



MMFC5TH

RULEBOOK

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MIDWEIGHT & LIGHT WEIGHT CATEGORIES



About Metal Monsters

Metal Monsters Fight (MMF) is the MENA region leading robot fight League since 2017, that runs a mid-weight, light-weight robot fight competition cup, show and a game, to spread out knowledge of robotics and technology among non-technicals via means of an entertaining show. And to encourage contestants to build robust reliable robots so as to enhance and develop their technical skills and abilities.

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MMF Show

It is an entertaining robot fight show event where contestants can showcase and show off their robots that is held more than once a year.

MMF Cup

It is the mega annual event of the robot fight competition that gather all the pro contestants in one occasion.

MMF Game

It is an occasional light weight robot fight interactive game for amateurs where you can find in, clubs and gaming zones.

MMF TV

It is the online website series for several fight shows and competition highlights that are live streamed or recorded.



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Light Wight Category

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Mid-Wight Category



About The Contest – MMF Cup 5th Edition “MMFC5th”

This competition is organized and prepared by Robocon Egypt initiative in collaboration with Delta Square LLC with their partners and powered by the Egyptian Academy of Scientific Research and Technology and hosted by the Arab Academy for Science, Technology & Maritime Transport New Alamein City campus.

Metal Monsters Fight Cup (MMFC) 5th edition is a midweight robot fight robot competition that contains 4 different arena activities for the contestants to perform across the period of the competition.

Dual Fight Rounds

It is the fight round qualifying matches for the competition finals where only 2 opponent robots compete together.

Showoff Rounds

It is single side game where the robot is required to show off its best moves, abilities and weapons before fight rounds.

MechMash Round

It is a fight match for the top 4 robots competing to win the MechMash prize.

Revival Round

It is a fight match for lowest ranked 4 robots in the top 8 list competing to win the Revival prize for the loser robots.

Activities

Dual Fight Match: It is the double-sided game match that is contested by two teams at once and lasts for 3 minutes.

Showoff Match: It is the match that is contested by only one team at once and lasts for 1 minute to show its skills and abilities.

MechMash Match: It is a survival match that is contested by the top 4 teams at once and lasts for 3 minutes following the same guidelines of the normal dual fight, giving a chance to bad luck competitors from semifinal round to win special prize.

Revival Match: It is a survival match that is contested by the last 4 out of the top 8 teams at once and lasts for 3 minutes following the same guidelines of the normal dual fight, giving a chance to losers from preliminary rounds to win special prize.



Quick Guide

Contest Theme "***Ancient Roots Inspires Future Fruits*** "

Egypt, the land of science origins has awakened and is reclaiming its leading role in the modern world considering the deep roots of technology and civilization, and its rich diverse cultural heritage that is powered by wisdom of the Nile, unique transcontinental geography, and smart original Egyptian ancestors.

The Egyptians throughout the ages were able to protect and preserve their land and empower the Egyptian culture against any aggression. So, Metal Monsters in its fourth edition, came to prove this inside the arena in which authentic Egyptian robots conquer the attacks of the invaders.

The Egyptian cultural and historical heritage is rich in important events that changed the future of Egypt and the shape of the whole world. The influence of the ancient Egyptians extended through history and geography in all the continents of the ancient world. It was started by the ancestors thousands of years ago, and the descendants continue it in cooperation with their friends and partners from all over the world.

“The fourth edition of the Metal Monsters Cup competition brings you inspiration from the Egyptian civilization in all its details. What is required of the participants in this version is to build a robot capable of fighting inspired in its shape and identity, its brand from the ancient Egyptian culture, which is reflected in the design of the robot and its decoration and choosing His personality, name, colors, movements and effective weapon”.

It is possible that the weapons of the ancient Egyptians in their historical wars were a good source of inspiration for the contestants in choosing their weapons, as well as the equipment used in the conduct of ancient life matters, in addition to the distinctive ancient architecture and hieroglyphic, demotic and Coptic inscriptions. Each team consists of min. 2 members and maximum 10 members. Each team should participate with only one robot, which is manually operated via a wireless mean of RC remote controller.



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Importance of Safety

Safety is the most important elements in the development of the Metal Monsters.

The safety of the designed robots is the first and foremost issue for the safety principle of the contest. The participating teams, as the robot designers, are responsible for the safety of their robots.

The teams must work and cooperate closely with the organizers to ensure the utmost safety of the contest.

Safety must always be the top priority and it must be considered by all people involved in the contest including officials, participants and spectators in all circumstances.

Teams are required to pay sufficient attention to the safety of their robots before applying to take part in the contest.



1 Registration & filtration system criteria

"Timeline of the tournament and acceptance conditions".



1.1 Registration

Registration period is available for 1 month for all applicant teams that are enrolled into a technical filtration process to accept only eligible teams among the applicants.

Filtration process is divided into 2 parts, the first part is eligibility process to filter teams according to their experience and previous work submissions as per section 1.3, and the second part is the selection process to decide accepted teams after submitting a valid proposal during the registration period and the accepted teams are within a week after registration period end up and announced and contacted to confirm their registration.

- Accepted teams have to confirm their registration and pay their registration fees by the Fees payment orientation meeting day shown at the timeline above or before.
- Registered teams shall submit a group photo for the team and single photo for each team members for the use of ID and social media promotions.



1.2 Filtration System

A team to be accepted, must pass two filtration processes to ensure safety for all participants, so the team selection depends on two main factors that the applicant team must prove as the priority goes to well organized teams with high technical level of experience.

1.2.1 Filtration part 1 (Eligibility Process): **Proving experience**

All team must submit their previous works during the registration process to prove their technical experience and organizational levels. Teams that achieve **35** points at least out of 70 points are accepted and required to submit a proposal after getting notified.

- Have the team or at least any of the team members participated in Metal Monsters before? [\(20Points\)](#)
- Have the team or at least any of the team members participated in heavy combat robot competition before? [\(15Points\)](#)
- Have the team or at least any of the team members participated in a heavy-duty robot competition (e.g. Robocon - ROV)? [\(15Points\)](#)
- Have the team or at least any of the team members build a robot before? [\(5Points\)](#)
- Have the team or at least any of the team members participated in any kind of robot competitions before? [\(10Points\)](#)
- Does your team represent an entity, organization, company or a student activity? [\(5Points\)](#)
- How much do you expect a Metal Monsters robot cost? [\(Bonus Question\)](#)

1.2.2 Filtration part 2 (Selection Process): **Proving Ideas**

All teams should submit proposal showing project briefing, team members, rendered robot, bill of materials and components used (BOM), and a feasible time plan which is evaluated form the jury committee to ensure safety and decide feasibility of the project and robot design during the registration process.

The ultimate goal from submitting the proposal is to prove the feasibility and effectiveness of the robot and to make sure that the robot is safe to compete.



