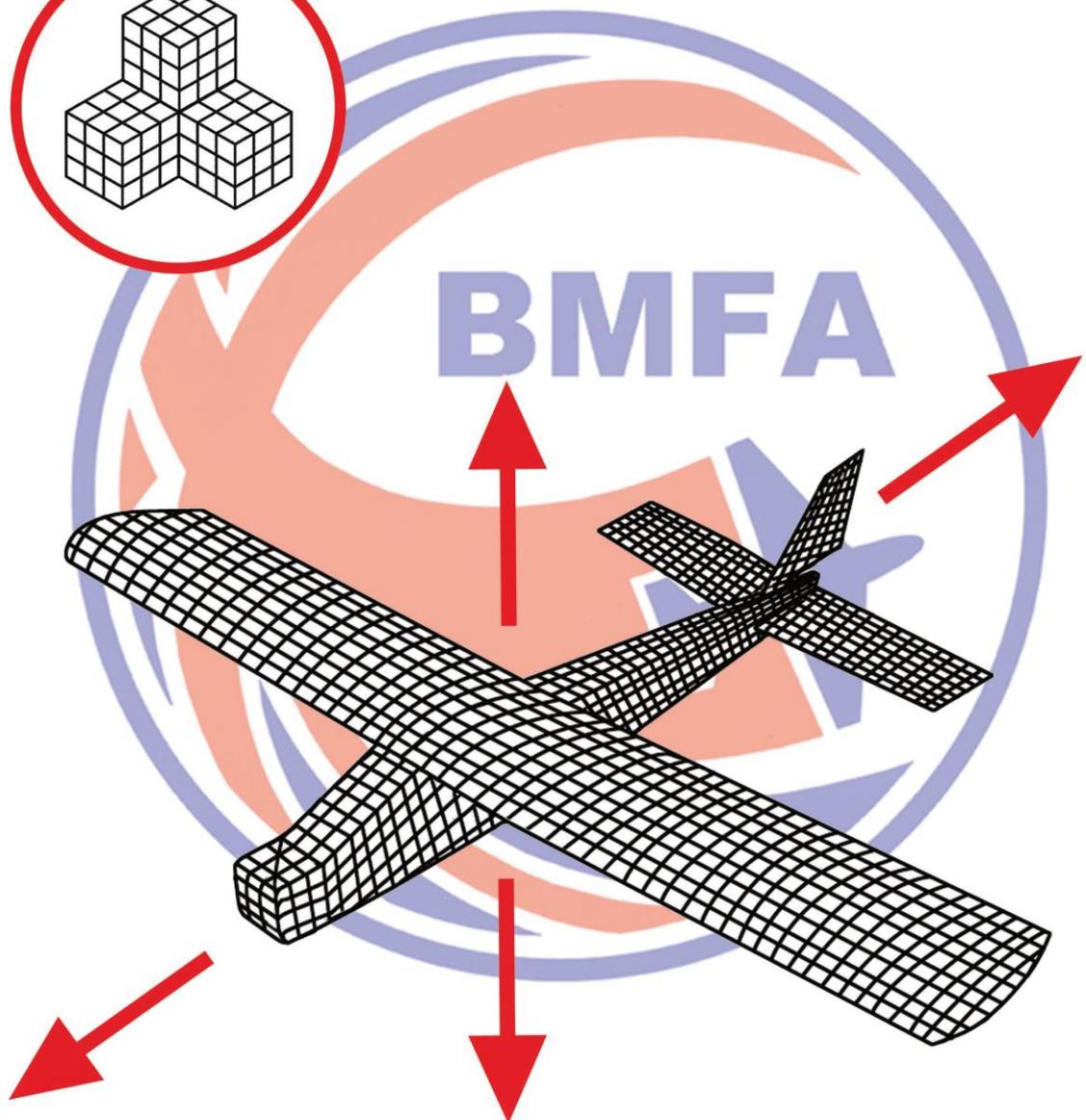
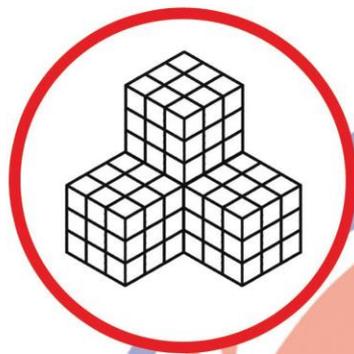


