

ABU ASIA-PACIFIC ROBOT CONTEST 2008, PUNE, INDIA

ABU ROBOCON 2008, PUNE, INDIA

THEME AND RULES

Last update: 15th August 2007



G O V I N D A

Introduction

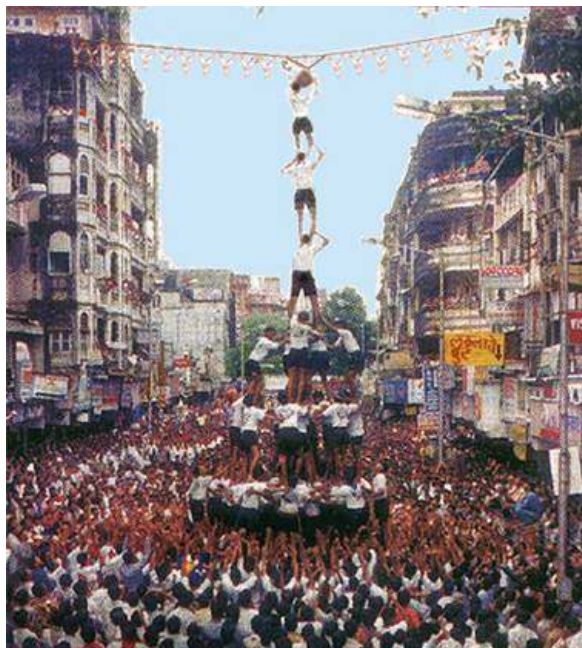
The contest theme is based on Indian mythology related to Lord Krishna (a Hindu deity) and the festival of Dahi-Handi, celebrated annually in northern part of India.

Born as a prince and brought up into a cowherd family, **Krishna** is often referred to as "**Govinda**".

As children, **Govinda** and his friends used to raid kitchens in search of milk, butter (Makhkhan) and cheese (Paneer). They also used to tease young girls (Gopis) carrying pots (Matka) filled with water, milk, butter, or cheese on their heads.

A common practice in rural India is to suspend these pots (containing Cheese, Butter and Milk) from beams high in the ceiling out of reach of cats. During the day when the men were busy in the fields and the womenfolk busy with outdoor chores, the naughty and adventurous **Govinda** along with his band of friends would form a human pyramid to reach these pots and help themselves to the contents.

The Festival of “Dahi-Handi”



During this festival, large earthen pots filled with milk, curds, butter, honey, fruits and coins are suspended at a height of 20-40 feet from the ground.

Young men and boys (**Govindas**) form a human pyramid by standing over each other's shoulders.

When the pyramid is tall enough, the topmost person in the pyramid would reach out and break the pot to claim its contents as well as the currency notes tied to the rope by which the pot hangs. This prize money is distributed among those who formed the human pyramid.

Game and Rules

“The Objective”

Two (2) opposing teams (a Red team and a Blue team) will operate Manual machines and Autonomous machines and attempt to get at the pots of butter placed at a height and remove the large cube of Butter (Makhkhan) from the bowls. A few of the machines would also attempt to “Steal” the Earthen Pots (Matkas) containing balls of Cheese (Paneer) being carried by the Young Girls (Gopis).

Points are earned when the Butter is removed from the Bowls placed at a height. Points could also be earned when a Pot and/or Cheese is transferred to a Basket.

The team which picks up all the three butter cubes directly from the bowls and holds them in the air will be declared “GOVINDA” (the winner) and the game will be over.

If no team becomes “GOVINDA”, the team which accumulates more number of points within the specified time of three (3) minutes will be declared as the winner.

Definition of words and their representation in the game:

Words in bracket are translation in Hindi language

1) Butter (Makhkhan)

Butter is represented by a 200 mm cube of low density polystyrene painted Yellow for the Central Bowl. For the Side Bowl, the cube is of the same size and is painted White.

**2) Earthen Pot (Matka)**

A hollow thin walled cylindrical Pot made up of light weight plastic material with a wide mouth on the top.

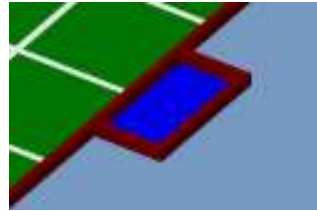
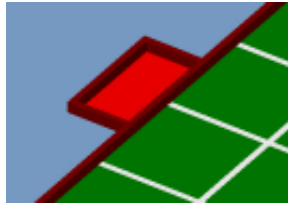
**3) Cheese (Paneer)**

The Cheese is represented by a light weight miniature basket ball which rests on the mouth of the pot with most of it visible above.



