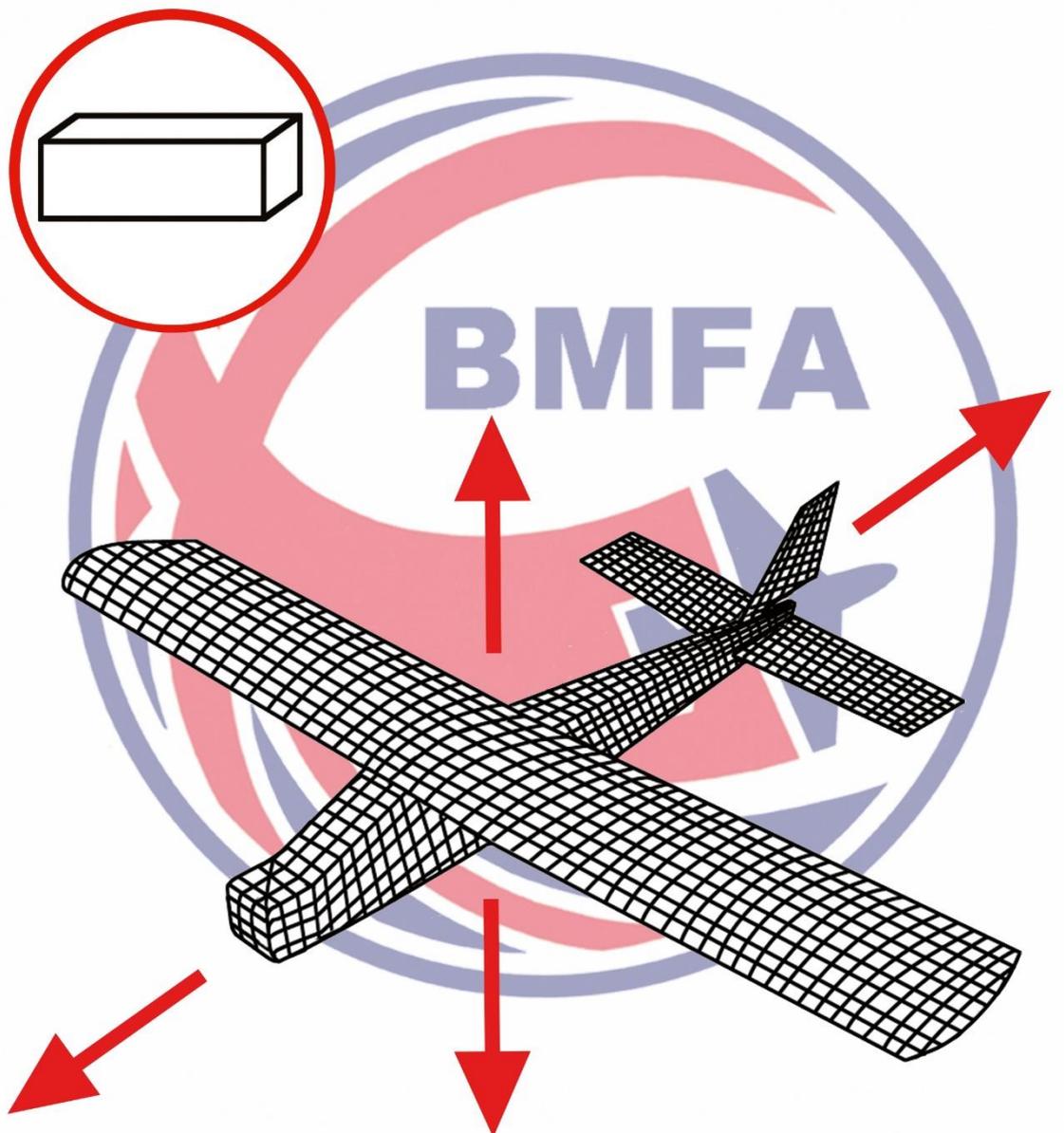


British Model Flying Association

2024

Payload Challenge 3

Distance



**British Model Flying Association
2024 University and Schools
Payload Challenges**

Dates Notice

11th, 12th & 13th June 2024

**National Centre for Model Flying
BMFA Buckminster
Sewstern Lane
Grantham
Lincolnshire
NG33 5RW**

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model aircraft

The British Model Flying Association invite your school or youth group to enter a team or teams in the

2024
Payload
Challenge 3
Distance

The information contained in this brochure provides a detailed overview of the 2024 Payload Challenge (Distance) as well as all information and forms for prospective entrants. We look forward to meeting your staff and students in 2024.