Accepted proposals must contain the following:

- **Team formation:** Showing (Team name, Team members names, Job title)
- **Abstract:** Describing how the robot is built and materials are selected
- **Robot Theme:** Telling the story behind the robot appearance and name mentioning how its related to ancient Egyptian culture.
- **Robot Design:** Rendered concept of the robot or a real photograph of a currently existed robot (*Hand sketches are not accepted*).
- **Robot control system:** Control circuit layout is needed with a description of each element function and criteria.
- **Robot power system:** Power circuit layout is needed with a description of (Power source type and criteria, Power distribution system)
- **Bill of Materials:** List of materials and components used to build the robot in a table describing the following (Item, Quantity, Price, Vendor)
- **Budget Sheet:** An estimated detailed budget sheet for the whole project contains the following sections costs (Materials, Components, Machining)
- **Milestones & Timeplan:** A Gantt chart is needed to describe visually the highlighted actions and milestones.

**A submitted proposal requires one work day to be revised by the committee and decide its status.*

**Accepted proposals are notified to start implementing and manufacturing.*

**Rejected proposals are notified and mentored by MMFC technical support to edit and review what is necessary to be accepted.*



1.3 Confirmation video submission

Enrolled teams are required to send a video of their working robots showing their mobility and weapons according to the following criteria:

- Video length mustn't exceed 2 minutes and not less than 1 minute.
- Video edit or montage is not allowed.
- Video must be clear and shows working stuff.
- Sent videos will not be accepted after the deadline shown in the timeline graph above.
- Videos should be sent directly to this e-mail: info@metal-monsters.com

All teams must and should submit their confirmation videos showing their working stuff and stick to the delivery date. A **bonus gift points** are awarded to the team that submits on time; teams that have late deliverables will not be awarded. These points are valid only for the 1st game.



2 Contest theme

" Ancient Roots Inspires Future Fruits "

"Discover the new game and know more about robots' types".

2.1 Game concepts

We believe in Metal Monsters that there is a need to set and prepare the mindset of the surrounding community from technical and non-technical people who has the ability to lead a potential robust technological change based on knowledge of robotics, as the need for intelligent reliable heavy-duty machines are becoming a global demand with a growing market.

Combat robots is a new approach to spread out our values, as we believe in two main values:

- **Spreading out knowledge** of robotics and technology among non-technical and the public via means of an entertaining competitive show.
- **Build a competition environment** based on teams' filtration system and one trial games in order to increase reliability and repeatability of participating robots and raise up the technical level of our products.

2.2 Ideas

Main ideas in designing the rules:

1. Any team to win should depend on a perfect adaptive playing strategy
2. The game is easy to understand and entertaining to the spectators.
3. The winner of each match is not predictable until the end of the game.
4. Robot creators have to build robust reliable machines.
5. Enhance mechanism design and performing skills among participants.



2.3 Types of combat robots

Robots can be classified into various categories according to weapons, playing strategy or even construction and mechanisms used. Throughout these types of competitions there have been a various number of designs, but there are some basic designs that always popup, and those are what is mentioned below.

2.3.1 Wedge

A wedge is a combat robot that is designed with an incline plane on the front of it. The whole point of a wedge is to give the robot the ability to pick up its opponent and drive them into the wall of the arena or some other hazard.



2.3.2 Spinner

The spinner combat robot is considered the perfect one to offense and defense assuming it stays alive. To classify a robot as spinner one the outside of the robot spins, or the entire top spins. The reason why this robot is perfect to offense and defense is because its offense is its defense. While hitting a spinner one your robot is also going to take damage unless it can get under the spinner, making the wedge robot the spinner robots kryptonite. Spinner bots are also destructive to themselves, so the team should be prepared and bring a lot of spare parts.





2.3.3 Drum

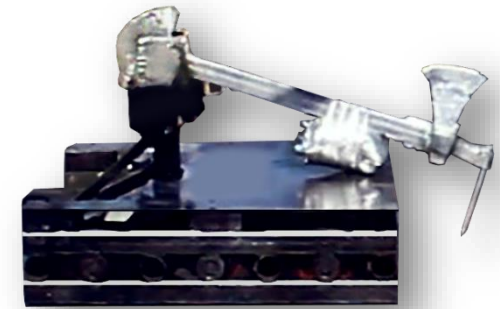
Drum bots are the heavy hitter's types. The way a drum robot works is it has a huge rotating mass on the front. If the drum is designed correctly it will have the capability of throwing other robots up into the air or into the side of arena's wall. However, due to the heavy mass rotating at a high rpm, these robots can be difficult to control. The reason for this is because the high moment of inertia will make the robot want to flip over as it turns.



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2.3.4 Crusher

The crusher robot has a vice like crusher designed to hold and possibly bend the other robot's frame. If a team decided to design one of these types of bots, then they should spend a lot of time practicing their driving. Since not only will they have to be able to drive well but they will need good timing to catch or grip the other bot. Also, they need to become acquainted with the match's rules, since METAL MONSTERS competition has limits according to rules below organizing the amount of time a robot can hold opponent one before it let it go. Finally, during the design process the team needs to consider the weight of their crusher system since it will need to deliver a large amount of force, but can't go over the weight limit.





2.3.5 Flipper

The flipper robot has an arm normally tied to a powerful pneumatic system that is used to flip opponent's robot over. Similar to the crusher a team will need to have a good driver that has good reflexes to operate this bot. If a flipper operates off of a pneumatic system then the operator also needs to realize that he will have a limited amount of time he can use the flipper arm before the air tanks run out of air. Finally, if the arm isn't durable enough it could easily be torn off by a spinner or a drum robot, leaving it defenseless if that was its only form of offense.



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2.3.6 Hybrid

Hybrids combine the styles listed above. By doing this a team would be giving their robot added design features that could be used as secondary weapon. The biggest issue of doing this is it will increase the time for their design process, and they will have to pay more attention to their weight. Also, it is difficult to put and secondary features on a spinner.

