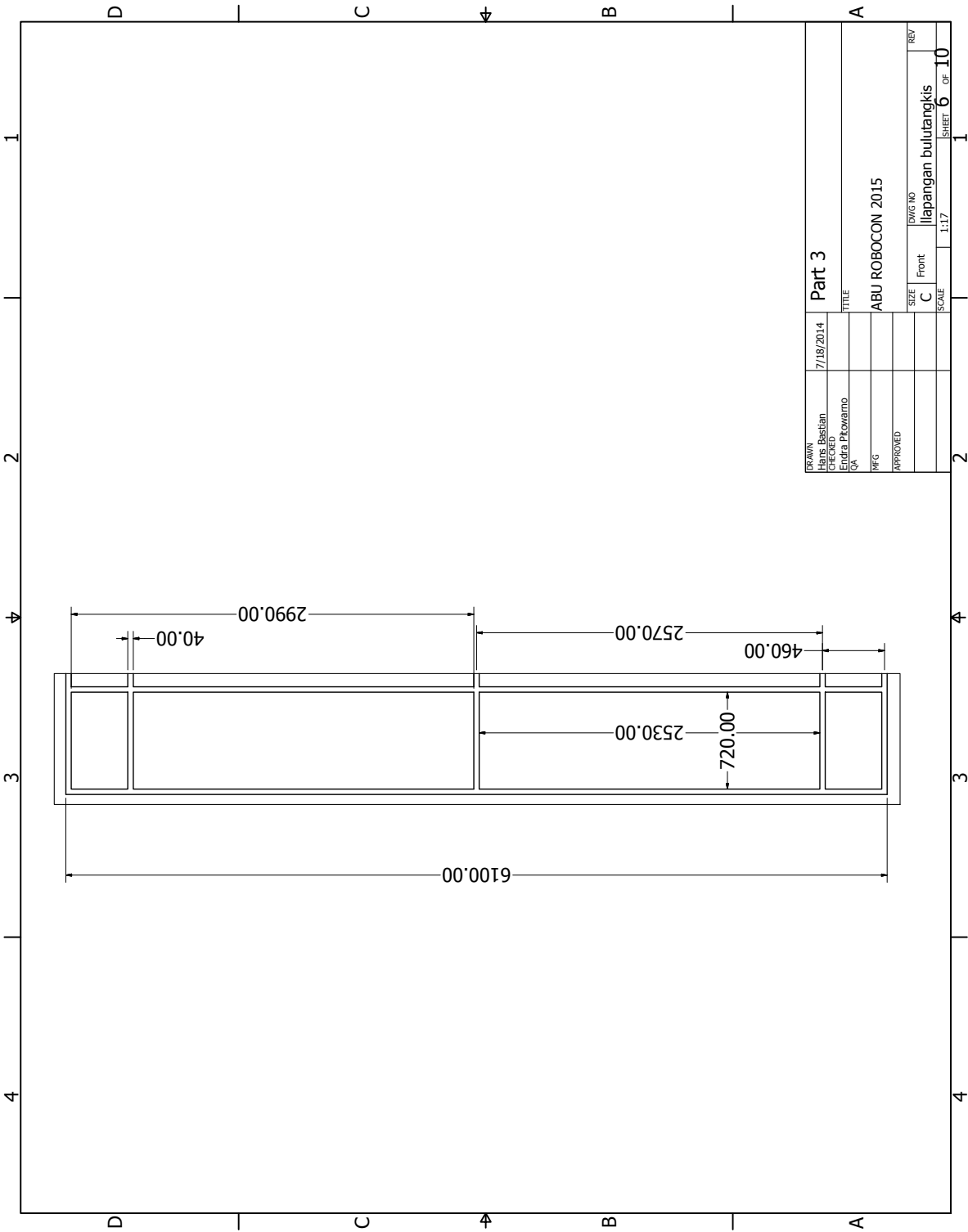


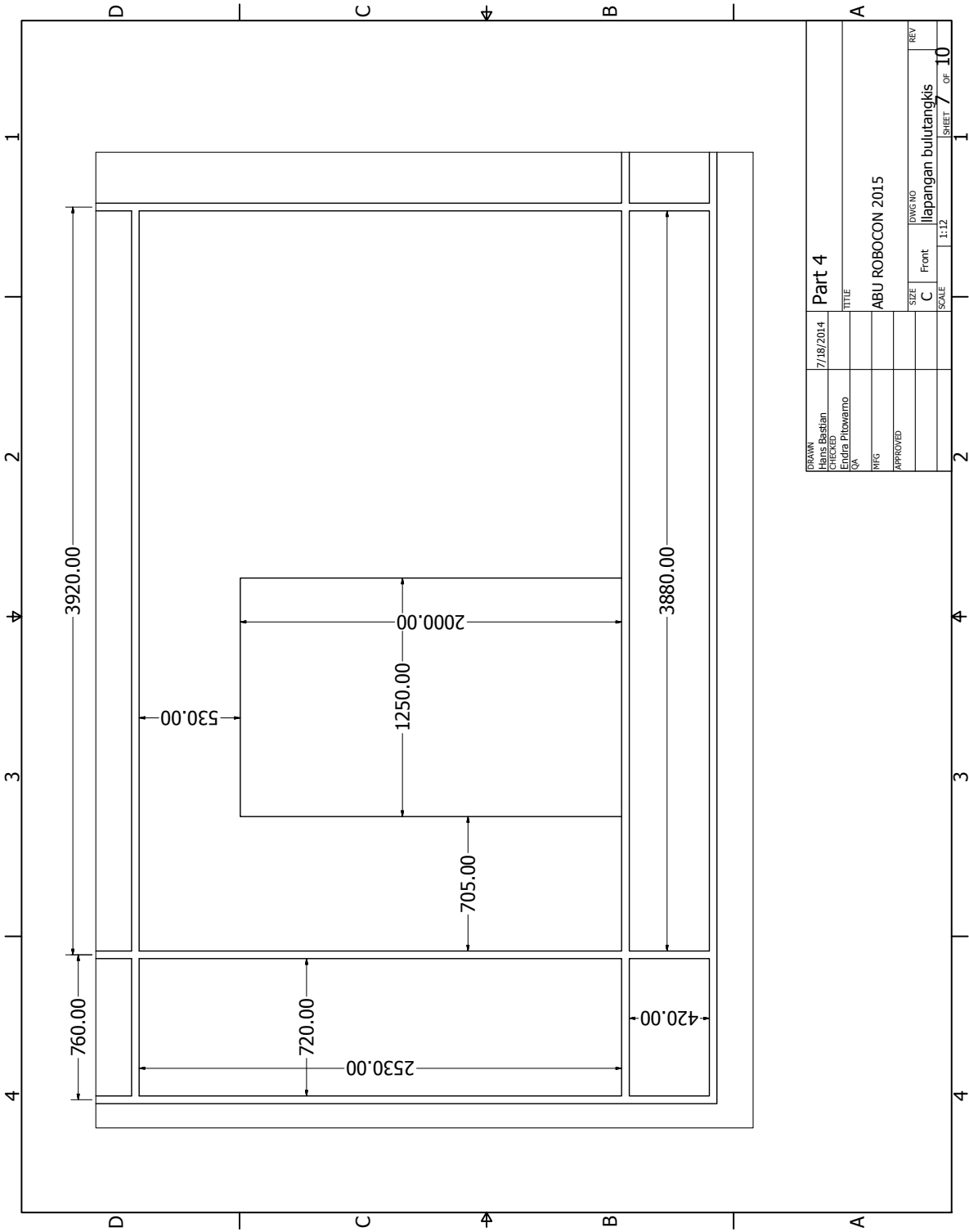