British Model Flying Association

2020

Payload Challenge 2

Cube Lift



**British Model Flying Association
2020 University and Schools
Payload
Challenges
Dates Notice**

5th, 6th & 7th June 2020

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

In Partnership with



**ROYAL
AERONAUTICAL
SOCIETY**

Supported By

BAE SYSTEMS



**ROYAL
AIR FORCE** **Engineering**

**ROYAL
AIR FORCE**
model aircraft

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

2020 **Payload Challenge 2** **Cube Lift**

The information contained in this brochure provides a detailed overview of the 2020 Payload Challenge 2 Cube Lift as well as all information and forms for prospective entrants. We look forward to meeting your staff and students in 2020.

Should you require any assistance please contact
the BMFA Challenge Co-ordinator.
Manny Williamson
(Address as on the entry form, final page)

NOTE

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

New for 2020:

All flight batteries supplied by competition organisers – ensure you read notes on specification and connectors.

INTRODUCTION

The payload Challenge 2 Cube Lift has been developed as a follow on to the Challenge 1 Egg Lift which forms an initial introduction to the concepts of aircraft design and build and also as a meaningful lead in to Challenges 3, 4 and 5 which require a more comprehensive understanding of design and build principles.

Challenge 2 utilises the same base wing as Challenge 1 but with the addition of a more challenging payload shape and weight to further explore the limits of airframe design.

Teams are required to consider their aircraft as on a specialist mission delivering sensitive material to operatives "in the field".

In this instance the payload is Rubik's Cubes (even covert operatives get bored sometimes.....)

New for 2020 is the provision of batteries by the organisers as part of the entry fee

CORE OBJECTIVES

1. Construct a lightweight and cost-effective aircraft utilising the provided wing template from foam-board or 'Depron' / expanded sheet polystyrene foam.
2. Develop a payload module to be attached to or incorporate into the aircraft, to accommodate and safely transport the payload of up to 4 standard size 3x3 Rubik's Cubes.
3. For the flying element of the competition, teams are required to demonstrate their aircraft in flight in its unladen state as well as with the payload in place with the ultimate aim of a safe delivery to and from the prescribed landing area via the competition circuit.

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 2020 Flight Challenge 2 Cube Lift.

In Partnership with the Royal Aeronautical Society

- The Royal Aeronautical Society (RAeS) is pleased to be able to once again join the BMFA Payload Challenge event.
- 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

CONDUCT

G 1.1 The maximum number in a team will be 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 It is important that all team members including the pilot attend the morning briefing.

G 1.4 Teams should familiarise themselves with the contents of the competition rules brochures.

G 1.5 Deliberate or repeated violation of safety rules may result in the team's expulsion from the competition.

G 1.6 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 1.7 The Competition Director reserves the right to ground any aircraft if in his opinion, or that of his appointee, the aircraft does not meet an appropriate standard of construction or radio installation.

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 The specified "isolator" 4 Max XT60 "wall" unit must be fitted.

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 fuse predominantly away from the direction of the propeller arc.

G 2.8 It is important that the unit is affixed to a suitably sturdy area of the airframe in order to prevent damage when fitting or removing the fuse.

G 2.9 It is recommended that a tag or pennant is affixed to the fuse to aid removal and visibility.

G 2.10 Only one flight battery may be used per flying round (provided by the competition organisers).

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.

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 serviceable failsafe must be fitted that as a minimum returns the throttle to stop on loss or corruption of the radio signal.

G 3.4 Radio installations will be scrutinised by the organisers and must be deemed fit for the intended application.

G 3.5 Computer transmitters are permitted.

G 3.6 Aids to flight stabilisation such as gyros and auto level are permitted but pilot authority must be maintained at all times.