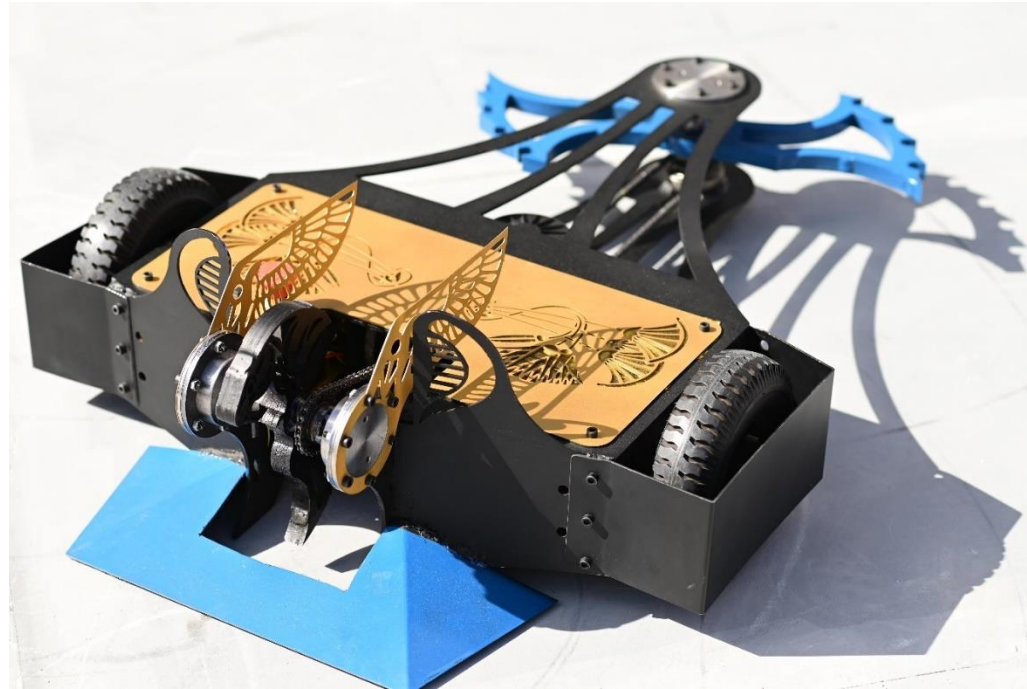




2.3.7 Others

Types mentioned above are not the only designs that can be used when creating a combat robot. They are however the most common. As it is mentioned at the beginning it is possible to create the best fighter according to team vision and skills, and there are limitless ideas that could come up with. Also, as organizers for the METAL MONSTERS competition, we actually like to see this creativity.





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3 Terms & definitions

"Meaning of terms, you may find in this book".

Game	When mentioned, it refers to the whole game time including setting time and competing time "match time".
Match	When mentioned, it refers to the competing time which is 3 minutes after the setting time.
Setting time	2 minutes are given before the match time to set and place robots at their specific start zones.
Team member	It's the main team members they are 2 members, a robot operator and one assistant.
Pit crew	If a team has a pit crew member, they shouldn't exceed 8 members, they can assist outside the arena and before the game.
Junior	A team member that is -18 years old.
Senior	A team member that is +18 years old.
Organizers	San3a Tech & Robocon Egypt crew members and their partners.
K.O.	When a robot is totally smashed and disabled by the opponent's robot it is said to be K.O – Knocked Out.
SM Challenge	Social media challenge
Mortal Points	Bonus score points that are only valid to be used one time.
Immortal Points	Bonus score points that are valid to be used before every game.
W-W	Weapon to Weapon attack, when a robot tries to attack opponent's robot weapon.



4 Required Missions

"Missions to do to win the grand prize".

MMFC4th edition tournament require accepted teams to perform specific missions to win

1st Mission: Robot Theme

Each robot to be accepted to participate at the arena fights should have a visual theme and a rich story behind the name, shape, colors, and decorations. That are appearing in its colorful design, colors, vinyl and drawings that is related to the "Ancient Roots Inspires Future Fruits".

2nd Mission: Arena Performance

Arena performance are the activities of show off and fights inside the arena during the days of the finals that are described in details at section 5. Arena Performance Gameplay Structure



5 Arena performance gameplay structure

“General rules of the game and activities description”.

Metal Monsters 4th edition competition main structure is formed of 4 main activities which all the teams are enrolled in with the following sequence

No.	Activity	Activity Description
1	Showoff 1 st Round	All teams show their robots off.
2	Dual Fight Rounds	Dual fights are the combat rounds (Preliminary, Qualifying, Semifinal, Final)
3	Showoff 2 nd Round	Last 4 of the top 8 teams show their robots off during showoff matches.
4	Revival Round	Survival match for the last 4 of the top 8 robots.
5	Showoff 3 rd Round	Top 4 teams show their robots off during showoff matches.
6	MechMash Round	Survival match for the top 4 robots.

5.1 Showoff 1st round

All the accepted teams are enrolled in this round in series time slots. Each team has 1 minute to showoff its robot abilities of (Best moves & maneuvers, Weapon ability, Aggression) to collect 5 immortal points before the dual fights round.



5.2 Dual fight round

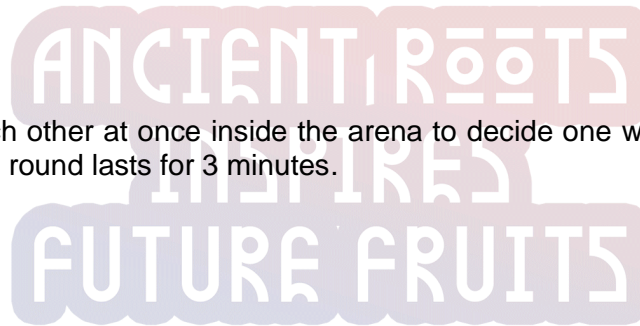
All accepted teams are enrolled in dual face to face fights within four main rounds (Preliminary Round, Quarter Final, Semi Final, Final), each match is only one round lasts for 3 minutes with knockout system.

5.3 Showoff 2nd round

Last 4 of the top 8 teams show their robots off during showoff matches. Teams are enrolled in this round in series time slots. Each team has 1 minute to showoff its robot abilities of (Best moves & maneuvers, Weapon ability, Aggression) to collect 5 immortal points before the Revival match.

5.4 Revival round

The last 4 of the top 8 teams fight each other at once inside the arena to decide one winner depending on the knockout or the highest score. Revival round is only one match of one round lasts for 3 minutes.



5.5 Showoff 3rd round

Top 4 teams show their robots off during showoff matches. Teams are enrolled in this round in series time slots. Each team has 1 minute to showoff its robot abilities of (Best moves & maneuvers, Weapon ability, Aggression) to collect 5 immortal points before the MechMash match.

5.6 MechMash round

The Top 4 teams fight each other at once inside the arena to decide one winner depending on the knockout or the highest score. MechMash round is only one match of one round lasts for 3 minutes.



6 Arena games' procedures

"Learn how to start and set your robot inside the arena".

• **Fights (Dual Fights – Quad Fights)**

Once the game has begun, each team has to follow the following sequences:

6.1 Setting of robots

- **2 minutes** are given for setting and deployment of robots in the arena before the match starts.
- Code uploading to robots is allowed during the "Setting time"
- AC plugs and electric power sources are not allowed to be used inside or around the arena.
- At the end of the setting time, Arena referee whistles and the team members **should get out** of the arena.
- Any team that fails to complete setting of the robots within setting time should get out of the arena immediately, it is prohibited to complete setting after the start whistle.
- Only the **two** team members from a team are allowed to set robot within the setting time.
- Only the **two** team members are allowed to operate and control the robot during the match.
- Team members and the pit crew members are not allowed to get into the arena during the match.
- It is not allowed to operate a robot during the setting time.