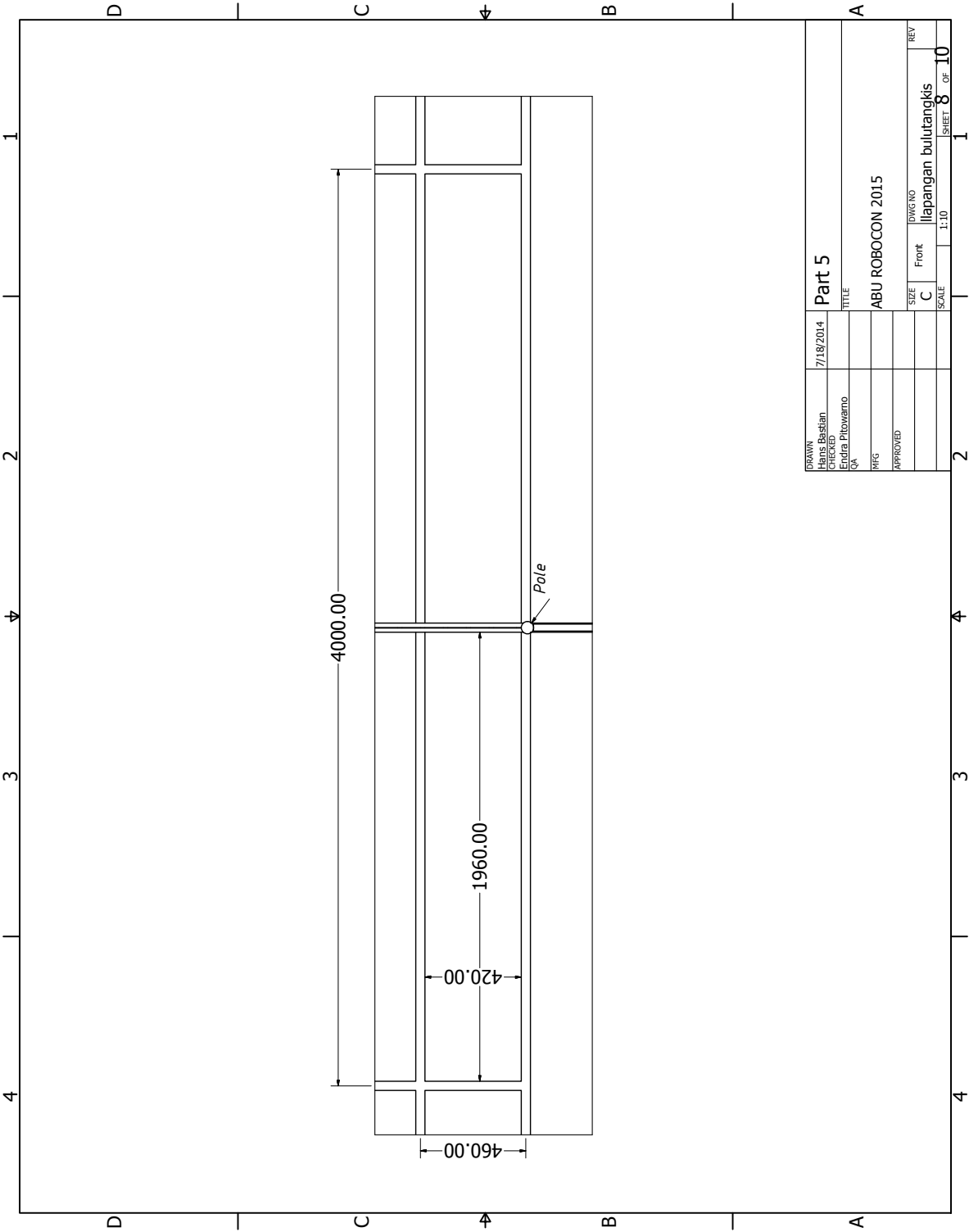
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