4) Basket (Tokri)

The rectangular area on the game field surrounded by a 50 mm wall. Pots and Cheese are to be deposited here. The color of Basket is Red for Red team and Blue for Blue team. There are two (2) Baskets for Red team and two (2) Baskets for Blue team.



5) Central Bowl (Handi)

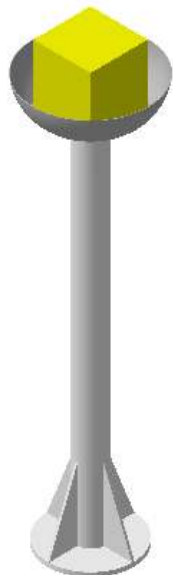
This Bowl is placed in the centre of the game field. Yellow colored Butter cube is placed in it.

6) Side Bowl

There are two (2) Side Bowls, one in each half of the game field. White colored Butter cubes are placed in these Bowls.

7) Girls (Gopies)

The Girls are carrying Pot containing Cheese on their head. Girls are represented by towers with provision to rest the Pot and Cheese on the top.



Central Bowl



Side Bowl



Girl

1.0 Teams

1.1 Each team shall comprise of four (4) members consisting of three (3) students and one (1) instructor, all from the same university, polytechnic or college. Only the three (3) students are permitted to enter the Game Field.

1.2 Team members must be enrolled in their University/Polytechnic/College at the time of the international contest. Exceptions to this rule are those who were enrolled in a University /Polytechnic /College at the time of the domestic contest.

1.3 Postgraduate students are not eligible to participate in the competition.

2.0 The Game Field with various Objects: (Refer Figs. 1, 2 and 10)

The game is played on a game field (sized 14500 mm x 13000 mm), which is surrounded by a 100 mm high and 30 mm wide wooden wall. The floor of the game field is made of 2 mm thick vinyl sheet. The field consists of a Manual Area in pacific blue color, an Autonomous Area in green color and Common Areas colored red and blue for respective team.

2.1 Manual and Autonomous Areas

The Manual machines can move freely in the Manual Area but cannot enter the Autonomous Area. The Autonomous machines can move freely in the Autonomous Area but cannot enter the Manual Area.

The Autonomous Area is H-shaped (overall size 9500mm X 8000mm) and surrounded by a wooden wall of 50 mm height and 30 mm in width. There is a grid of lines in the Autonomous Area and these lines are made of 30 mm wide White, non-shiny tape. (Refer Figs. 1, 2 and 10).

2.1.1 Manual machine Start zone

Manual machine Start zone is a square (1000 mm x 1000 mm) and is located

in the Manual Area. There are two (2) Manual machine start zones. One, colored red, is for the Red team and the other, colored blue for the Blue team.

2.1.2 Basket

The Basket is a rectangular area (500 mm x 250 mm). Pots and Cheese “Stolen” from the Girls are deposited here. There are four (4) such Baskets and each of these Baskets is surrounded by a 50 mm high and 30 mm wide wooden wall. The Basket colored Red belongs to Red team and colored Blue belongs to Blue team.

2.1.3 Autonomous machine Start zone

Autonomous machine Start zone is a square (1000 mm x 1000 mm) and is located in the Autonomous Area. There are two (2) Autonomous machine Start zones. One, colored red, is for the Red team and the other, colored blue for the Blue team.

2.1.4 Common Area

The Common Area for each team (2000 mm x 1500 mm) has a fence of 50 mm height and 30 mm width along its three (3) sides. The Common Area has white grid lines as per Fig. 1 and 2. Red Common Area is for Red team and Blue Common Area is for Blue team.

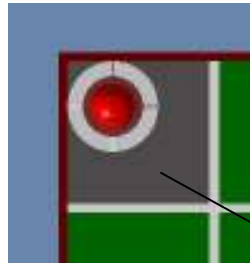
2.2 Objects

2.2.1 Girls

As per Fig.1 and 2, the Girls stand at four (4) corners of each half of Autonomous Area. There are eight (8) Girls in total. Each Girl is placed in at the corner of 500 mm x 500 mm Grey square. Each Girl is carrying Pot with Cheese ball. The top of the Cheese ball is at a height of 750 mm from the surface of the game field.