6.2 Game procedures

- Game begins after a **permission** from the arena referee, each team should get into the field and place their robot on their specific start zones
- Arena referee whistles to start two minutes setting time, team members should begin setting and preparing their robots for the match.
- Robots must be set at their specific start zones.
- At the end of the 2 minutes setting time the arena referee whistles, and team members should **evacuate** the battle field immediately.
- Doors of the arena are locked and team members take their places outside around the arena waiting for the whistle of the arena referee to start the match.
- Each match lasts for 3 minutes.
- Teams are allowed to operate their robots only after the arena referee whistle of the match beginning.
- After the start of the match teams should fight to decide the winner and it is **prohibited** to get into the arena during the match time.



• Showoff

6.3 Setting of robots

- **2 minutes** are given for setting and deployment of the robot in the arena before the show starts.
- Code uploading to robots is allowed during the "Setting time"
- AC plugs and electric power sources are not allowed to be used inside or around the arena.
- At the end of the setting time, Arena referee whistles and the team members **should get out** of the arena.
- Any team that fails to complete setting of the robots within setting time should get out of the arena immediately, it is prohibited to complete setting after the start whistle.
- Only the **two** team members from a team are allowed to set robot within the setting time.
- Only the **two** team members are allowed to operate and control the robot during the show.
- Team members and the pit crew members are not allowed to get into the arena during the show.
- It is not allowed to operate a robot during the setting time.

6.4 Game procedures

- Show begins after a **permission** from the arena referee, the team should get into the field and place their robot at any point in the arena.
- Arena referee whistles to start two minutes setting time, team members should begin setting and preparing their robots for the show.
- Robots must be set at their specific start zones.
- At the end of the 2 minutes setting time the arena referee whistles, and team members should **evacuate** the battle field immediately.
- Doors of the arena are locked and team members take their places outside around the arena waiting for the whistle of the arena referee to start the show.
- The showoff lasts for only 1 minute.
- The team is allowed to operate their robots only after the arena referee whistle of the show beginning.
 - After the start of the show, the robot should reveal its epic movements, skills and aggression to get the full mark and it is **prohibited** to get into the arena during the match time.



7 Teams

"Team formation and positioning during game time".

- Team consists at least of two members and at maximum ten members.
- Players in one team may be from different ages and different backgrounds.
- The team consists of two main players called "team members" that can participate during the game at the game field.
- For teams that have more than one robot, it is allowed for them to drive the robots with more than two operators.
- Other team members aren't allowed to participate during the game, they are allowed to assist in outside before the game, and they are named "pit crew".
- Only the team members are allowed to participate to set the robot during the setting time.
- Members that are 18- years old are named "Juniors" and 18+ are called "Seniors".
- Juniors can't participate as team members they could be a pit crew.
- A junior can participate as a team member only in one case if there is a senior in the lead.
- Team leader must be a senior.
- Robot pilot must be a senior.



8 Robot design aspects

"Tips to build your robot with the proper specifications".

- Each team has to build **one or two** manual remotely controlled machines.
- All robots must have an attractive appearance of design and colors.
- All machines must be safely activated and deactivated.
- Robot can be divided or split into sub-units or connected by flexible cords.
- Robot dimensions must not exceed **(100X100X80) cm** (Width X Length X Height).
- Robot total weight must not exceed **50Kg** and not to be less than **35Kg**.
- Robots must be manually operated via means of wireless remote controllers.
- The voltage of the power sources used must not exceed **36VDC**, also the voltage must not exceed **48VDC** between any two points.
- Readymade robots are **not allowed** to be used like robot kits, robots must be designed and built by team members.
- For safety issues **mechanical emergency master switch** is required to directly shut off electric power of the whole robot system.
- More than one emergency button is also allowed as long as it is reachable and easy to use by any of the operators.
- Jumper plugs can be also used instead of a switch as an alternative to either type of switches.
- All batteries and terminals should be **isolated and protected** well from any direct or indirect short circuit.
- Flame gas tanks should be be **isolated and protected** well from any direct or indirect hits.
- Using **pneumatics or hydraulics is not allowed**, *"Dampers are allowed"*.



9 Robot control

“Recommendations for the best fight control”.

- Each robot must be controlled via a reliable remote controller e.g. commercial RC controller.
- It is preferred to use commercial RC controllers due to its high reliability as we recommend to use RC system that uses a form of Digital Spread Spectrum DSS communication with automatic pairing between the transmitter and receiver.
- All automatic moves and functions are allowed provided you are able to remotely disable or override those functions at any time.
- There is no prohibited control technique, but your control system should be reliable and stable.
- All of readymade controllers, their peripherals and shields are allowed to be used.
- Using mobile phone as a controller is also allowed but we don't prefer such controllers.

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10 Robot personality & theme

“Fans never forget awesome remarkable robots”.

- Each robot must have its own unique personality.
- Robot personality can be inspired from nature, animals, manmade elements, etc
- Personality must be shown clearly in the mechanical design, colors, and decoration of the robot and is named as the **“Robot Theme”**
- The robot theme must be original and aligned with the MMFC theme.



11 Weaponizing

“Choose your weapon type wisely and keep it safe”.

A weapon is that part of the robot that is powered to fight other robots, crash and smash them. Robots must have real weapon so as to compete at the METAL MONSTERS as following:

11.1 Flames

- Gas storage is limited by [0.75 Liter](#).
- Maximum length of the flame is [70 cm](#) and it must be adjustable.
- Flames cannot be initiated at the setting time.
- Manual flame ignition during setting time is not allowed



11.2 Spinners

Spinners must be safe enough so it should follow the following rules:

- Must have a mechanical emergency stop switch or a reachable fail/safe mechanism that shuts the power off.
- Switch may be upside or downside the robot.
- Spinners must be able to reach zero speed from maximum speed within 1 minute.

11.3 Flippers

A METAL MONSTERS robot can flip using any of the allowed mechanisms and techniques mentioned before such electric motors driven mechanisms.



11.4 Hybrid or multiple weapon

A METAL MONSTERS robot may include more than one weapon beside that the ability to use modular interchangeable weapons within robot design limits and is considered as a spare part.

12 Robot design restrictions

"Red lines boost our creative thinking".

All of these restrictions below were tailored for our safety and not to cause any harm for any one during the METAL MONSTERS contest days.