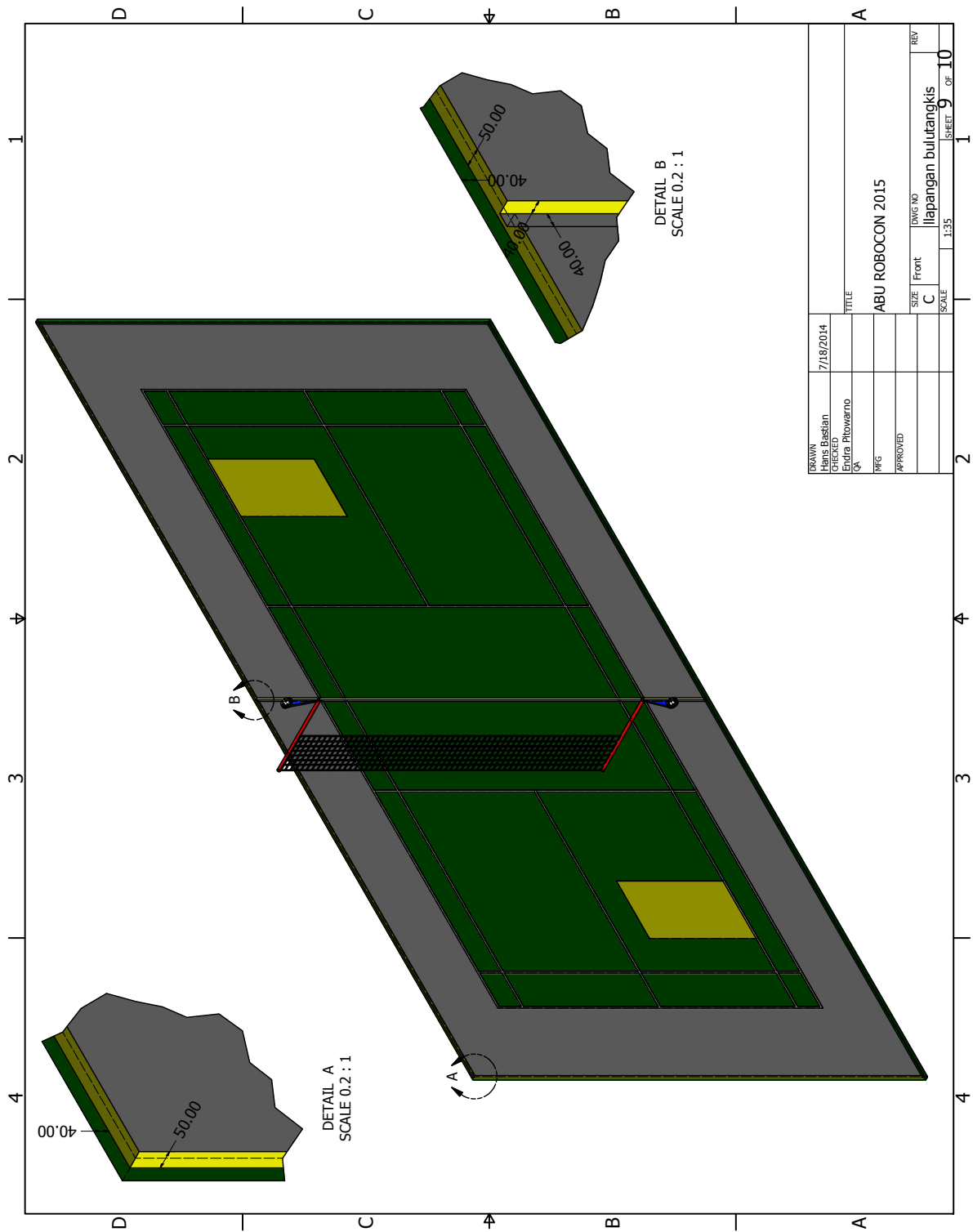