Should you require any assistance please contact
the BMFA Challenge Co-ordinator.
Manny Williamson
manny@bmfa.org

NOTE

These competitions are supported by cash prizes, both for the school/department and the individual members of the winning team.

INTRODUCTION

The Payload Challenge 3 (Distance) has been developed as an introduction to the more advanced concepts of aircraft design and build, and also a meaningful lead in to Challenges 4 and 5.

The academic requirements are less rigorous than the more advanced challenges 4 and 5 (Quantity and Weight). Teams are required to produce 3 view drawings summarising their design process and are also required to conduct a 5 minute presentation to a team of expert judges prior to the flight element of the competition.

For the flying element of the competition, teamwork, planning and a well-structured approach combined with a well-designed and practical airframe will be key elements to success in this competition.

Please note that it is strongly recommended that the help of an experienced aero modeller is enlisted from the very start.

Local contacts are available from the BMFA office.

We look forward to receiving your team's entry for the 2024 Payload Challenge 3.

Sponsored by the Royal Aeronautical Society

- The Royal Aeronautical Society (RAeS) is pleased to be the headline Sponsor for the 2024 BMFA Payload Challenge.
- The RAeS will provide Aerospace Professional support for judging and operation of the competition.
- This support for the competition is part of the RAeS outreach programmes to schools, colleges, and universities.
- The RAeS also provides career support to aspiring and established Aerospace Professionals and details can be found on its website at <https://www.aerosociety.com/careers-education/>



GENERAL CONTEST RULES

TEAMS

- G 1.1** A team will consist of a maximum of five students plus a manager and a pilot.
- G 1.2** For the flying element of the contest a pilot can be supplied by the contest organisers if required.
- G 1.3** Only registered team members may participate in all elements of the competition.
- G 1.4** The role of team manager is an organisational position, however for teams with less than 5 members, the manager may participate as an active member of the team.
- G 1.5** All team members including the manager and pilot must attend the daily morning briefings.
- G 1.6** Team pilots will receive an individual flight-line briefing as appropriate.
- G 1.7** Teams will be allocated a defined workspace in the hangar building and must work within the designated area.
- G 1.8** Teams should familiarise themselves with the contents of the competition rules brochures.

AIRCRAFT CONFIGURATION

- G 2.1** Aircraft must be of fixed wing configuration (no rotating lifting surfaces).
- G 2.2** The specified power system for each category must be used.
- G 2.3** Only the battery pack supplied by the organisers may be used for the flight competition.
- G 2.4** No modification to the motor is permitted.
- G 2.5** Only the specified “isolator” unit must be fitted (XT60-Wall)
- G 2.6** The “isolator” must be mounted in such a location as to be readily accessible by team members and also easily visible to flightline marshals.
- G 2.7** The Isolator unit must be located a minimum of 100mm from the propeller arc and orientated so as to promote removal of the isolator predominantly away from the direction of the propeller arc (25 degree minimum).
- G 2.8** The isolator unit must be accessible from behind the propeller arc, insertion/removal must not be through the propeller arc.

- G 2.9** A tag or pennant must be affixed to the isolator to aid removal and visibility.
- G 2.10** Only one flight battery may be used per flying round.
- G 2.11** A propeller spinner or rounded safety nut must be fitted on forward facing motors.
- G 2.12** The allocated team number must be displayed on the upper wing surface of the aircraft in characters a minimum of 100mm high in a contrasting colour.
- G 2.13** Aircraft must display a valid UK Operator ID Number before flying – this is a legal requirement, teams will be provided with a sticker carrying the appropriate number at aircraft scrutineering.

RADIO RESTRICTIONS

- G 3.1** Radio control will be used to fly and manoeuvre the aircraft.
- G 3.2** Equipment on the 2.4GHz band only.
- G 3.3** A correctly set failsafe must be programmed that as a minimum returns the throttle to stop on loss or corruption of the radio signal – this is a UK legal requirement.
- G 3.4** Aids to flight stabilisation such as gyros and auto level are not permitted unless stated in the specific challenge rules.

