Man-Machine
Challenge Booklet 2026

Organised by:

DSO NATIONAL LABORATORIES

SCIENCE CENTRE singapore

Supported by:

MINDEF SINGAPORE

SAFMC 2026 CATEGORY MAN-MACHINE CHALLENGE BOOKLET CHANGE LOG

Version	Release Date	Description
1.0	03 Nov 2025	Official challenge booklet release
2.0	06 Feb 2026	Additional information on the size of the playfield (Section 3.2) Addition of constraint on allowable VTX power rating (Section 3.3.5)

CONTENTS

1. INTRODUCTION

Competition Schedule, General Rules and Regulations can be found in the “General Rules and Regulations” Booklet.

For Category Man-Machine, each team, which consists of **TWO (2)** to **FIVE (5)** members, are expected to design and build **ONE (1)** to **THREE (3)** drone(s) equipped with a customized mechanism to perform payload pick-up and delivery tasks.

2. CATEGORY MAN-MACHINE AWARDS

Award winners will be selected based on either presentation scores, performance on the competition’s challenge day, or a combination of both.

There is no limit to the number of awards that a team can win, and there may not be a winner for every award.

All scoring decisions made by the judges are **final**. For cases that require arbitration, the Singapore Amazing Flying Machine Competition (SAFMC) organising committee will have the **final** say.

The list of awards for Category Man-Machine is listed in the subsequent sections.

2.1. CHAMPIONSHIP AWARD

This is the pinnacle award any local team can win and is bestowed on the team that achieves the highest total score across all areas. For Category Man-Machine, there will be **THREE (3)** Championship Awards: a winner and **TWO (2)** runners-up. The scoring and weightage can be found in Section 4.

2.2. BEST INTERNATIONAL TEAM AWARD

This award is given to the best international team in Category Man-Machine. The SAFMC organising committee recognises that international teams can bring a wide spectrum of unique designs and innovations and would like to award the best international team in this category if the minimum standard is met.

2.3. JUDGES' COMMENDATION

This award is given out to Category Man-Machine teams exhibiting a high quality in design and/or performance but did not win the Championship Award or the runners-up prizes. Teams that have won any of the top 3 prizes will not be considered for the Judge's Commendation Prizes. Overall scores may be taken into consideration for this award. Up to **TWO (2)** Judges' Commendation Awards may be given for the whole Category Man-Machine.

2.4. PRIZES

CATEGORY MAN-MACHINE				
Awards	**Medals**	**Trophy**	**Cash Prize**	**Remarks**
Championship Award	✓	✓	$4,000	
1st Runner Up	✓		$3,000	
2nd Runner Up	✓		$2,000	
3rd and 4th Runner Up	✓			
Best International Team Award	✓	✓	$4,000	
Judge's Commendation	✓		$500	Up to two teams can win this award

3. CATEGORY MAN-MACHINE MISSION

Teams are required to design a system of **UP TO THREE (3)** drones equipped with customized mechanisms for payload delivery. The drones are to be piloted by a single designated pilot through a maze of unknown layout. The system of drones can consist of customised or Commercial-Off-The-Shelf (COTS) product that is capable of semi-autonomous or fully autonomous flight and need not be homogeneous.

The detailed descriptions of the playfield, available tasks, as well as the scoring criteria are found within Section 3 and Section 4. Teams are advised to read through these sections in detail to develop a strategy and identify key design requirements before designing the drones to execute the mission. The technical rules for the drones are found in Section 6.