FLIGHT COMPETITION

G 4.1 Time for trimming flights will not be available on the day of the competition.

G 4.2 The extent of the flying area will be announced during the morning briefing, any pilot flying within the briefed "no fly" area's will be directed to land immediately.

G 4.3 The pilot of the aircraft should perform appropriate pre flight checks.

G 4.4 The number of flight rounds will be announced at the morning briefing to reflect the expected weather conditions and number of entries.

G 4.5 The distances indicated on the flight plan sheet are for guidance purposes only, these will be set and announced at the morning briefing to reflect the prevailing wind conditions and location on the airfield.

G 4.6 Pilots will be individually briefed regarding flight pattern and dead airspace on the flight-line prior to their first flight of the competition.

G 4.7 The flight-line controller has overall responsibility and authority for all matters relating to flight safety.

G 4.8 Pilots must be prepared to “ditch” their aircraft on the order of the flight-line controller should he deem it necessary on safety grounds.

PROTESTS

G 5.1 Any protest must be filed in writing to the Contest Director by the faculty advisor or team captain.

G 5.2 Any protest must be filed no more than 10 minutes after the Flight Competition is announced as being completed.

G 5.3 In order to have a protest considered a team must be willing to put up points specified in each Challenge, which may be forfeit, if their protest is not upheld.

G 5.4 The Contest Director may call upon a jury of interested parties to help with his decision.

G 5.5 The Contest Director carries the final vote in the event of a split decision.

LIST OF CONTENTS

- C 1 OBJECTIVES
- C 2 CONTEST ELIGIBILITY
- C 3 PAYLOAD
- C 4 AIRCRAFT/POWER REQUIREMENTS
- C 5 PRESENTATION
- C 6 THE FLIGHT COMPETITION
- C 7 SCORING
- C 8 ENTRY DETAILS
- C 9 PRIZE AWARD DETAILS
- C 10 WING SPECIFICATION DRAWINGS AND WWW LINKS
- C 11 FLIGHT PATTERN
- C 12 ENTRY FORM

Competition resources supported by



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

Visit their website to view materials for the 2020 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 **2020BMFA** for 10% discount on competition items.

Please note; the BMFA does not stock competition materials

C 1 OBJECTIVES

C 1.1 Teams are to construct an airframe which includes a fixed wing of specified dimensions

C 1.2 Teams are required to develop a payload module to be attached to or incorporate into the aircraft, to accommodate and safely transport the payload of up to 4 standard size 3x3 Rubik's Cubes.

C 1.3 Teams are required to give a 5 minute presentation on their aircraft.

C 1.4 Teams are required to participate in a flight competition to demonstrate the performance of their aircraft.

C 2 CONTEST ELIGIBILITY

C 2.1 The contest is open to students in full time education up to the end of secondary education. Teams may be from schools, cadets, scouts or other youth groups.

C 3 PAYLOAD

C 3.1 Payload will be up to 4 standard size 3x3 Rubik's Cubes.

C 3.2 Rubik's Cubes will be supplied by the competition organiser.

C 3.3 Cube specification: 57mm x 57mm (+/- 5mm), 65 grams (+/- 10 grams).

C 3.4 Only cubes supplied by the organisers may be used in the competition.

C 4 AIRCRAFT/POWER REQUIREMENTS

C 4.1 The aircraft is to utilize a standard fixed wing of specific dimensions. Teams may wish to make themselves aware of the 'Flite Test Versa' wing which meets these specifications and gives less experienced teams the option of downloading files and following the on-line guidance for construction. The aircraft must be substantially made of foam /paper based materials. Plywood etc may only be used for motor mounts and spars for local stiffening and adhesive tape/glass weave tape may be used as required. Control horns, servo mounts and hinges must be securely fixed so as to meet scrutineering requirements.