FLIGHT COMPETITION

- G 4.1** The flight-line controller has overall responsibility and authority for all matters relating to flight safety.
- G 4.2** Once the flight-line has opened for competition flights no other flying must take place other than with the permission of the flight-line controller.
- G 4.3** A flight may not commence until the pilot has received a flight-line briefing from the flight-line controller or their appointee.
- G 4.4** A flight may not commence without the permission of the flight-line controller or their appointee.
- G 4.5** The pilot must perform appropriate pre-flight checks.
- G 4.6** Only the registered team members plus the pilot and manager may be in the competition flight box during a competition flight.
- G 4.7** Only the registered team members (maximum of 5) may take an active participation and handle the aircraft and payload during the competition flight.
- G 4.8** Team members may only enter the active runway for aircraft dispatch/recovery with permission of the flight-line controller or their appointee.

G 4.9 The aircraft must be made safe (isolator removed) before handling, this must be clearly demonstrated to the flight-line controller or their appointee.

G 4.10 Non-compliance with flight-line safety procedures may result in a zero score for the related flight and for repeated violations a zero score for the round.

G 4.11 Pilots must act immediately as directed by the flight-line controller or their appointee at any time an aircraft is in the air and must ditch (forced termination of flight) immediately if directed.

G 4.12 The extent of the flying area will be announced during the pilots briefing, any pilot flying within the briefed “no fly” areas will be directed to land immediately.

G 4.13 The number of flight rounds will be announced at the pilots briefing to reflect the expected weather conditions and number of entries.

G 4.14 The distances indicated on the flight plan sheet are for guidance purposes only, these will be set and announced at the pilots briefing to reflect the prevailing wind conditions and location on the airfield.

CONDUCT

G 5.1 Deliberate or repeated violation of safety rules may result in the team’s expulsion from the competition.

G 5.2 In the event of unsportsmanlike conduct, the team will receive a warning from the Competition Director. A second violation will result in expulsion of the team from the competition.

G 5.3 The Competition Director reserves the right to ground any aircraft if in their opinion, or that of their appointee, the aircraft does not meet an appropriate standard of air worthiness.

PROTESTS

G 6.1 Any protest must be filed in writing to the Contest Director by the team manager.

G 6.2 Any protest relating to the flying element of the competition must be filed no more than 15 minutes after the Flight Competition is announced as being completed.

G 6.3 In order to have a protest considered a team must be willing to sacrifice points as specified in each Challenge, which may be forfeit, if their protest is not upheld.

G 6.4 The Contest Director may call upon a jury of interested parties to help with their decision.

G 6.5 The Contest Director carries the final vote in the event of a split decision.

GENERAL

G 7.1 Time for flight testing will not be available on the day of the competition except at Contest Director's discretion where it is deemed advisable to conduct a test flight after repairing major damage incurred in an earlier round.

G 7.2 Tuesday 11th June is the official practice day for the competition, teams arriving before this date will not be permitted to use the flying area.

G 7.3 Teams arriving from overseas in advance of the competition must not attempt to fly their aircraft at any location other than the official competition venue *

G 7.4 Teams found to be flying unlawfully prior to the competition may be subject to scoring penalties or disqualification.

*** This is a legal requirement – in order to fly a model aircraft in the UK pilots and aircraft are required to be registered with the UK Civil Aviation Authority under the terms of the Article 16 Authorisation granted to members of the British Model Flying Association.**

Non compliance with the terms of the Article 16 Authorisation is a criminal offence under UK Law.

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Competition resources supported by



<http://www.4-max.co.uk/bmfa-payload-challenge.html>

Visit their website to view materials for the 2024 Payload Challenges but it is important that you place your order either by telephone or email in order to receive the discounted payload challenge prices.

Quote **2024BMFA** for 10% discount on competition items.

Please note: the BMFA does not stock competition materials.

D 1 OBJECTIVES

D 1.1 Teams are to research, design, build and prove an electric powered, radio controlled aircraft, to transport the designated payload over the longest distance possible in a prescribed 6 minute time slot utilising a standardised propulsion unit.

D 1.2 Teams are required to produce 3 view drawings summarising their design process.