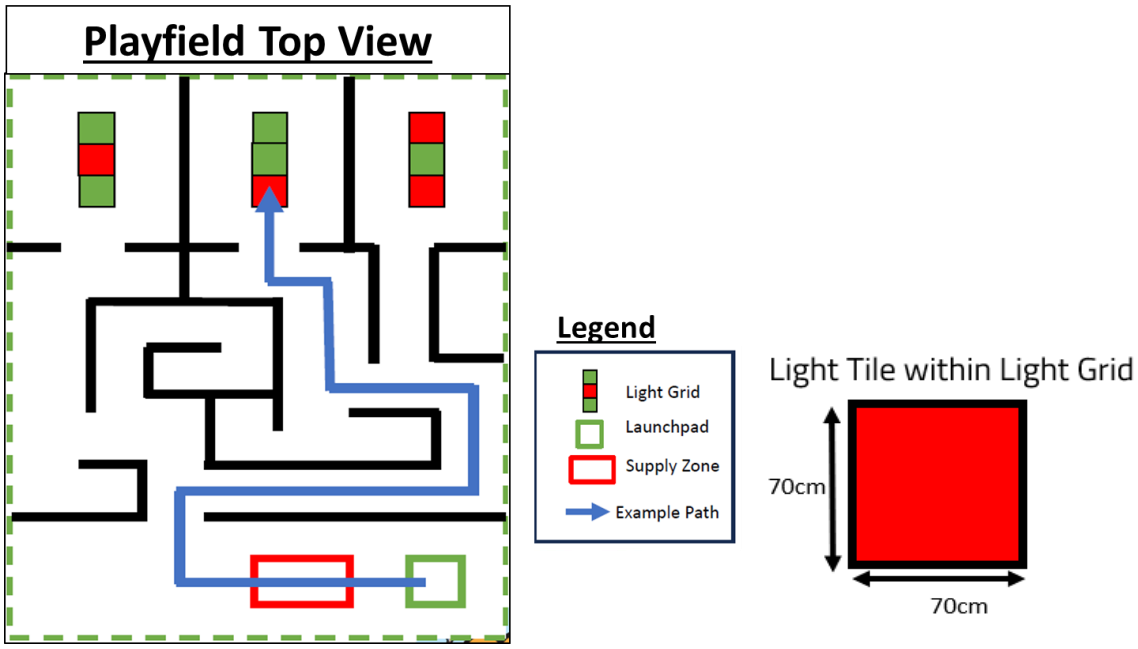
3.1. MISSION TASKS

The mission requires the drones to pick up payload(s) race to navigate through the playfield to deliver coloured payloads onto corresponding Light Tiles in a precise and accurate manner.

The key phases of the mission are:

- **Take off** within the Start Area.
- **Pick up** payloads
- **Navigate** through the maze
- **Release** payloads at Light Grid

3.2. PLAYFIELD



Top View of Playfield and Light Tile

The layout of the playfield is shown above. When referring to the above diagram, note that:

- The layout is **not drawn to scale and is FOR ILLUSTRATION PURPOSES ONLY.**
- The actual layout will be **unknown** to teams until the competition round.
- The total area of the playfield is approximately 20m x 20m.

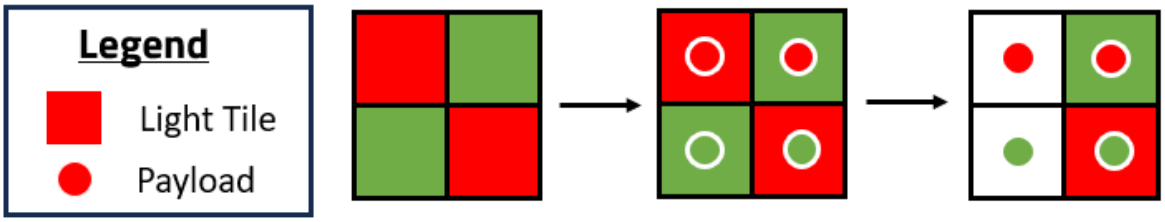
3.3. MISSION RULES

3.3.1 OBJECTIVES

The team's objective is to pick up payloads from the designated supply zone and deliver them to the Light Grids at the end of the playfield by navigating through the maze.

Drones are required to pick up their payload without direct human interaction other than through remote controlling devices. Pre-loading of payloads on drones is not allowed as well. Once drones have picked up their payload(s), they will proceed to navigate through the playfield.

The Light Grids are split into **THREE (3)** separate columns at the end of the playfield, and will each consist of **THREE (3)** Light Tiles for each Light Grid, and each Light Tile will be lit either red or green. Likewise, payloads will be coloured red or green, and teams must deliver payloads to a tile of the same colour as the payload delivered. Once a payload has been correctly delivered to a Light Tile of the same colour, the Light Tile will then turn white, as shown below.



Example of Light Tile Turning White

There will be two competition stages – qualifying stage and knockout stage.

For each stage, teams will be given 10 minutes of setup time to perform any setup required for their drone(s) and payloads, followed by 10 minutes of mission time to perform the mission.

For the qualifying stage, teams will perform the mission on their own and teams with the shortest time taken will proceed to the knockout stage. For the remaining teams that have either not completed the mission or have used up the full 10-minutes mission time, scores will be tabulated based

on the number of payloads scored. In event that there are remaining slots for the knockout stage, they will be allocated to the highest-scoring teams.

