



# MechaMania

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## Challenge Manual

Updated as of 16<sup>th</sup> September 2019

## Eligibility

- Participants must be 16 years old and below as of 31 December 2019.
- The maximum number of participants per team is 3.
- The minimum number of participants per team is 2.

## Playfield Design

- The playfield used is shown below, in Figure 1 and Figure 2

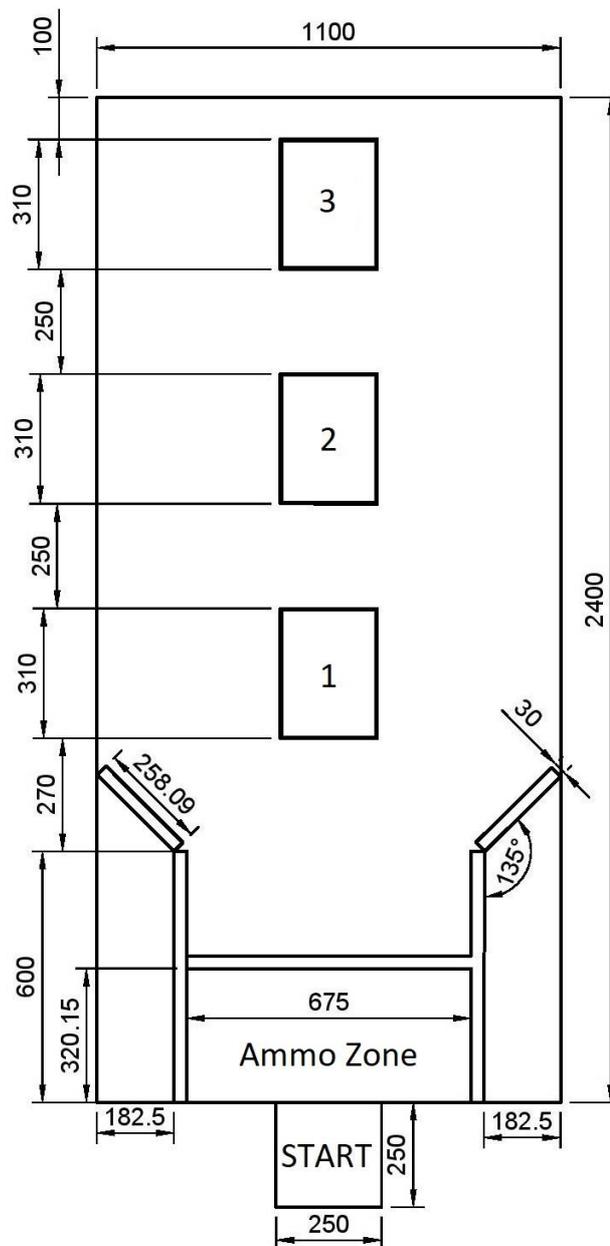
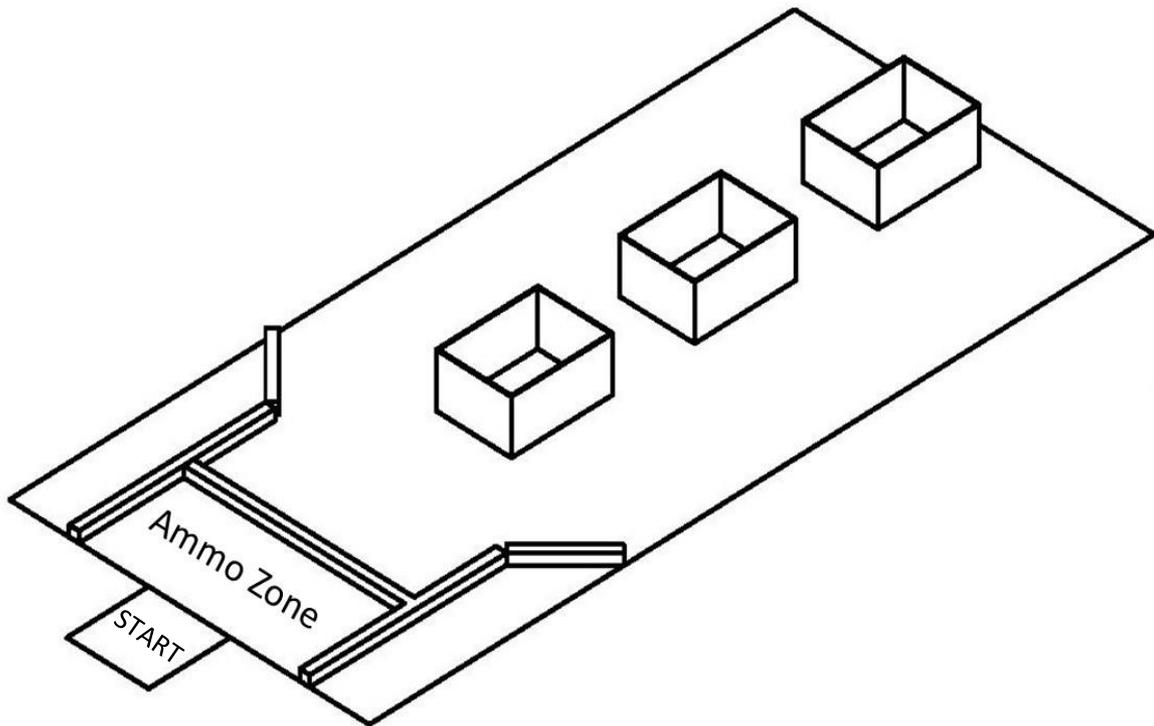


Figure 1: Top View of Playfield Layout



**Figure 2: Side View of Playfield Layout**

- The Start Area is 250mm x 250mm, and the Playing Area is 2400mm x 1100mm.
- The Playing area will be elevated at an angle of  $3^{\circ}$   ~~$32^{\circ}$~~  ( $\pm 1^{\circ}$ ) while the Start Area will not be elevated (flat on the ground).
- There are **3** Scoring Boxes positions, indicated by the shaded areas labelled 1 to 3 in Figure 1.