- Drones are not allowed.
- Hydraulics are not allowed.
- Pneumatics are not allowed.
- Projectiles are not allowed.
- Radioactive materials are prohibited.
- Toxic metals, liquids and materials are not allowed.
- Organic substances and materials are not allowed to be used except wood and its products.
- Entire rigid plastics, glass, ceramics and all of their forms are not allowed to be used on the robot exteriors.
- Robot jamming and EMPs are prohibited.
- Liquid pouring or liquid weapons are not allowed beside glues, grease, etc.
- Any weapon or a way to harm any of the people outside the arena like smoke generators, bright lights and LASER are forbidden and is considered a disqualification.
 - Internal Combustion Engines are not allowed to be used.



13 Winners

"Knocking out the opponent is always the perfect way to win".

A team to win must fulfill the first mission 4.1 and knock out the opponent robot and win the arena fight as following

• **Fights (Dual Fights – Quad Fights)**

A team is said to be winner in one of these cases:

- Team can win by K.O., it occurs when knocking out the opponent team by Incapacitating their robot for 10 seconds.
- If any of the teams failed to win by K.O., Then the winner is determined by score points. The team that gets higher score is the winner.
- In case of drawing, the team who has the highest (1st mission score) score points is the winner.

• **Showoff (1st Round – 2nd Round – 3rd Round)**

The main goal for the robot performing a show is to collect 5 immortal points from being perfect and making something catchy inside the arena showing the following:

- **Best Move**, the robot has to show how perfect is its mobility system and how it can maneuver.
- **Weapon Ability**, the robot operator shows his skills using his weapon the best way.
- **Aggression**, attacking frequency must be shown to prove how responsive the robot is to the sudden changes in moves and weapon positions.



14 1st Mission evaluation – Robot Theme

The team to win the best theme prize should have a strong logic story behind the visuals and the name of the robot that is clearly seen in its appearance and mechanical shape to be able to impress both audience and judges.

Robot theme prize is a free prize where Judges are evaluating participant robots from their point of view on a scale from 0 to 10 according to the following

- **Story**

The team can create his own story or inspire an existed one and create innovative identity for the robot.

- **Shape**

The team must create a decorative robot. The more the shape is integrated with the mechanical design of the robot, the more points the team gets.

- **Art**

Colorful well themed eye-catching robots are always good to impress, but the most impressive robot are the ones that has the perfect integration between the robot body, weapon design, extra decorations, colors, and stickers.

Story	How impressive is the story?	0-10
Shape	Is the body shape integrated with mechanisms?	0-10
Art	How perfect is the integration between art elements?	0-10



15 Arena evaluation

"Be aggressive & burn to win".

• **Fights (Dual Fights – Quad Fights)**

All of the following evaluation methods and calculations are only applied if one of the two contestant teams fail to knock out the opponent team "K.O.", score points will be classified and calculated as following:

15.1 Hitting

- Move is considered a hit when is caused by a robot or one of its weapons with an intention of pushing away the opponent.
- Hitting type is determined by two factors (Power of the hit – Reaction of the opponent's robot – effect of the hit by the opponent's robot) and decided be field judge.

15.2 Aggression & Meekness

- A robot is awarded +ve score for its aggressive attitude & -ve points are deducted for its meek attitude.
- Aggression is the intention to attack the opponent robot with high frequency of trials at time
- A robot is described to be aggressive when trying to attack an opponent using a powered weapon.
- Meekness is the intention to withdraw, run, and avoid opponent attacks without an intention to maneuver or to respond to the attack.
- A robot is described to be meek when not trying to attack the opponent.
- A meek robot has a low attack frequency of average 10 seconds between each attack trial evaluated by the field judge.



15.3 Flaming

- Flame points is only considered and classified by field judges.

15.4 Bonus Score

- Confirmation video submission, the team that commits to the timeline and the submission date is awarded mortal points valid only before the 1st. dual game.
- Popular team poll, A poll is to be announced on Metal Monsters' official platform before the cup finals, teams are announced at this poll where they engage to boost their opportunities to win the poll and get their bonus points. Only one team is awarded.

*All score points, hits, flips and flaming points are decided and estimated by the field judges.



Hitting

Soft	Soft hit occurs when causing trivial damage to the opponent's robot	+1
Hard	Hard hit occurs when causing serious damage to the opponent's robot	+4
Weapon	Weapon-to-Weapon hit occurs when attacking opponent powered/broken weapon	+6

Aggression & Meekness

Aggression		Meekness		
Normal Attack	The robot tries to hit the opponent	+1	Escape -ve 1 point is deducted for a low freq. meek robot for each escape	-1
Powered Attack	Trying to hit with a powered weapon	+2	Stop -ve 2 points are deducted every 5 secs. for a stopping robot	-2
Powered W-W Attack	Trying to hit opponent weapon by a powered weapon.	+6		

Flaming

Flame	15 points will be added for a robot which is able to burn all or a part of the opponent	+15
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Bonus Points

Confirmation video Submission	+5 points are valid only before the 1 st . game are awarded to teams sticking to timeline	+5
Popular team poll	The team that wins the poll is awarded mortal points to use before any dual match	+5



• Showoff (1st Round – 2nd Round – 3rd Round)

The main goal for the robot performing a show is to collect 5 immortal points from being perfect showing cool abilities of the robot and the pilot. The field judge just checks ✓ that the team has passed the criteria as following.

Best move	The robot shows how to maneuver and control	✓	1 point
Weapon ability	Weapon is ready to smash in a cool way	✓	2 points
Aggression	The robot is aggressive enough to impress	✓	2 points



16 Disqualifications

"Please be careful and responsible inside and outside the arena".

A team is said to be disqualified and out of the contest if it commits any of the following:

- Intention of harming the arena walls, ceiling and floor.
- Causing any types of harm to the people outside the arena is considered a disqualification.
- A robot without **proper protection** is not allowed to participate.
- Remote control interference with others is an acceptable reason for disqualification.
- A team that fails to pass the **technical inspection** (*Weight-Dimensions-Safety*) is considered to be disqualified.
- A team that fails to obey safety rules and guidelines during the game days is out of the contest.



17 Judges

Chief Judge the Head Judge is responsible for all other judges and make sure that all of process going straight. and decide in the case of a tie between the Judges.

Field Judges There are 3 Judges for each Match. Two judges, one for each team to calculate team score. And the third judge (Organizer) for timing and any violations during the matches like: Starting Matches, Stopping Matches early, Declaring a win by KO , Declaring and administering Timeouts and Watching for safety violations.

Technical Judges the Technical judge is intended to confirm that the Robot complies with all of the Rules and evaluate Robots by filling specs sheet.

Safety Judges the Safety judge is intended to confirm that the Robot complies with all of Safety Rules.

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17.1 Judges' Duties

1. Deciding the outcome of matches that do not end in early termination.
2. Provide information to Metal Monsters officers regarding the disqualification of teams and their robots
3. Fulfill all documents required and provide it to Metal Monsters Officers.