D 1.3 Teams are then required to give a verbal presentation in front of a panel of judges on their aircraft.

D 1.4 Teams are required to take part in a flight competition to demonstrate the performance of their aircraft.

D 1.5 The winning Team is the Team with the highest aggregate score for all aspects of the competition.

D 1.6 Although normal course tuition and guidance is expected, the reports, drawings and the building of the aircraft are to be treated as though they are examination submissions and are to be the sole work of the students.

D 2 CHALLENGE ELIGIBILITY

D 2.1 The contest is open to all students in full time education including accredited apprenticeships.

D 2.2 Applications outside of this criteria will be considered on an individual basis.

D 3 PAYLOAD

D 3.1 Provision should be made to accommodate a payload measuring a **maximum** of 150mm x 150mm x 300mm, the payload will be supplied by the organisers and will have a **maximum** weight of 500g, the assumption must be made that the payload will include instrumentation and data recording capability, and as such must be mounted to the airframe securely to ensure that it cannot move or breakaway in flight.

Note: It is likely that organisers will test the payload area with a block measuring 148mm x 148mm x 298mm, it is suggested that where the provision is made for internal carriage of the payload teams do not aim for a very tight fit, as failure to accommodate the appropriate payload dimensions will remove the aircraft from the flight competition until rectified.

D 3.2 The payload may be mounted externally or internally but may in no way contribute to the strength or integrity of the airframe.

D 4 AIRCRAFT - POWER REQUIREMENTS

- D 4.1** Aircraft must be of a fixed wing design (no rotating lifting surfaces).
- D 4.2** There are no dimensional restraints on aircraft design.
- D 4.3** The power system will comprise one 4-Max PO-3541-1070 motor and 4M-ESC50AV2 speed controller.
- D 4.4** The aircraft design must incorporate an XT60-Wall bulkhead mounted isolator unit to disconnect the battery from the speed controller when the isolator plug is removed.
- D 4.5** One 3 cell Lithium Polymer battery PPL-60C3S-2200 of 2200 mAh nominal capacity per round (**supplied fully charged by the organisers for each round**).
- D 4.6** No modification to the motor or ESC is permitted.
- D 4.7** The motor may be used as direct drive only (no gear boxes)
- D 4.8** Propellers must be of fixed pitch.
- D 4.9** Only batteries supplied by the organisers may be used for competition flights.
- D 4.10** Batteries will be fitted with XT60 connectors (negative to pointed end)

DUPLICATE/REPLACEMENT AIRCRAFT

- Teams may submit multiple aircraft for scrutineering.
- Teams must indicate which aircraft is their primary aircraft.
- Replacement aircraft must be of identical design to the primary aircraft.
- Replacement aircraft must weigh no less than the primary aircraft.
- Teams must indicate to the flight-line team when a duplicate/replacement aircraft is being utilised for the flight-line competition.
- A penalty of 15 points will be applied to the flight round score (for that round only) where a duplicate/replacement aircraft is utilised.

W 5 RADIO RESTRICTIONS

- D 5.1** Radio control equipment must utilise the 2.4Ghz band and be UK compliant.
- D 5.2** The use of gyros/auto stabilisation is permitted, however any aids to stable flight must be able to be overridden by pilot command at any phase of flight.
- D 5.3** Fully autonomous flight is not permitted in this class.
- D 5.4** Radio installations will be scrutinised by the organisers and must be deemed fit for the intended application.

D 6 COMPETITION PROCEDURES

There will be three elements to the competition in which all teams are required to participate.

D 6.1 The design element, which will enable the contestants to present their designs in a three view drawing.

D 6.2 The presentation, where students will be required to explain their design to a panel of judges.

D 6.3 The flight element will determine which aircraft is able to cover the most distance within the allotted time period (most laps of the course over all rounds flown).

D 6.4 Each team must display their designated entry reference on the wing of the aircraft in characters a minimum of 100mm high in a contrasting colour. Aircraft not fulfilling this requirement will not pass scrutineering and processing.

D 6.5 Subsequent to each team's presentation, aircraft details will be recorded.

D 6.6 A safety and airworthiness inspection will also be conducted to enable teams to address any item requiring attention before flight. Correct failsafe operation must also be demonstrated at this time so it is important that the transmitter is made available to the scrutineering team.