#### Scoring Box Layout and Design

- The Scoring Box's dimension is 310mm(L) x 230mm(W) x 150mm(H)
- The Scoring Box is modified from an A4 paper box (dimensions given above are inclusive).

#### Playfield Alterations

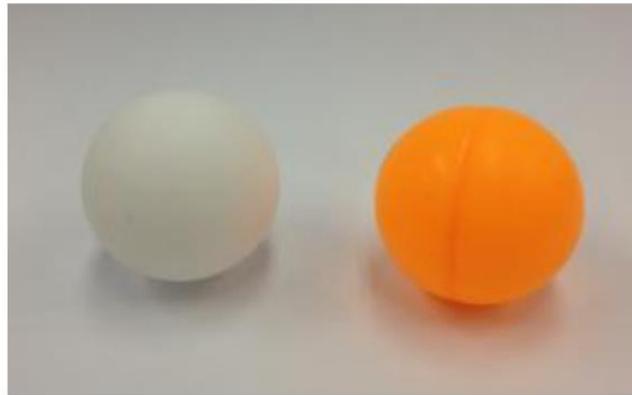
- Note that the width of the Playfield may be slightly wider than the illustration in Figure 1 ( $\pm 50$ mm). All Scoring Boxes will be centred accordingly.

## Game Play

- The robot will start in the Start Area.
- Robots are to deposit Scoring Objects into the Scoring Boxes, without leaving the Start Area throughout the duration of the Game.
- Teams may possess **ANY** amount of Scoring Objects **ON** their robot, regardless of type of Scoring Object. However, the robot may only shoot a **MAXIMUM** of 2 balls at a time.
- Scoring Objects that have been shot out from the robot are not allowed to be used again, unless with an exception where the Scoring Objects bounces back to the Ammo Zone without any interference from humans.
- Teams are not allowed to interact with their robot during the game, except to:
  - Reload the Scoring Object(s) onto their robot
  - Manually position their robot within the Start Area
  - Change program
- While teams are interacting with their robot, the robot must not be attempting to score at the same time.
- The time limit for each Game is **1 minute**.
- Each team is given **2 tries**. Teams are allowed to run their robot anytime during the whole duration of the competition until they have finished using up both their 2 tries.
- No more runs will be allowed after the duration of the competition even if the team have not used up their 2 tries yet.

## Round 1

- The Scoring Object that will be used is a **ping pong ball** and a sample is shown below in Figure 3:



**Figure 3: Sample of Ping Pong Balls used**

- Teams are to use the **99** ping pong balls given each Game to score points. Scores will be tabulated at the **end** of each Game.
- Objects that have been scored may not be removed by the team from the Scoring Basket or playfield during the course of the Game.
- Each Scoring Object A in a Scoring Basket will score points for the team, following the scoring table shown below:

Basket Position	Score per Scoring Object A
1	1
2	2
3	3

- The best score of the 2 tries will be taken, and the teams will be ranked accordingly.

## Ranking System

- The Overall Score for each individual award will be calculated by **taking** the **higher** score of the 2 tries.
  - For example: If Team A scores 80 points and expands 50 balls in 1<sup>st</sup> try, and score 70 points and expands 60 balls in its 2<sup>nd</sup> try, their Overall Score will be taken as 80 points and expanded 60 balls.
- Teams will be ranked from the highest Overall Score to the lowest Overall Score to determine the winners for each individual award.
- In case of teams with the same final score, the 2<sup>nd</sup> best score among the 2 tries will be taken into consideration.

## Awards

- This year under the MechaMania category, there will be 4 awards to be given out and each award will have 3 placings. The criteria for each award will be explained below.
  - **Best Marksmanship** goes to teams who have the highest overall score
  - **Rapid Fire Award** goes to teams who are able to shoot the most number of Scoring Objects into the Scoring Basket in the shortest amount of time.
  - **Best Consistency Award** goes to teams who are able to shoot the most number of Scoring Objects in a single Scoring Basket
  - **Best Mechanical Design** goes to teams whose robot displays strong durability, well application of gears and appealing aesthetic design.

## **General Rules**

- Only two team members are allowed at the playfield.
- The dimensions of the robot must not exceed 250mm x 250mm x 250mm during inspection and at the start of the run.
- After the run begins, there is no size restriction. However, the robot must remain within the confines of the Start Area.
- After the run ends, the team is to assist in the collating of the Scoring Objects if required.

- Teams are allowed to use any LEGO® part (e.g. parts from RCX, NXT or EV3 sets).
- Teams can use up to 4 motors (RCX, NXT or EV3), and only ONE RCX, NXT or EV3 brick.
- Teams are allowed to use any programming software to program their robots (e.g. Labview, RoboLab, NXT-G, EV3-G).
- Teams who fail inspection will be given 5 minutes to make adjustments on the spot. If the robot is still unable to pass the inspection, the team will be disqualified from the game.
- Referees have the rights to disqualify any team showing defiance or exhibiting an unacceptable behaviour.