17.2 Inspection Procedure

The inspection procedure has two primary parts: the Internal Inspection and the Functional Testing. The Robot also has to be weighed as part of the Inspection. A Robot's weight may be checked more than once during the inspection procedure. The Inspection is performed by Technical Judge and Safety Judge together.

1. **Internal Inspection:** involves the inspection of all the components of the robot to confirm that its components and their configurations comply with the requirements of the design rules and safety. For this part of the inspection, the robot is partly disassembled to allow access to all internal components. The Internal Inspection is performed at the pit table for the team's robot.
2. **Functional Testing:** Functional Testing of a Robot is not begun until the Robot has completely passed its Internal Inspection and has been reassembled. Functional Testing involves a demonstration that the Robot can be safely controlled and meets all of the Activation, Fail-Safe, Mobility, Deactivation and other requirements specified in the Design Rules. Operation and compliance of all active weapons on the Robot will be tested also.

Inspection and Testing Completion: If a robot fails any part of the Internal Inspection, it must again be inspected and pass completely before it can be eligible for the Functional Testing. Similarly, if a robot fails any part of the Functional Test, it must again be tested and pass before it will be allowed to compete in any Matches.



18 Game Field "Arena"

"Place where robots create glory to their makers".

Gamefield is mainly consisting of two main areas (Arena– Operators Area)

18.1 Arena

- It is the ground where robots are supposed to compete and smash.
- Arena is a plain square area with an internal dimension of 6m length and 6m width.
- Arena ground floor is constructed from coated hard steel.

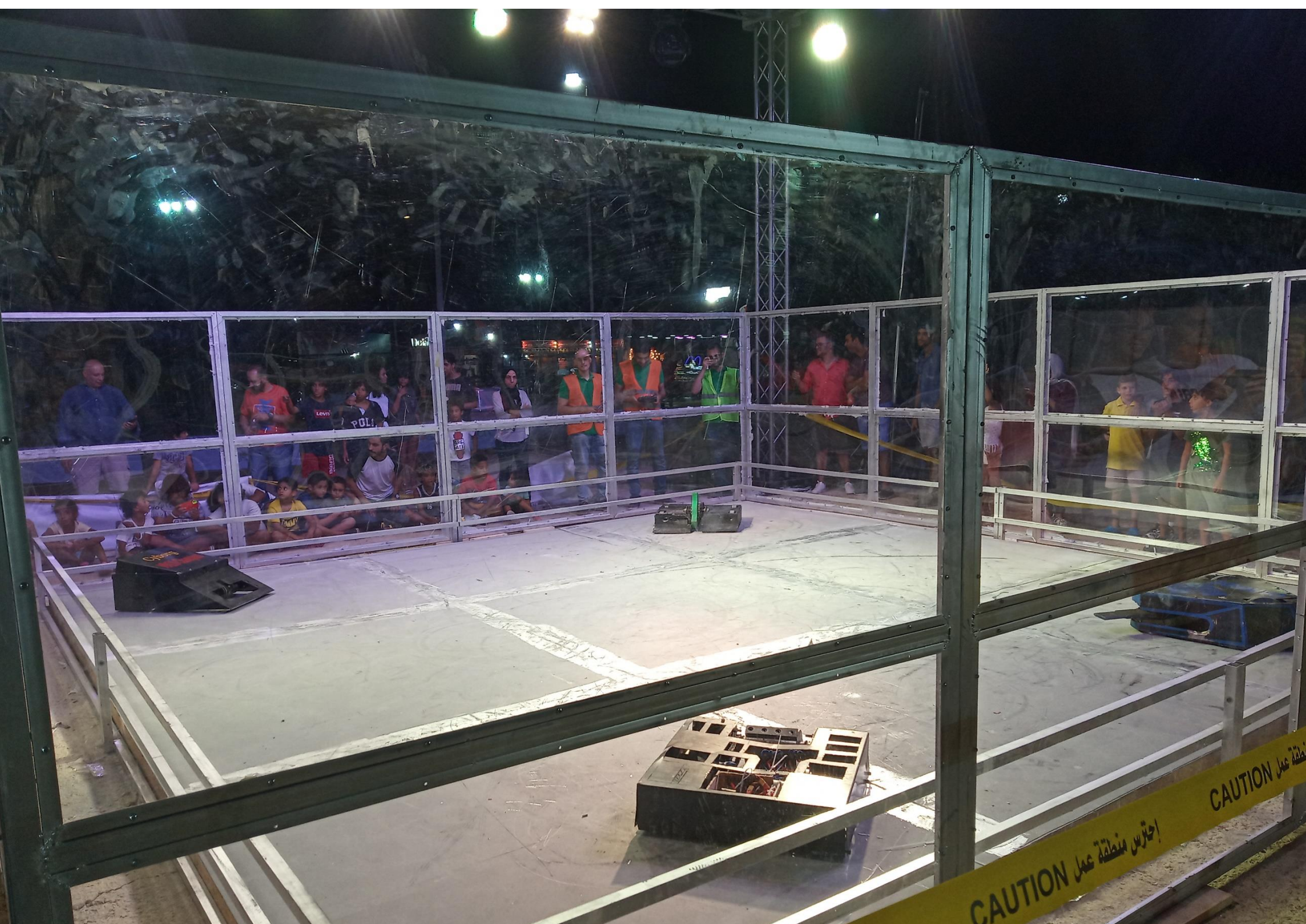


18.2 Safe area

- It is the area between the outer fencing and inner fencing which is almost 0.5m.

18.3 Operators' area

- It is the area around the arena where robot operators control their robot with a width of 1m.



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CAUTION احذر من منطقة عمل



19 Awards

"Caring people always gets the best".

- All teams are awarded participation certificates.
- 1st place winner is awarded a cash prize.
- 2nd place winner (1st runner up) is awarded a cash prize.
- MechMash winner is awarded a cash prize.
- Revival winner is awarded a cash prize.
- Best Theme winner is awarded a cash prize.

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Light Wight Category



About The Contest – MMFC Light Weight

This competition is organized and prepared by Robocon Egypt in collaboration with San3a Tech and hosted by Alamein Robotics Championship with their partner in Delta Group.

This category of Metal Monsters cup is a light weight robot fight competition that contains only one arena activity for the contestants to perform dual fights. Each team must compete using the Metal Monsters MRK™ Robot Kit with its peripherals and addons, though the team is free to edit, reform, build up, combine the MRK building blocks together as needed.

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Dual Fight Rounds

It is the fight round qualifying matches for the competition finals where only 2 opponent robots compete together. It is considered a double-sided game match that is contested by two teams at once and lasts for 2 minutes.