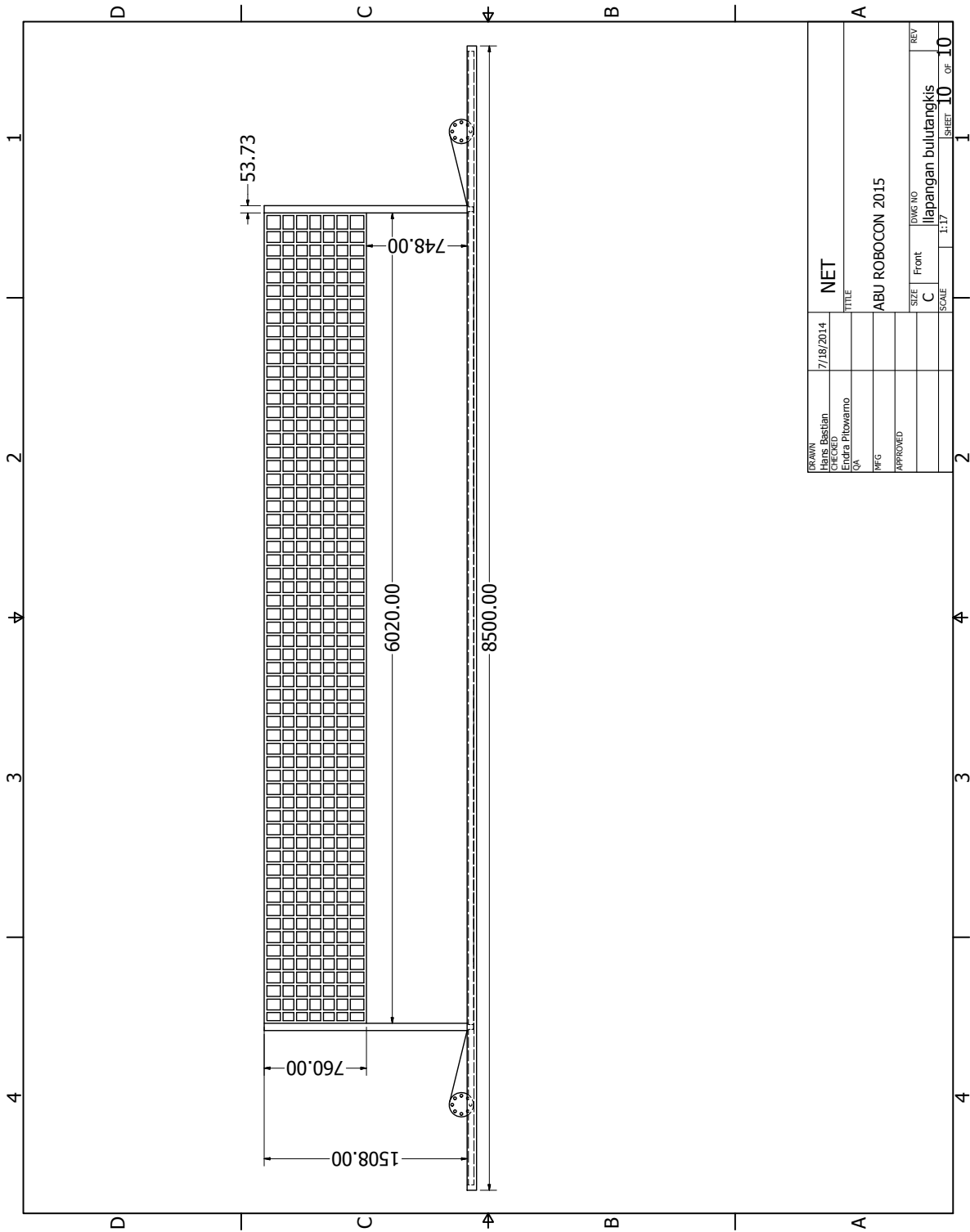












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REVISION		
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