2.2.2 Grey square around the Girls

Each Girl is placed in the corner of 500 mm x 500 mm. Portion of the Manual machine can enter the air space above this Grey Square. The Manual machine cannot touch the floor in this Square.



Grey Square

2.2.3 Central Bowl (Fig.3)

Central Bowl is in the centre of the game field. The Bowl is fastened to the top of tower. The Butter cube with Yellow color is placed in this Bowl. The top surface of this cube is at a height of 1500 mm from the floor of the game field.

2.2.4 Side Bowls (Fig.3)

There are Two (2) Side Bowls in the Autonomous Area. Bowls are fastened to the top of towers. Each of these Bowls carries one White Butter cube. The top surface of these cubes is at a height of 750 mm from the floor of the game field.

2.2.5 Pot (Fig. 4)

The weight of pot is 430g (± 20 g). The pot is to be painted with brown plastic paint all over.

2.2.6 Cheese (Fig. 5)

The diameter of cheese ball is 150 mm and weight is 150g (± 20 g). For material and surface texture refer the sample provided. Air pressure in the ball should be maintained so that it bounces to 750 mm (± 30 mm), if dropped from height of 1000 mm on a concrete surface.

2.2.7 Butter (Fig. 6)

Each butter will be made up of a 200mm cube of low density polystyrene. The butter cube painted Yellow will be placed in Central Bowl and the butter cube painted White will be placed in each Side Bowls. The weight of each Butter cube is 130g (± 20 g). The polystyrene density is 16 kg per cu. Meter.

3.0 Machines

Each team must design and construct by itself Manual and Autonomous machines to compete in the contest. Each team is permitted to use only one (1) Manual machine and three (3) Autonomous machines.

(See section 3.5 for weight restriction)

3.1 Manual machines

3.1.1 The Manual machine could be operated through a cable connected to it or remote control using infrared rays, visible rays or sound waves. Wireless radio control is not permitted. Operators are not permitted to ride on their Manual machine.

3.1.2 When operating via cable, the point where the cable is connected to the machine must be at least 900 mm above the ground. The length of the cable from the Manual machine to the control box should at least be 1000 mm or more but not exceed 3000 mm.

3.1.3 When in the Manual Starting zone, just before the game begins the size of the Manual machine **cannot exceed** (1000mm L x 1000mm W x 1000mm H). Once the game begins the Manual machine may change its form but the size of the Manual machine **cannot exceed the size of a cube of 1500 mm** during the game.

3.1.4 Manual machines are not permitted to split into Two (2) or more units at the start of the game as well as during the game.

3.1.5 Only one (1) member of each team is allowed to control the Manual machine in the game field.

3.1.6 Team members are not allowed to touch the Manual machine once the game has begun.

3.1.7 Manual machines are permitted to operate in the Manual Area and Grey Square, and, under certain conditions, (see section 4.2.2) in their own Common Area. These machines cannot enter the Autonomous Area.

3.1.8 No part of the Manual machine or its operator can intrude into the Autonomous Area and the opponent's Common Area as well as opponent's Basket including the space above.

3.1.9 A Manual machine is permitted to come into contact with its own team's Autonomous machines only when it (the Manual machine) is in its Common Area.

3.1.10 Manual machines are not permitted to touch any of the opponent's Manual and Autonomous machines.

3.1.11 When Manual machines of the opposing teams interfere with each other, the referee will decide and redirect the machines appropriately.

3.1.12 Space for pasting stickers /tags (by Organizers of the contest) is to be provided on Manual machine. This space should be the size of 150 mm x 100 mm.

3.2 Autonomous machines

3.2.1 Autonomous Machines can enter Autonomous Area, Grey Square, its own Common Area and Basket including the space above.

3.2.2 Autonomous Machines cannot enter Manual Area (excluding Basket) and opponent's Common Area including the space above.

3.2.3 Every Autonomous machine must operate autonomously.

3.2.4 Starting up Autonomous machines

3.2.4.1 Only one team member is allowed to start the autonomous machines. The third member can assist in carrying, placing and aligning the machines.