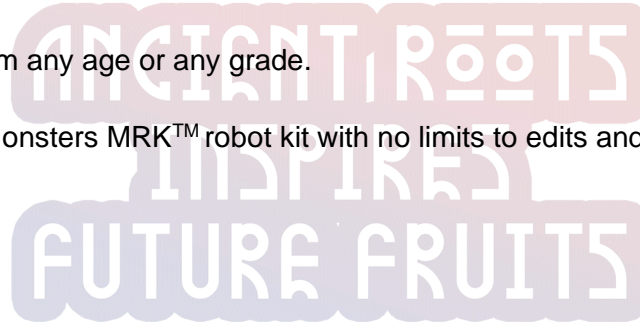
Quick Guide

Contest Theme "*Ancient Invasion*"

Contest is consisting of a number of matches. A match is contested by two teams at once and lasts for 2 minutes. Each team consists of 2 members at least and 4 members maximum. Each team should participate with only one robot, which is manually operated via means of wireless control.

Only school students can participate in the MMFG from any age or any grade.

A team to participate has to compete with the Metal Monsters MRK™ robot kit with no limits to edits and reusage of its mechanical structure.





1 Terms & definitions

"Meaning of terms, you may find in this book".

Game	When mentioned, it refers to the whole game time including setting time and competing time "match time".
Match	When mentioned, it refers to the competing time which is 3 minutes after the setting time.
Setting time	2 minutes are given before the match time to set and place robots at their specific start zones.
Team member	It's the main team members they are 2 members, a robot operator and one assistant.
Pit crew	If a team has a pit crew member, they shouldn't exceed 8 members, they can assist outside the arena and before the game.
Junior	A team member that is -18 years old.
Senior	A team member that is +18 years old.
K.O.	When a robot is totally smashed and disabled by the opponent's robot it is said to be K.O – Knocked Out.
Mortal Points	Bonus score points that are only valid to be used one time.
Immortal Points	Bonus score points that are valid to be used before every game.
W-W	Weapon to Weapon attack, when a robot tries to attack opponent's robot weapon.



2 Registration & Timeline





3 Game procedures

Once the game has begun, each team has to follow the following sequences:

3.1 Setting of robots

- **30 seconds** are given for setting and deployment of robots in the arena before the match starts.
- Code uploading to robots is allowed during the "Setting time"
- AC plugs and electric power sources are not allowed to be used inside or around the arena.
- At the end of the setting time, Arena referee whistles and the team members **should leave** the arena immediately.
- Any team that fails to complete setting of the robots within setting time should leave the arena immediately, it is prohibited to complete setting after the start whistle.
- Only **two** team members from a team are allowed to set robot within the setting time.
- Only the **two** team members are allowed to operate and control the robot during the match.
- Team members and the pit crew members are not allowed to get into the arena during the match.
- It is not allowed to operate a robot during the setting time.

3.2 Game procedures

- Game begins after a **permission** from the arena referee, each team should get into the field and place their robot on their specific start zones
- Arena referee whistles to start two minutes setting time, team members should begin setting and preparing their robots for the match.
- Robots must be set at their specific start zones.
- At the end of the setting time the arena referee whistles, and team members should **evacuate** the battle field immediately.
- All team members take their places outside around the arena waiting for the whistle of the arena referee to start the match.
- Each match lasts for 2 minutes.
- Teams are allowed to operate their robots only after the arena referee whistle of the match beginning.
- After the start of the match teams should fight to decide the winner and it is **prohibited** to get into the arena during the match time.



4 Teams

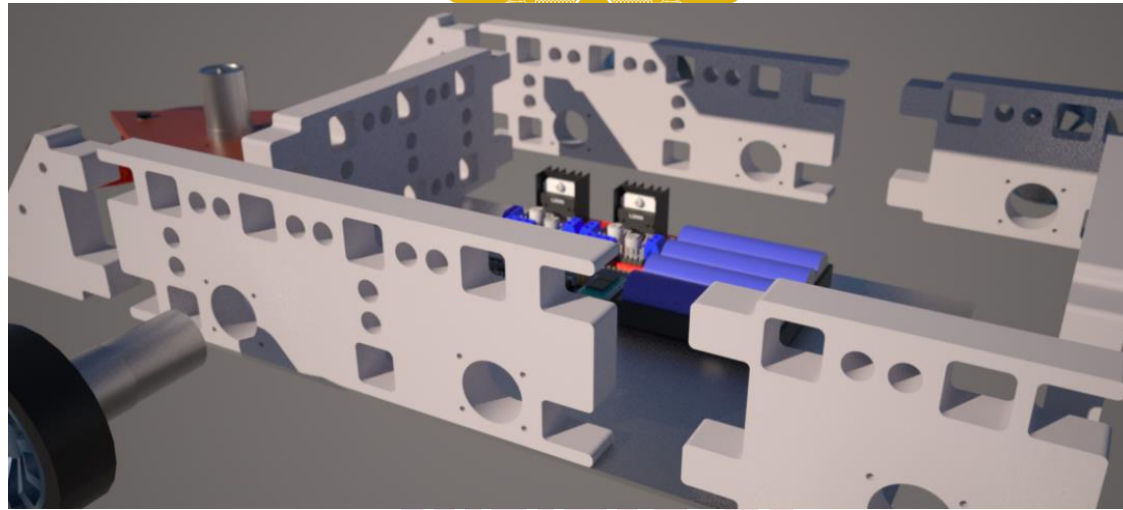
- Team consists at least of two members and at maximum five members.
- Players must be school students.
- A team may be from different ages and grades.
- The team consists of two main players called "team members" that can participate during the game at the game field.
- Other team members aren't allowed to participate during the game, they are allowed to assist in outside before the game, and they are named "pit crew".
- Only the team members are allowed to participate to set the robot during the setting time.

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5 Robot design aspects

- Each team has to build **one** manual remotely controlled machines using the MRK™ robot kit provided by the MM organizers.
- A team can add more than one weapon to its robot.
- The robot must be built at least using the MRK™ blocks.
- The team is free to edit and reform the blocks of the MRK as needed.
- The team can create its own weapon and attach it to the MRK blocks.
- All robots must have an attractive appearance and colors.
- All machines must be safely activated and deactivated.
- Robot dimensions must not exceed **(55X55X30) cm** (Width X Length X Height).
- Robot total weight must not exceed **5.5Kg**.
- Robots must be manually operated via means of wireless remote controllers.
- The voltage of the power sources used is DC and has no voltage limitation.
- All batteries and terminals should be **isolated and protected** well from any direct or indirect short circuit.
- All wires and electrical system must be **inside** the robot.
- Any addon structure to the robot body / weapon must be built totally from non metal materials.
- Using **pneumatics or hydraulics is not allowed**, *“Dampers are allowed”*.