Q 7 SCRUTINEERING

D 7.1 All aircraft must pass through scrutineering and receive a "passed" sticker before being eligible for all elements of the challenge.

D 7.2 More than one aircraft may be submitted for scrutineering.

D 7.3 Where multiple aircraft are presented teams must indicate which is their primary aircraft.

D 7.4 Aircraft must be presented for scrutineering with the following items: -

- The controlling transmitter
- The correct propeller (not fitted)
- The isolator plug (not fitted)

D 7.5 Aircraft scrutineering will cover the following points:-

- General airworthiness/structural integrity
- Compliance with competition rules
- Correct operation of failsafe

D 7.6 On completion of successful scrutineering "passed" stickers will be affixed to major/detachable airframe components.

D 7.7 Duplicate/replacement aircraft will receive a different colour "passed" sticker.

D 7.8 The design submitted for scrutineering must be in accordance with the drawings and reports submitted for judging (see penalties section).

D 7.9 Following any repair, aircraft must be re-scrutineered and approved for flight by the Contest Director or their appointee.

D 7.10 Where major components are substituted this must be cleared with the Contest Director or their appointee and indicated to the flight-line team

D 7.11 Any repair or modification that alters the design of the aircraft submitted for judging (for example to improve flight performance or controllability) must be approved by the Contest Director or their appointee.

D 8 DESIGN COMPETITION

DRAWINGS

D 8.1 Each team must submit a three view drawing for the aircraft which is to be flown. The drawing is not required to be to scale but must contain dimensioned front, end and plan elevations. Drawings must include the name of the team and the designated reference number in the title box.

Teams must submit the drawing set by Email in PDF format to the Challenge Administrator lisa@bmfa.org 30 days prior to the flight competition.

The drawings will be worth a maximum of **25 points** which will be allocated as follows:

3 clear views	max 5 points
Inclusion of relevant dimensions	max 5 points
Description of materials utilised	max 5 points
Manufacture/assembly notes	max 5 points
Overall graphic quality/clarity	max 5 points

PRESENTATION

D 8.2 Prior to the first competition flight, each team will present their aircraft design before a panel of professional engineers.

D 8.3 Each team will be allocated five minutes in which to describe and promote their design.

D 8.4 Content falling outside of the allocated time will not be considered during marking.

D 8.5 Visual aids will not be permitted, however teams may utilise material/test samples, aircraft cross section samples and replica components as part of the presentation to judges.

D 8.6 The aircraft must be available for the presentation.

D 8.7 A **10 point** penalty will be incurred if the complete aircraft does not feature as part of the presentation.

D 8.8 The presentation is worth **30 points**. Judging criteria for the presentation will include:

- Balance and continuity
- Articulation
- Technical highlights

D 8.9 Subsequent to each team's presentation, aircraft details will be recorded.

NOTE: Experience has shown that teams do not make the best use of the opportunity to gain the additional points that the presentation offers, remember, your team's presentation should aim for a professional standard and "sell" the benefits of your particular design to the maximum.

This competition is as much a test of your organisational skills as of your engineering flair. You may well have a world-beating design....on paper but each year several teams fail to complete their projects by the date of the Flight Competition.

D 9 FLIGHT COMPETITION

D 9.1 The aircraft must be rendered "safe" on all occasions that it is handled by the team for the purpose of payload loading, a team member must display the isolator/breaker for the benefit of the flight line marshals during loading and unloading.

D 9.2 At the start of the prescribed time slot the model should be without payload, on being given the start signal the team must load the aircraft with the payload. The model must then be carried to the take off line and set down facing predominantly into wind, at this time the power system can be rendered "live" by inserting the "isolator".

D 9.3 The aircraft must take off from a standing start (no pushing) utilising its own undercarriage. The take off must be completed before passing pylon number one.

D 9.4 Having completed a successful take off the model must proceed to pylon number one whereupon a flag will be raised immediately the model has passed the pylon. The aircraft will then proceed to pylon two where the same process will apply. The aim is to complete the highest number of laps of the course within the permitted time allowance. Only completed laps will count towards the overall score, the initial lap including the take off will be counted as one lap.

D 9.5 Should a successful take-off not be completed, teams may retrieve the model for further attempts without reloading the payload within the allotted time period.