During the knockout stage, teams will play against each other, with teams competing to deliver payloads to their own Light Grids as quickly as possible.

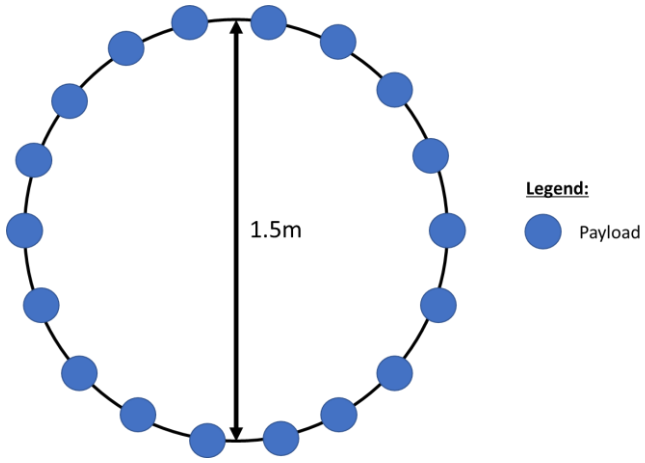
The team that has completed all the Light Tiles first or has the higher score will move on to the next knockout round.

3.3.2 PLATFORM AND FLIGHT

1. Teams can use **UP TO THREE (3)** drones. Simultaneous flight of multiple drones is allowed.
2. Each drone must weigh **less than 2kg** (inclusive of max capacity of carriable payloads), and measure **less than 1m** in any direction (includes maximum diameter of propeller circles).
    a. Teams are allowed to control their drone(s) using any form of control method.
    b. Drones are not allowed to be autonomous.
3. Pilots are allowed to fly their drone(s) using remote sensors (e.g. video link). The pilot will be confined to the pilot booth and will not have line of sight to the drone.
4. Other than in the Launchpads and Supply Zones, the drone(s) are not allowed to be in contact with the floor or platform.
5. Drone(s) cannot fly over or above the walls.

3.3.3 PAYLOAD PICKUP AND CARRIAGE

1. On the challenge day, teams will be provided beanbags which will act as the payload. Each team will be provided 18 beanbags (9 red, 9 green), and teams must ensure that their pickup and delivery system do not damage the beanbags.
2. The beanbags weigh 85g and measure 12cm along each side. They can be found at https://www.javysports.com/tossing-aiming/452-834-bean-bags.html#/413-bean_bag-soft_pu_with_reinforced_stitching/414-quantity-set_of_4.
3. Teams may design custom payload carriers to be used within the challenge. The beanbag shall be placed within the payload carrier, and the entire unit will be considered as the payload and may be delivered to the Light Grid together. The payload carrier must measure **at most 15cm** in any direction, and weigh **at most 200g** (excluding payload). The beanbags must be removable, undamaged, from the carriers after the challenge.
4. Payload carriers, if any, must be clearly coloured red or green, and only a beanbag of the same colour may be placed in it.
5. Drone(s) may be equipped with a corresponding pickup mechanism as long as it is within the drone(s)' dimensional and weight constraints.
6. Payloads must be arranged along the circumference of a **1.5m diameter circle** on the ground within the Supply Zone at the start of the challenge, such as in the example below. Teams may place fewer than 18 payloads.



7. Ground support structures may be used to support the payload, so long as the payload's lowest point is within 1cm off the ground. Stacking of payloads on top of one another is not permitted.
8. Once teams have started the mission, no direct human intervention to adjust the positions of the payloads is allowed.
9. Each drone may pick up its payload without landing. No direct human physical intervention is allowed when loading the payload. A single drone may carry multiple payloads.
10. Payloads must not be dragged on the ground outside the Supply Zone.

3.3.4 PAYLOAD RELEASE

1. There are no restrictions on the number of drones entering the Light Grids.
2. Each payload must be released while the drone is in the air.
3. If the payload is released when the drone has landed, it will not count as a valid drop.
4. Once the payload has dropped on any Light Tile, teams are **NOT** allowed to retrieve the dropped payload with their drone(s). They are

required to fly the drone back to the Supply Zone to pick up a new payload.

5. If the payload does not land cleanly within a tile, it will not be counted as a successful drop.
6. Points will not be awarded for payloads dropped onto an already scored/white tile.