3.2.4.2 Each team has 60 seconds to power up its Autonomous machines from the time the referee announces "Power up".

3.2.4.3 The Autonomous machines could then be "powered up or booted up" and be in a "sleep mode".

3.2.4.4 After the power up time of 60 seconds is over, the referee or announcer will count down from 5 and the game will start at the end of countdown.

3.2.4.5 Once the game starts, all Autonomous machines should be "started" one by one, and the task of starting all must be completed within 20 seconds from the "start signal".

3.2.4.6 Each Autonomous machine must be "started" from the "sleep mode" through a single operation only.

3.2.5 After all the actions of starting Autonomous Machines are completed or 20 seconds after the starting signal, the team members responsible for handling and starting the machines must leave the game field immediately.

3.2.6 Once the Autonomous machines start, team members are not permitted to touch the machines except in the case of “retry”.

NOTE: All participating teams are requested to carefully study Rules 3.2.7, to 3.2.11 and understand the implications of the same before they plan their strategy and the designs of their machines.

3.2.7 The entire set of Autonomous machines of a team should fit within a **cube of 1000 mm** before the game begins and when the machines are in the Autonomous Start zone.

3.2.8 Each autonomous machine's size and form may undergo a change during the game, but each machine should fit into a **cube of 1350 mm** thereafter. Each autonomous machine should not exceed this limit during a game.

3.2.9 Autonomous machines cannot split or separate into two or more units.

3.2.10 The number of Autonomous machines is limited to three (3) maximum.

3.2.11 Two (2) or more Autonomous machines touching each other in the start zone will be considered as one machine.

3.2.12 Space for pasting stickers /tags (by Organizers of the contest) is to be provided on all Automatic machines. This space should be the size of a post card. (150 mm x 100 mm)

3.3 “Retry” of Autonomous machines.

3.3.1 For Autonomous machines, a “Retry” is permitted once per game for each team.

3.3.2 Autonomous Machines granted retry must be started by single operation one by one. When the Autonomous Machines are in the Start Zone, they should satisfy the conditions mentioned in 3.2.7, 3.2.10 and 3.2.11

The team members who are responsible for handling and re-starting Autonomous Machines must leave the game field immediately once the action of restarting is completed or after 60 seconds from a Retry is granted by a referee.

3.3.3 Retry will not be granted for the Autonomous machines which are holding cheese, pot or butter.

3.3.4 On “Retry”, no parts of the machines should be replaced, power sources of the machines should not be recharged. One cannot add a power source also.

3.3.5 When a “Retry” results in violation of the rules, it is up to the referees to rule on the situation, including the validity of the “Retry”.

3.4 Power Supply for Machines

3.4.1 Each team shall prepare its own power supply for all its machines.

3.4.2 Voltage of the electric power supply for machines shall not exceed 24V DC.

3.4.3 A Power supply that is considered dangerous or unsuitable by the Contest Committee shall not be permitted. When compressed air or springs etc are to be used they should be charged after the game starts using the power supply pre-mounted on the Machines.

3.5 Weight

All Manual and Autonomous machines including their power sources, cables,

remote controller and other parts of each machine shall be weighed prior to the competition. The total allowable weight of all machines and above accessories for each team to be used throughout the contest must not exceed 50 Kg. The total weight of 50kg doesn't include spare batteries with the same shape, same weight and voltage.

3.6 Machine specifications

Size and weight of each machine will be measured before the competition. Machines that are not made in conformity with this Rulebook will not be allowed to participate in the Contest.

4.0 The Competition

4.1 Matches

4.1.1 Each match shall last for maximum three (3) minutes.

4.1.2 The team which picks up all the three butter cubes directly from the bowls and holds them in the air will be declared "GOVINDA" (the winner) and the game will be over.

4.1.3 Otherwise, the team which scores the maximum points at the end of 3 minutes will be declared as the winner.

4.1.4 In case of tie, the winner will be decided as per the following order of priority

4.1.4.1 The team which has picked and held Yellow butter cube in the air till the end of the game.

4.1.4.2 The team which has picked and held two white butter cubes in the air till the end of the game.

4.1.4.3 The Team which has picked and held one white butter cube in the air till the end of the game.

4.1.4.4 The team which has captured more numbers of pots along with cheese balls.

4.1.4.5 The team which has captured more number of cheese balls

4.1.4.6 The team which has captured more number of pots.

If there is a tie after that also, the referee should decide the winner.