D 9.6 The aircraft must complete a successful landing, remaining in airworthy condition other than damage to undercarriage and propeller.

D 9.7 The aircraft must come to a complete standstill before a team member may approach, disarm, then retrieve the aircraft and return it to the loading bay, this will be controlled by the Flight Line Controller.

D 9.8 At the end of the time slot the details of the flight will be recorded by the Flight Line Controller and added to the judge's scorecard.

D 9.9 The aim is for each team to fly three, six minute slots, however, a final decision will be announced at the morning briefing to reflect the time available, the number of teams competing and the expected weather conditions.

D 9.10 The distances indicated on the flight plan sheet are for guidance purposes only, these will be decided and set prior to the commencement of the flight competition.

D 9.11 Time for flight testing will not be available on the day of the competition. Entrants should test fly their aircraft prior to the weekend of the competition.

D 9.12 For protest information see General Rules but in this category the team will need to put up 20 points.

D 10 SCORING

Penalty points are assessed as follows:

- **2 points deducted for each day or part day late in delivery of drawing.**
- **10 points deducted for no aircraft at presentation**
- **20 points deducted for unsuccessful protest.**
- **A penalty of 15 points will be applied to the flight round score (for that round only) where a duplicate/replacement aircraft is utilised.**

The flight score will be normalised, **100 points** will be awarded to the team who complete the largest number of laps over all rounds and all other team's scores will be calculated as a percentage of this figure.

See scoring information panel for further details

Challenge 3: Distance Scoring

Design Drawing: One single PDF.

Category	Points Available	The judges would like to see:
3 Clear Views	5	Plan, side and front views
Inclusion of leading dimensions	5	Include wing-span, length, wing area, CG, control surface outlines.
Description of materials used	5	Label details in views to show parts made from ply, balsa, foam, etc.
Manufacture/assembly notes	5	Such as: hot wire foam, laser cut parts, 3D printing, laminating, covering.
Overall graphic quality/clarity	5	Neat outlines, clear text, fine leader lines and uncluttered dimensions.
Total Max Points	25	

Presentation (5 minutes)

Category	Points Available	The judges would like to know:
Balance and Continuity	10	In 5 minutes, the team is to describe the design of their aircraft. Include any interesting features and promote your design. We like to see contributions from several team members.
Articulation	10	
Technical Highlights	10	
Total Max Points	30	

Flight Competition

	6 minutes round time		End of allocated round time	Flight Score
	Round time starts, aircraft is loaded with the payload and takes off from the runway	Fly continuous circuits around the pylons	Land safely	
Round 1	 6 minutes round time available			Count the number of completed laps
Round 2	 6 minutes round time available			Count the number of completed laps
Round 3	 6 minutes round time available			Count the number of completed laps

Example Round	Aircraft completes 12 laps and is halfway to the 13 th at end of the round time	Flight score = 12
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Normalisation of flight scores

Upon completion of all three rounds, the number of laps are added together. The team with the highest aggregate score is awarded **100** points. All other scores are calculated as a percentage of this figure.

Drawings	Max possible score	25 points
Presentation	Max possible score	30 points
Normalised flight score	Highest aggregate flight score	100 points
Penalty 1	Late drawing	-2 points per day
Penalty 2	No aircraft at presentation	-10 points
Penalty 3	Protest not upheld	-20 points
Penalty 4	Use of duplicate aircraft	-15 points

D 11 PRIZE AND AWARD DETAILS

1st Place

Presentation of the BMFA University and Schools Payload Challenge Trophy.

£100.00 Cash prize, paid to university department or school.

£25.00 Cash prize, paid individually to each team member (up to a limit of seven including Pilot and Team Manager)

Certificates will be awarded to all competitors.

Note: The trophy is presented to the winning team but is not permitted to be taken from the BMFA premises.

D 12 ENTRY DETAILS

Please complete the online Entry Form and payment to register your teams entry for the 2024 Payload Challenge.

To facilitate planning, we must receive, by 1st April 2024, a formal notification of your intent to enter the 2024 competition.

D 13 DRAWINGS

Drawing must be submitted at least 30 days prior to the day of the flying competition, late submission will be penalised as described previously.

Material should be e-mailed to the Challenge Administrator:

lisa@bmfa.org

Flight Pattern Subject To Wind Direction