3.3.5 SAFETY AND ADMIN

1. Each team must consist of **TWO (2)** to **FIVE (5)** members.
2. All drones must follow CAAS regulations (e.g. CAAS registration sticker must be visible on drone). For drones above 1.5kg, the pilot must have completed UA Basic Training (UABT). Any disregard for CAAS regulations will result in **disqualification**.
3. All drones must be inspected by an SAFMC official designated event staff 30mins before the team's competition slot.
4. Teams are allowed to change flight batteries during the game only if the drone has landed on the Launchpad AND there are no airborne drones within the playfield.
5. The drone(s) can only take-off when there are no people within the drone-side of the playfield.
6. If any drone(s) malfunction or crash, no disruption to the match is allowed. Teams are only able to retrieve their malfunction/crashed drone(s) after the match ends. No troubleshooting of drone(s) is allowed during the mission.
7. In the case where all the drones in one of the teams are taken out of the game, the opponent has to continue to attempt to win the game. In the event that all the opponent's drones are also inoperable or if the mission time is up, the scores up to that point will be considered.

8. During the qualifying round, teams may be given up to **TWO (2)** attempts, and the shorter time, or the higher score if each attempt took the whole mission time, will be used. Practice time may be given if schedule permits. For the knockout round, only **ONE (1)** attempt will be given.
9. For each attempt, each team will have a **duration of up to TEN (10) minutes of mission time** to compete in the playfield, or until the team or opponent (during knockouts) has completed their task.
10. Each team will be allocated one section of the playfield, which will be separated from the other section by system partitions. If **any part** of the team's drone crosses to the other team's section of the playfield, the offending team will be **disqualified** from the competition.
11. Teams that are competing against each other can decide to choose the section of the playfield that they want or to flip a coin.
12. Both teams will then be given **TEN (10) minutes of set-up time** prior to the mission start time. During this time, teams are allowed to set up their pilot booth, Supply Zone and Launchpad. No additional markers and/or hardware is allowed inside or outside of the playfield except at the pilot booths.
13. Each competing team will be allocated a RaceBand frequency at the start of each race which they must use.

	Frequency (MHz)							
Band	Ch1	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6	Ch 7	Ch 8
Raceband	5658	5695	5732	5769	5806	5843	5880	5917

14. Teams are required to set their video transmitter (VTX) to broadcast at their allocated RaceBand frequencies. Other teams (not competing) are not allowed to turn on their VTX when a race is ongoing.
15. The allowable VTX power limit will be capped at 100 mW.
16. Teams are permitted to power on their drone(s) and VTX for testing during the set-up time but are not allowed to fly out of the Launchpad. No one is to be in the playfield while there is any airborne drone during this time. Offending teams will be **disqualified**.
17. Once the 10 minutes of setup time is up, the mission time will automatically start. Any drones that are not at the Launchpad will have to return to the Launchpad first before any action will be recorded. The mission time will continue to run throughout and will **not** be paused in the event of any landing, maintenance or repair works, etc.
18. The radio transmitter must have an emergency switch to terminate the operation of all the drones, and teams are required to demonstrate this during inspection.
19. Teams with inoperable drone(s) are allowed to repair in between races. If the drone is deemed incapable of flight, a new identical copy of the drone can be used for the next race. There will be no restriction on the number of spare drones the team can prepare so long as the drone is replaced by another drone of the same design, at the discretion of the Chief Referee or Category Man-Machine Technical Chairperson.
20. In case of doubt, the Chief Referee or the Category Man-Machine Technical Chairperson has the final decision.

3.4. MISSION SCORING

The referees will make all scoring decisions and their decision is **final**. For arbitrary cases, the Chief Referee will have the **final** say. Mission scores take up 40% of the total Championship Score.

Successful delivery of payload requires that a **single** payload is **dropped on a Light Tile of the same colour**. Dropping a payload onto a white or differently coloured tile does **NOT** count, and if two payloads are dropped simultaneously on a tile, only one of the correct colour (if applicable), will be considered.

At the end of each knockout round, points will be tallied and winning teams will proceed onto the next round. Knockout rounds will continue until a single team is left standing and is declared the winner. The winning team will receive the full mission score (40%). This will be followed by the 2nd team receiving 35%, the 3rd and 4th teams receiving 30%, the 5th to 8th teams receiving 25%, and the rest receiving 20% each.

3.5. PENALTIES

The sum of penalties will be deducted from points acquired in the mission attempt to give a final mission score. The referees will make all scoring decisions and their decision is **final**. For arbitrary cases, the Chief Referee will have the **final** say. Further correspondence will not be entertained.

