

# ROBOT BATTLEFIELD

## 1. OBJECTIVE

Design a mobile robot to navigate through a minefield and obstacles to reach the predetermined destination in the shortest possible time.

## 2. RULES FOR THE COMPETITION

- 2.1 A maximum time of 3 minutes is allowed per match. Each match should have 2 entries.
- 2.2 Each robot will commence from its respective mid-span "START" position. When the 'Start' command is given it should proceed towards the predetermined destination [i.e. base line] located on the opposite side of the arena. No robot is permitted to enter the arena **5 seconds** after the match commences.
- 2.3 The first robot that completely crosses the 'finishing line' [i.e. Base Line] win and the match stops.
- 2.4 Once inside the arena, each robot has to navigate through a maze of mines and obstacles while observing the rules and regulations stated in 2.6 below. At the same time, it is permitted to prevent its opponent from reaching the finishing line by pushing it out of the arena or against any mines/obstacles.
- 2.5 When the Competition Time of 3 minutes is up and if both robots fail to reach the finishing line, they cannot proceed to the next level of competition.
- 2.6 A robot is disqualified and will be removed from the arena if it:
  - i) ventures completely beyond the arena boundary
  - ii) triggers a mine
  - iii) requires manual assistance or intervention for whatsoever reasons.
  - iv) remains within or touches any part of the penalty area, **20 seconds** after the match commences.No participant is permitted to step inside the arena. Helpers will retrieve stalled robots if human intervention is required.
- 2.7 Obstacles are considered as part of the maze and are rigidly held onto the ground.

## 3 INSPECTION OF ROBOT

- 3.1 30 minutes before the competition commences, all participants must submit their entries for inspection by a panel of judges. After which, all robots must be displayed on a designated table for public viewing.
- 3.2 Disqualification

After an entry has been submitted for inspection, no alterations, changes and /or modifications to their mechanical design, power supply and/or electronic circuitry are permitted before and/or during the competition without any permission from the judges. Failure to observe this ruling will subject participants with disqualification.

#### 4. ENTRY TO HIGHER COMPETITION LEVEL

- 4.1 The fixture for the preliminary, quarter-final, semi-final rounds is determined through drawing lots. Lots are re-drawn at every level of competition. All entries are paired based on the lots drawn. In case of odd number of entries then the entry occupying the last slot is permitted to make a run through the arena alone. (During and for **the preliminary [first] round only**, if all entries failed to make a successful run except for the 'odd entry' in the last slot, this 'odd entry' will not emerge immediately as the overall winner. The judges reserve the right to select one robot among the cohort to compete with this 'odd entry'. Should this 'odd enter' wins in this 'special' contest, it will be declared as the overall winner. Otherwise, it will only be awarded a special award.)
- 4.2 During the preliminary, quarter-final and semi-final rounds, if no robot manages to complete a successful run then no representation from that group shall advance to the next level of competition.
- 4.3 At the end of several rounds, if the number of remaining entries is four or less, then the following strategy is applied to determine the winners :

<u>Number of Finalist</u>	<u>Strategy</u>
<u>1</u>	Overall Winner. No further match needed
<u>2</u>	The faster robot that crosses the Finishing Line wins. And the remaining one automatically becomes the 1 <sup>st</sup> runner-up. [If both finalists fail to complete the run, a re-match is arranged after a 3-minute interval. If both fail again, then each will be awarded a consolation prize.]
<u>3</u>	Round Robin [Fastest run: 3 points, 2 <sup>nd</sup> fastest run: 1 point, Incomplete run: 0 point.] If no outright winner emerges then each finalist will make a run through the arena individually. The judging criterion is based on the fastest run time. That is, the finalist with the fastest run time will be the winner. Any finalist failing to complete the run will be awarded consolation prizes only.

#### 5. SPECIFICATIONS

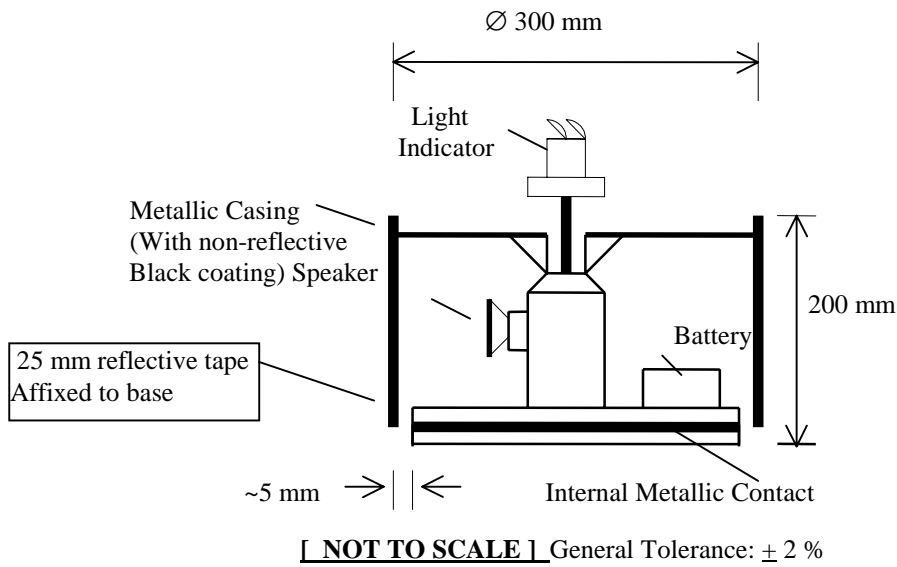
##### 5.1 Specifications of Robot

- i) Min. Dimensions : >300 mm [Length] x >300 mm [Width] x >150 mm [Height]
- ii) Weight : < 10 kg.
- iii) Power supply : Autonomous
- iv) No retro-reflective tape or coating on robot body.