4.2. Competition Rules

4.2.1 Points are scored when Autonomous and Manual machines transfer the Pots and Cheese from the Girls to the Basket as follows.

4.2.1.1 Autonomous and Manual machines of Red team must transfer the Pots and Cheese to the Red colored Basket.

4.2.1.2 Autonomous and Manual machines of Blue team must transfer the Pots and Cheese to the Blue colored Basket.

4.2.1.3 Points are scored when Yellow and/or White Butter cube is picked up and held in the air by an Autonomous Machine.

4.2.2 The Manual machines cannot enter the Common Area (and assist an Autonomous machine) until they have transferred at least one (1) Pot or Cheese (or both) from the Girl to the Basket in order to enter the Common Area and assist an Autonomous machine.

4.2.3 Manual machines are NOT permitted to touch, remove or move the Pot or Cheese once they are placed in the Basket of the opponent's team color. There is a penalty if they do so.

4.2.4 Autonomous machines are permitted to steal or move Pots or Cheese placed in opponents Basket. Then they should deposit the stolen material in their own colored Baskets to earn points.

4.2.5 Manual Machines are not allowed to touch the Butter cube. Only the Autonomous Machines are permitted to handle the Butter cube.

4.2.6 Once Autonomous Machine picks up the Butter, it should make sure that it retains the Butter in the air till the end of the game.

4.2.7 An Autonomous machine of a team can touch its Manual machine only when its Manual machine is in the Common Area.

4.2.8 An Autonomous Machine can gain points by picking up Cheese or Pot or Butter that are dropped on the floor of its own Common Area or Autonomous Area. A Manual Machine can gain points by picking up Cheese or Pot that are dropped on the floor of the manual area, Grey Square, or its own Common Area.

If autonomous machine picks up the butter cube lying on the floor of its own common area or autonomous area and holds it in air and completes the other conditions for “GOVINDA”, it can gain full points for that, but the game will continue for 3 minutes and the winner will be decided on the maximum number of points earned by a team.

4.3 Scoring

4.3.1 A team gains points when it successfully collects Pots and/or Cheese into its own Baskets by its Manual / Autonomous machine or when Butter cubes from the Bowls are successfully picked up and retained in the air by an Autonomous Machine.

4.3.2 Points are awarded as follows:

- 4.3.2.1 Pickup and retention of Yellow Butter by Autonomous machine = 12 points
- 4.3.2.2 Pickup and retention of White Butter by Autonomous machine = 6 points
- 4.3.2.3 Presence of Pot with Cheese on its top in Basket = 3 Points
- 4.3.2.4 Presence of Pot in Basket = 1 point
- 4.3.2.5 Presence of Cheese in Basket = 1 Point

5.0 Violations and Deductions of Points

5.1 Once a game begins, the following actions will be regarded as violations and three (3) points will be deducted for each occurrence.

5.1.1 A violation occurs if a Manual machine touches Cheese or Pot placed in the opponent's Basket intentionally.

5.1.2 A violation occurs when a Manual machine or its operator enters, or a portion of machine or operator extends into the air space inside Autonomous Area and opponent's Autonomous machine start zone as well as the opponent's Basket's air space. The exception is Grey Square around the Girls where portion of machine can enter but not the operator's.

5.1.3 A violation occurs when Manual machine or its operator or any part of them touches the floor of grey square.

5.1.4 A violation occurs when a Manual machine touches its opponent's Autonomous machines.

5.1.5 Autonomous and/ or Manual machine cannot snatch the Butter Cube and/or Pot and/ or Cheese held by the opponent.

5.1.6 The act of intentionally dropping or changing the positions of butter cube, cheese, pot so that it becomes difficult for other team to score.

5.1.7 If above violations continue intentionally, three (3) points will be deducted for every five (5) seconds of duration of violation.

6.0 Disqualification

The following behaviors shall be considered for “disqualification of the team” by the referees for that particular match. 9 points will be deducted from the total score of the disqualified team for that match.

6.1 Causing or attempting to cause damage to the game field, the equipments on the field, or the opponent’s machines and the objects such as Cheese, Pot, Girls, Bowls and Butter.

6.2 Members of a team touching their own machines intentionally.

6.3 Manual machine or its operator intentionally blocking, touching or attacking the opponent’s Autonomous machine directly or / and indirectly.