LIST OF MISSION PENALTIES

S/N	DESCRIPTION	PENALTY
1	Exceeding the 10 minutes setup time for Category Man-Machine.	Mission time will start regardless.

2	Use of external markers/hardware outside of the playfield and pilot booths.	Referee's discretion or **disqualification**
3	No additional internal markers/hardware within the playfield.	Referee's discretion or **disqualification**
4	Interrupting the competition by potentially interfering with other competitors, e.g. switching on your drone's VTX, transmitters, etc.	Referee's discretion or **disqualification**
5	Drone crossing into opposing team's playfield.	Referee's discretion or **disqualification**
6	Attempting to subvert competition rules or gain an unfair advantage over other teams, e.g. receiving assistance from spectators, etc.	Referee's discretion or **disqualification**

4. SCORING

There is a total of **FIVE (5)** scoring components for the competition, namely: Aerial Platform **(A)**, Creativity **(C)**, Learning Journey **(L)**, Team Challenge Video **(V),** and Mission **(M)**. The first four components (A, C, L, and V) will be assessed by our Category Man-Machine judges, while the Mission (M) factor will be computed from the highest attained score from the challenge attempts.

Scores will be awarded relative to the performance of other teams. Further details on the scoring components can be found below.

The weightage of the scoring components is listed as follows:

Segment	Factor	Weightage
Presentation	**A**erial Platform	20%
	Creativity	20%
	Learning Journey and Insight	10%
	Team Challenge **V**ideo	10%
Competition	**M**ission	40%
	Total	100%

4.1. AERIAL PLATFORM FACTOR (A)

The **Aerial Platform Factor (A)** will be awarded based on the ability of the teams to demonstrate a comprehensive understanding of the following areas and apply them when designing and constructing their flying machine. It carries a 20% weightage to the overall score.

No points will be deducted for wholesale usage of COTS products with little or without modifications.

1. Platform Choice
    a. If a COTS product is used, teams are to explain:
        i. Choice of COTS products.
        ii. Modifications to COTS products, in the form of payload mechanism.
    b. For custom-built drones, teams are to explain:
        i. Aerodynamic Design
        ii. Centre of gravity placement
        iii. Design factors affecting platform's flight stability, responsiveness, and controllability
        iv. Sizing for lift / thrust

2. Mechanical Design
    a. Quality of fabrication, workmanship, materials used
    b. Platform weight optimisation

3. Electronics Design
    a. Power / Battery sizing to meet mission objectives
    b. Explanation of choice of sensor suite for the given environment
    c. Explanation of choice of embedded computer / microprocessor
    d. Neatness of harnessing and aesthetics

4.2. CREATIVITY FACTOR (C)

The **Creativity Factor (C)** is based on:

1. what type of mechanism is used and how it is integrated with the drone to tackle the obstacle course.
2. how the payload is carried and how successful payload release/retrieval is achieved.

The above two criteria carry a 20% weightage to the total score. Teams are to explain in detail about the above during the presentation segment.

Teams are also encouraged to utilise and present unique concepts which capitalize on the usage of wearable technology to enhance semi-autonomous drones.

4.3. LEARNING JOURNEY AND INSIGHT (L)

The **Learning Journey and Insight Factor (L)** is related to quality and content of the presentation. It carries a 10% weightage to the overall score.

1. Time management
    - Finishing within the allotted time, with enough time allocated for each segment.
2. Delivery

- Speakers are clear and concise.
- Speakers are able to answer questions smoothly.

3. Content
    - Information presented is relevant to the flying machine and the team's project progress.
    - Team is able to explain the rationale behind design choices and major decision.
    - Team is able to express what they have learnt through the process and their learning journey.

4. Teamwork
    - Presentation should highlight the work of all the team members, and how they have contributed and cooperated to the team.
5. Fun
    - Should be able to capture the attention of the judges.
    - The judges should enjoy your presentation.

4.4. TEAM CHALLENGE VIDEO (V)

The **Team Challenge Video (V)** scores provide a proof-of-flight insight into how the drone performs. It carries a 10% weightage to the overall score.

1) Flightworthiness
    - Drone must be shown to perform stable, sustained flight.
2) Mission-readiness
    - Demonstrate that drone(s) is/are shown to be able to fulfil mission requirements; fly a route while carrying a payload and when the drone is hovering at a fixed point, able to release the payload successfully.
    - Explain the on-board sensor suite for each unique drone to be used in the challenge segment.