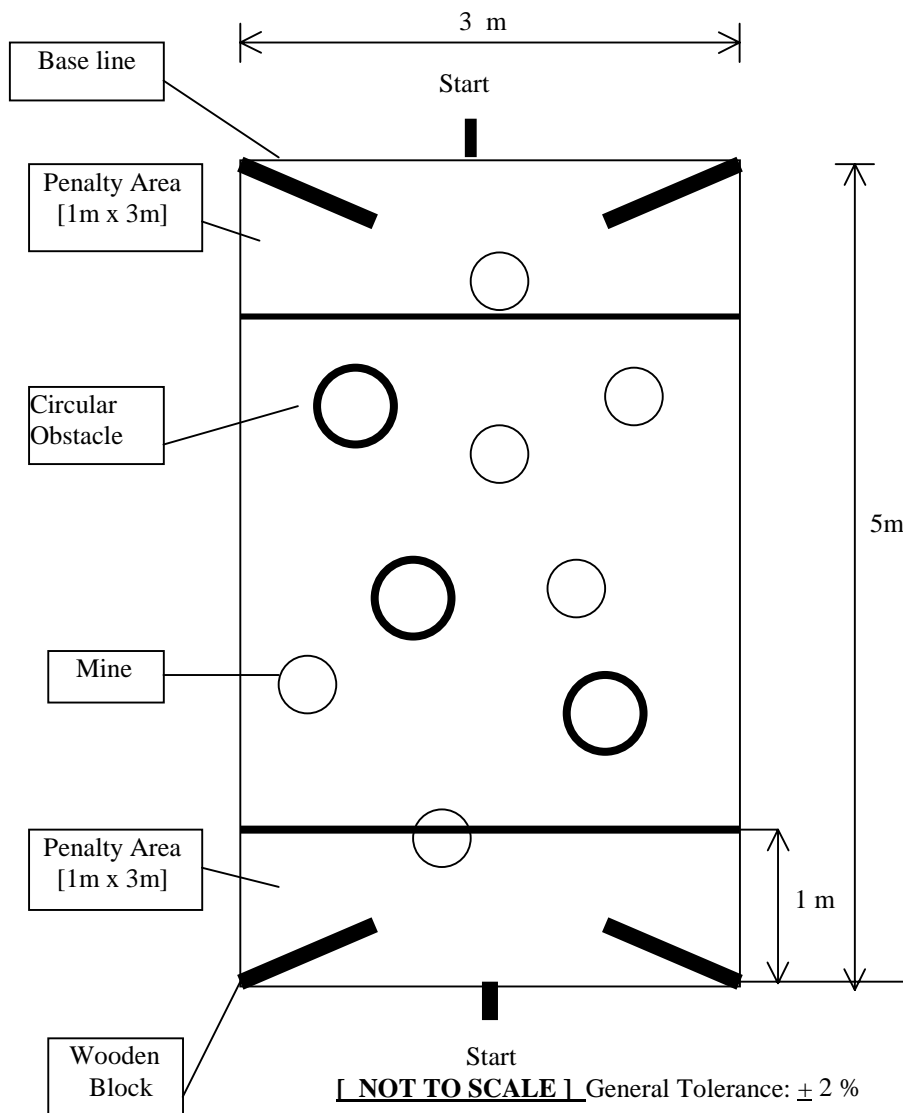
##### 5.2 Specifications of Mines (Figure 1)

- Dimension : Approx.  $\phi$  300 mm x 200 mm [ height excludes light indicator]
- Metallic Casing : Coated in black. Base affixed with 25 mm Scotch-lite Reflective Tape.
- Accessories : Built-in Lamp & Alarm system powered by battery
- Activation : When mine is disturbed, the lamp & alarm system will activate.

**Figure 1 : Dimensional Details of Mine**



**Fig 2 Details of Arena**



### 5.3 Specifications of Competition Arena [Figure 2]

- Area : 3 m x 5 m [Lined with black tapes (~ 50 mm width)]
- Floor & Light : Lighting & floor as per condition of designated Competition Hall.
- 'START' : The mid-span marking on opposite side of arena.
- Finishing Line: Base line on the opponent side.
- Nos of Mines : Minimum 6 mines per round.
- Distance between mines/obstacles: minimum 400 mm.
- Penalty Area : 1 m x 3 m from START position. Marked with masking tape.
- Obstacles : 3 circular BLACK plastic containers or less [Min.  $\phi$ 0.4 m x 0.5 m] randomly positioned. Four wooden blocks of approx. 750 mm x 50 mm x 50 mm are placed at all corners inclined at an angle of  $30^\circ \pm 2^\circ$  to the base line as shown in Figure 2.

## 6. CLONING

- 6.1 In accordance with the spirit of the competition, clones will only be awarded one prize even though they may produce the best results. Clone will be identified during the 'caging' procedure.
- 6.2 Clones will be identified by substantially identical physical appearance and working principles.
- 6.3 When in doubt, the decision of the judges will be final.