6.4 Manual machine picks up or moves the opponent’s Pots and Cheese placed in the Basket intentionally.

6.5 More than one (1) False Start in a match (machines being started before the referee signals a start.)

6.6 Performing any act against the spirit of fair play and friendship between participating teams.

6.7 Persistently using the cable to guide or pull the Manual machine will lead to disqualification from the match.

6.8 Intentionally attacking the opponent's Manual machine with own Manual machine will lead to disqualification.

6.9 The team that does not follow the instruction or warning of the Referee will lead to disqualification from the match.

6.10 Autonomous Machine entering the opponent's Common Area or the space above it will lead to disqualification.

However if Autonomous machine moves or falls into the opponent's common zone by accident it should be removed immediately as per referee's instructions. (The referee is empowered to determine whether it is an accident or not.) Retry can be allowed after that.

6.11 Manual Machine or any part of it intentionally entering the opponent's Common Area or the space above will lead to disqualification.

6.12 Three violations would lead to disqualification from that match.

7.0 Safety

7.1 All machines must be built such that they will not harm the operators, the referees, and match officials, members of the audience, opponent's equipment and the game field. Explosives, fires and hazardous chemicals shall not be used.

7.2 To ensure safety, when using a laser beam, it must be less than a Class 2 laser, and used in a way that will not harm any operators, the referees, match officials, audience, opponent's equipment and the game field.

7.3 When using optical sensors teams must consider the fact that there will

be very bright lights on the game field for video recording and broadcasting purposes.

8.0 Others

8.1 For any other behavior not specified in the rules, referees are given full authority to make the decision and the decision is final in the event of a dispute.

8.2 Any amendments to these rules will be announced by the Contest Committee and be updated on website <www.roboconindia.com> under **FAQ**.

8.3 All teams are encouraged to decorate the machines to reflect the culture, aesthetics and styles of their respective countries.

8.4 All machines must be designed and made by student teams - ready made commercial machines will be disqualified from being used. Teams are **not allowed** to have sponsor's logo anywhere on the machine or on the uniform.

8.5 When requested by the Contest Committee, each participating country will be asked to provide information on their machines, including the videotape, which explains the structure and the movement of the participating team's machines. The Contest Committee will verify whether each participating machine complies with the rules through viewing the videotapes, prior to the shipment of the machines.

8.6 The allowable margin of error to the Objects in this Rulebook wherever not mentioned is $\pm 5\%$ both in weight and size.

9.0 Questions regarding theme and rules

Website: <www.roboconindia.com>

E-mail : <robocon2008@roboconindia.com>

10.0 FAQs

The “FAQ” shall be updated on <www.roboconindia.com/faq>

Robocon 2008’s Theme and Rules was drafted by the consultative council including these members:

Prof. C. Amarnath – Indian Institute of Technology, Bombay

Prof. Susmit Sen – Indian Institute of Technology, Kanpur

Prof. Subir Kumar Saha – Indian Institute of Technology, Delhi

Prof. Prakash Joshi – Maharashtra Institute of Technology, Pune

Prof. Anant Chakradeo – Maharashtra Institute of Technology, Pune

Prof. Chaitanya Kachare – Maharashtra Institute of Technology, Pune

APPENDIX

A1. MATCHES

The contest is played according to the following format:

Preliminary Rounds: Round robin within groups.

Winner from each group shall advance to the Quarter-Final.

Quarter-finals: Knock out matches.

Semi-Finals: Knock out matches.

Finals: Knock out match.

A2. AWARDS

Prizes shall include awards for the winners, runner-ups, best idea, best technology, and best design and ABU Robocon award, Sponsors' awards.

A3. COSTS of PRODUCTION and CARRIAGE

A3.1 Cost of Production

The ABU Robocon Organizing Committee shall provide USD 1000 as a subsidy for machine construction to each committee member organization.

A3.2 Cost of Carriage

A transport company, specified by the committee, will ship your machines to the playing venue in Pune, Maharashtra, India. Details will be announced later.

A4 Samples being sent to all the participating broadcasters

- 1) Cheese (Paneer) - A miniature basket ball of 150 mm diameter (One (1) sample)
- 2) Bowl for keeping Butter (Makhkhan) Cube (One (1) sample)
- 3) Vinyl sheeting (2 mm thick) color shades for Autonomous area, Manual area, Red and Blue Start zone, and Grey square.

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