3) Creativity
    - How the mechanism is used to pick up the payloads and whether it can pick up multiple payloads.
    - Delivery of video (i.e. how it is filmed/presented)

4.5. MISSION FACTOR (M)

The mission attempt scores will form the **Mission Factor (M)** score. Please refer to Section 3 for the mission scoring and penalties. This carries a 40% weightage to the overall score.

5. FLOW OF EVENTS

Similar to real-world scenarios, teams may face unexpected issues during the competition. They should not expect the conditions or layout of the challenges to be fully defined beforehand or to remain identical for each attempt between competitors. Factors such as venue conditions, and other uncontrollable elements can also influence competition results.

5.1. PRESENTATION SEGMENT

Teams will deliver their presentation to a panel of judges in person during the challenge day.

Teams will be given a maximum of **TEN (10)** minutes for this segment. **FIVE (5)** minutes are allocated for the team presentation, and **FIVE (5)** minutes for Questions & Answers.

Please refer to Section 4 for scoring factors for the presentation segment.

During the presentation segment, teams are required to:

1. Bring each unique aerial platform used for the challenge.
2. Teams are to prepare a presentation in power point format with **no more than 5** slides for the presentation (including cover slide if any).

5.2. TEAM CHALLENGE VIDEO

Teams are to submit **ONE (1)** Team Challenge Video to the SAFMC organising committee. The video length should be no longer than **TEN (10)** minutes and should include the key components as stated in Section 4.

Videos should be uploaded to YouTube and set as "Unlisted". The link to the video should be sent to SAFMC@science.edu.sg with title subject: "[CAT MAN-MACHINE] - [Team Name] – Challenge Video" before the deadline. The deadline for submission is **28 February 2026, 2359hrs**. Video should be uploaded before the deadline, and any re-upload of the video detected past the deadline may result in **penalisation** or **disqualification**. You may write in to the SAFMC 2026 organising committee to request for a re-upload of the Team Video if necessary.

The submitted video should adhere to the following guidelines:

1. Animations are **NOT** allowed.
2. Computer-aided simulations may **NOT** be used to prove flightworthiness or mission-readiness.
3. Video must **NOT** be produced by a professional, or with professional assistance.
4. No offensive images or audio.
5. Narration and/or subtitles are allowed.
6. All videos must be original work conceived and created by the participants. No copyright materials (images, music, etc.) may be used in the video unless the participants own the copyright or have a license to use the material in the video.
7. If the participants have gained formal permission to use any copyright materials (images, music, etc.) under terms and conditions stipulated by the copyright owners, acknowledgements/credits must be included at the end of the video.

8. The use of logos including known commercial brands, institutional crests or trademarks, unless integral to the project, is not allowed.
9. Ownership of the underlying intellectual property of the video remains with the participant(s) of the individual/team project, with the following exception:
    a. Participant(s) grant the SAFMC organising committee the right to use, distribute and display their videos without further compensation or notification to the participant(s).
    b. Participant(s) grant the SAFMC organising committee the right to use their images and videos for publicity and advertising without further compensation or notification to the participant(s).

5.3. CHALLENGE SEGMENT

Teams are expected to comply with the following during the competition segment:

1. Teams are to arrive at their designated reporting time.
2. At the allocated competition schedule, the team shall report to the safety inspection point. An SAFMC official will check the drone for any violation of the category rules and regulations. Teams who do not pass the inspection will **not** be allowed to fly their drone in the challenge segment and may face **immediate disqualification** from the competition. The inspection will include, but is not limited to, the following checks:
    a. The maximum take-off weight (MTOW) and size of the drone.
    b. RC / datalink / video link transmitter and receiver are operating on allowed frequencies.