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6 Robot control

- Each robot must be controlled via a reliable remote controller e.g. commercial RC controller.
- It is preferred to use commercial RC controllers due to its high reliability as we recommend to use RC system that uses a form of Digital Spread Spectrum DSS communication with automatic pairing between the transmitter and receiver.
- All automatic moves and functions are allowed provided you are able to remotely disable or override those functions at any time.
- There is no prohibited control technique, but your control system should be reliable and stable.
- All of readymade controllers, their peripherals and shields are allowed to be used.
- Using mobile phone as a controller is also allowed.

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7 Robot personality & theme

- Each robot must have its own unique personality.
- Robot personality can be inspired from the Egyptian civilization elements.
- Personality must be shown clearly in the mechanical addons, colors, and decoration of the robot.
- The robot theme must be original.



8 Weaponizing

A weapon is that part of the robot that is powered to fight other robots, crash and smash them. Robots must have real weapon so as to compete at the MM as the team can build his own weapon or can purchase use the MRK™ weapon sets as following:

8.1 Spinners

Spinners must be safe enough so it should follow the following rules:

- Must be built from nonmetal material.
- Spinners must be able to reach zero speed from maximum speed within 30 seconds.

8.2 Flippers

A Metal Monsters robot can flip using any of the allowed mechanisms and techniques mentioned before such electric motors driven mechanisms.

8.3 Hybrid or multiple weapon

A Metal Monsters robot may include more than one weapon beside that the ability to use modular interchangeable weapons within robot design limits and is considered as a spare part.



9 Robot design restrictions

All of these restrictions below were tailored for our safety and not to cause any harm for any one during the game day.

- Drones are not allowed.
- Hydraulics are not allowed.
- Pneumatics are not allowed.
- Projectiles are not allowed.
- Radioactive materials are prohibited.
- Toxic metals, liquids and materials are not allowed.
- Organic substances and materials are not allowed to be used except wood and its products.
- Robot jamming and EMPs are prohibited.
- Liquid pouring or liquid weapons are not allowed beside glues, grease, etc.
- Any weapon or a way to harm any of the people outside the arena like smoke generators, bright lights and LASER are forbidden and is considered a disqualification.
- Internal Combustion Engines are not allowed to be used.



10 Winners

A team is said to be winner in one of these cases:

- Team can win by K.O., it occurs when knocking out the opponent team by Incapacitating their robot for 10 seconds.
- If any of the teams failed to win by K.O., Then the winner is determined by score points. The team that gets higher score is the winner.
- In case of drawing, the team who has the highest score points is the winner.

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11 Evaluation

All of the following evaluation methods and calculations are **only** applied if one of the two contestant teams fail to knock out the opponent team "K.O.", score points will be classified and calculated as following:

11.1 Hitting

- Move is considered a hit when is caused by a robot or one of its weapons with an intention of pushing away the opponent.
- Hitting type is determined by two factors (Power of the hit – Reaction of the opponent's robot – effect of the hit by the opponent's robot) and decided be field judge.

11.2 Aggression & Meekness

- A robot is awarded +ve score for its aggressive attitude & -ve points are deducted for its meek attitude.
- Aggression is the intention to attack the opponent robot with high frequency of trials at time
- A robot is described to be aggressive when trying to attack an opponent using a powered weapon.
- Meekness is the intention to withdraw, run, and avoid opponent attacks without an intention to maneuver or to respond to the attack.
- A robot is described to be meek when not trying to attack the opponent.
- A meek robot has a low attack frequency of average 10 seconds between each attack trial evaluated by the field judge.



*All score points, hits, flips points are decided and estimated by the field judges.

Hitting					
Soft	Soft hit occurs when causing trivial damage to the opponent's robot			+1	
Hard	Hard hit occurs when causing serious damage to the opponent's robot			+4	
Weapon	Weapon-to-Weapon hit occurs when attacking opponent powered/broken weapon			+6	
Aggression & Meekness					
Aggression			Meekness		
Normal Attack	The robot tries to hit the opponent	+1	Escape	-ve 1 point is deducted for a low freq. meek robot for each escape	-1
Powered Attack	Trying to hit with a powered weapon	+2	Stop	-ve 2 points are deducted every 5 secs. for a stopping robot	-2
Powered W-W Attack	Trying to hit opponent weapon by a powered weapon.	+6			



12 Disqualifications

A team is said to be disqualified and out of the contest if it commits any of the following:

- Non MRK™ robots aren't eligible to compete.
- Intention of harming the arena walls, ceiling and floor.
- Causing any types of harm to the people outside the arena is considered a disqualification.
- A robot without **proper protection** is not allowed to participate.
- Remote control interference with others is an acceptable reason for disqualification.
- A team that fails to pass the **technical inspection** (*Weight-Dimensions-Safety*) is considered to be disqualified.
- A team that fails to obey safety rules and guidelines during the game days is out of the contest.

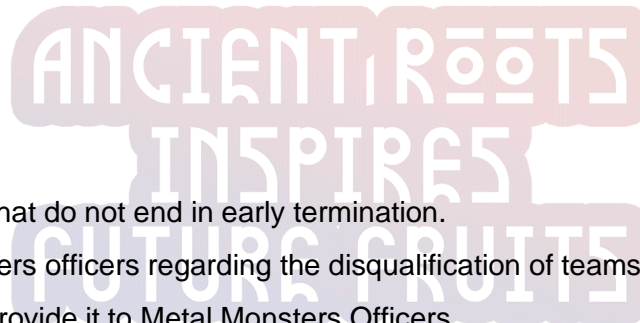
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13 Judges

Chief Judge the Head Judge is responsible for all other judges and make sure that all of process going straight. and decide in the case of a tie between the Judges.

Field Judges There are 2 Judges for each Match. Two judges, one for each team to calculate team score. And the third judge (Organizer) for timing and any violations during the matches like: Starting Matches, Stopping Matches early, Declaring a win by KO , Declaring and administering Timeouts and Watching for safety violations.



13.1 Judges' Duties

- Deciding the outcome of matches that do not end in early termination.
- Provide information to Metal Monsters officers regarding the disqualification of teams and their robots
- Fulfill all documents required and provide it to Metal Monsters Officers.
- Perform the needed robot internal inspections and functional tests



14 Game Field "Arena"

Gamefield is mainly consisting of two main areas (Arena– Operators Area)

14.1 Arena

- It is the ground where robots are supposed to compete and smash.
- Arena is a plain square area with an internal dimension of 4m length and 4m width.
- Arena ground floor and fencing is constructed from wood.
- Arena surrounding fence height is 20cm.

14.2 Safe area

- It is the area between the outer fencing and inner fencing which is almost 1m.

14.3 Operators' area

- It is the area around the arena where robot operators control their robot with a width of 1m.



15 Awards

All of the top 3 winning teams are awarded cash prizes.

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