c. Electrical harnessing should be appropriately insulated and should not be chafed or broken. No exposed wires and connectors are permitted.
d. All major assemblies and critical components must be securely fastened to the drone; loose items should be tied down and kept away from the propellers.
e. For drones operating on semi-autonomous mode, it should allow complete manual pilot override on-demand via RC or GCS.
f. The drones must demonstrate failsafe capability in the **event of a loss of link** between the RC/GCS and the drone. The failsafe check procedure is as follows:
    i. All propellers and releasable payloads are to be removed from the drones.
    ii. Flight motors will be armed and throttled up.
    iii. While the motors are still spinning in the same flight mode, the Wi-Fi router(s) will be switched off to simulate a link loss.
    iv. All motors should come to a **complete stop immediately**. The drones should **not** attempt a hover / controlled descent / to return home.
g. An SAFMC official will be with the operator during the mission attempt. The official may give instructions to the operator depending on the behaviour of the drone (e.g. to land immediately if the drones appear to be uncontrollable). The operator is to comply immediately with all such instructions, which may include the activation of the failsafe to ground the drones.
h. The drones must demonstrate **failsafe capability** upon **operator command**. The failsafe check procedure is as follows:

i. All propellers and releasable payloads are to be removed from the platform.
ii. Flight motors will be armed and throttled up.
iii. While the motors are still spinning in the same flight mode, the operator must be able to activate a kill-switch.
iv. All motors should come to a **complete stop immediately**. The drones should **not** attempt a hover / controlled descent / to return home.

i. Failsafe capability for the DJI Tello drones will be the OEM default failsafe logic. Any tampering or modifying of the OEM failsafe logic (unless to meet Point 2(e), Point 2(f) and Point 2(h)), will result in a **disqualification**. Tello drones are exempt from Point 2(e), Point 2(f) and Point 2(h), because:
    i. The Tello SDK does not allow for the expected failsafe behaviour to be configured.
    ii. DJI Tello drones do not allow motors to function when propellers are removed.

j. At the end of each mission attempt, the radio control transmitter, datalink transceiver, video receiver and any other wireless device for the drones must be switched off.

5.4. KEY RULES TO NOTE

Rules for personnel movement and communication during the setup time and the mission attempt are dictated in the following points:

1. Only members of the participating team are allowed to be inside the playfield during their allocated time.
2. No outside communication or assistance from the audience / spectators is allowed at any point. No headphones or earpieces are

allowed to be worn by the operator/pilot. Teams who flout this rule may be **disqualified**. Communication amongst teammates is allowed.

3. The netted playfield **must** be clear of persons whenever any drone(s) are armed or in flight.
4. If any drone(s) are **connected to batteries**, persons entering the netted playfield **must** don the appropriate Personal Protective Equipment (PPE), which will be provided.
5. Team members may enter the field to collect their drones, or to bring it out of the playfield to modify or repair (including changing batteries) **after** they have landed and have been disarmed. Entry into the playfield is only allowed upon confirmation with SAFMC officials.
6. Multiple video **receivers** are allowed. Only **ONE (1)** video transmitter is allowed for each drone.
7. No radio control transmitters, datalink transmitters and video transmitters and receivers are to be switched on within the competition venue, unless permitted to do so in the holding area or playfield. All repairs / maintenance / troubleshooting should be done in Raceband channel 8 with VTX set to either 25mW or pit-stop mode. Non-compliance may lead to **disqualification**.
8. There will be a charging space allocated for teams to charge their batteries. Teams will have to bring their own charger/charging equipment should they plan to charge their batteries. At any point, there **MUST** be at least **ONE (1)** team member overseeing the charging. Failure to do so will result in **disqualification**.
9. Teams shall make sure that their designated representatives are contactable and should arrive at least **TEN (10)** minutes before any allocated timing. Latecomers may have their mission times shortened or may be **disqualified**.

6. TECHNICAL RULES & REGULATIONS

Each team is to design and build a flying machine based on the following guidelines:

1. Off-the-shelf products and components are allowed in the competition.
2. For safety considerations, the total weight of the flying machine **must not exceed 2 kg (including maximum number of payloads).**
3. The platform **should not exceed 100 cm** in any direction (this measurement includes the maximum diameter of the propeller circles).
4. Teams can bring similar backup drones to replace any drones that has become incapable of flight. Changing of drones during runs is not allowed. Teams can only change drones between runs.
5. Only electric-based flight propulsion is allowed. Both brushed and brushless motors are allowed. No modification to the motors is allowed.
6. No internal combustion or gasoline engines are allowed.
7. No tethering or umbilical wires to the drones are allowed during flight.

6.1. AVIONICS SYSTEM

There is no limit on the number of inertial measurement units (IMUs), flight controllers (FCs), and other electronics used in the drones.

6.2. BATTERY

There is no limit on the number of batteries used, in series or parallel. Participants should size their batteries and drones appropriately for the respective mission. Lithium-Polymer (LiPo) batteries are preferred.

Batteries must be properly strapped or locked onto the drones before launch.