C 4.2 The aircraft may or may not be fitted with an undercarriage (wheels)

C 4.3 Propulsion unit is to consist of:

1 x 4 Max PO-2830-1350 motor

1 x 4 Max PP-TESC30AU speed controller

1 x 4 Max EC 60 panel mount Isolator Unit

1 x 3 cell Lithium Polymer battery capacity 1300mah (supplied fully charged by the organisers for each competition round)

C 4.4 Only batteries supplied by the organisers may be used for competition flights. Batteries will be fitted with XT 60 connectors (negative to pointed end)

C 5 PRESENTATION

C 5.1 Presentation: Prior to the first competition flight, each team will present their aircraft design before a panel of professional engineers.

C 5.2 Each team will be allocated five minutes in which to describe the build process and the design of the payload module(s). Content falling outside of the allocated time will not be considered during marking.

C 5.3 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. The aircraft should be available for the presentation and a **10 point** penalty will be incurred if the complete aircraft does not feature as part of the presentation.

C 5.4 The presentation is worth **30 points**. Judging criteria for the presentation will include:

1. Choice of materials.
2. Structures in addition to the main wing such as fuselage, tail plane etc
3. Consideration of the payload accommodation requirements
4. Innovation in structure and airframe
5. Innovation in manufacturing processes
6. Novelty factor such as styling/humour/aesthetic theme

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 teams 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. Each year several teams fail to complete their projects by the date of the Flight Competition.

C 6 THE FLIGHT COMPETITION

C 6.1 The aircraft must be rendered “safe” on all occasions that it is handled by team members (other than for launch). A team member must display the isolator/breaker for the benefit of the flight line marshals during loading and unloading.

C 6.2 At the start of the prescribed time slot the model should be without payload, on being given the start signal the aircraft must then be carried out to the flightline by the designated "launcher", at this time the power system can be rendered “live” by inserting the “isolator”.

C 6.3 The aircraft may then be launched at any time within the specified time period.

C 6.4 Having completed a successful launch 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.

C 6.5 Following a completed full circuit of the course without payload the aircraft should be landed, rendered safe and returned to the loading bay where the payload module is to be loaded with two Rubik's Cubes (supplied by the competition organisers). A second circuit should then be flown.

C 6.6 After landing, the aircraft should be rendered safe and returned to the loading bay where the payload bay contents are to be transferred to the "in-box". The aircraft is then to be loaded with four Rubik's Cubes from the "out-box" and a third circuit should be completed. On landing the aircraft is to be recovered from the runway and the Rubik's Cubes transferred to the designated receptacle at which point the elapsed time will be recorded.

C 6.7 At the end of the prescribed time slot the details of the flight will be recorded. This will be 6 minutes or when the cubes are in the receptacle.

C 6.8 Should a successful launch not be completed, teams may retrieve the model for further attempts without reloading the payload within the allotted time period.

C 6.9 Running repairs may be made during the allocated time period, the aircraft must be rendered "safe" and the isolator fuse must be removed and be visible to the flightline controller at all times while the aircraft is being handled.

C 6.10 The aim is for each team to fly three rounds of three circuits 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.

C 6.11 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.

C 6.12 Time for trimming flights may not be available on the day of the competition. Entrants should test fly their aircraft prior to the weekend of the competition.

C 6.13 For protest information see General Rules but in this category the team will need to put up 20 points in order to register a protest.

C 7 SCORING

The flight score will be normalised, **100 points** will be awarded to the team who transport the specified payload in the shortest total time over all rounds. All other scores will be calculated as a percentage of this figure (this has been implemented in order to maintain a valid balance between the points available for the presentations and flight score).

A bonus of 5 points will be awarded for each correctly transferred cube at the completion of each round. A total of 30 bonus points will be available if all 3 rounds are flown.

For the presentation a maximum of 5 points will be awarded in respect of each of six key categories as follows:

1. Choice of materials.
2. Structures in addition to the main wing such as fuselage, tail plane etc
3. Consideration of the payload requirements
4. Innovation in structure and airframe
5. Innovation in manufacturing processes
6. Novelty factor such as styling/humour/aesthetic theme

See Scoring Panel for detail and examples

Challenge 2: Cube Lift Scoring

Presentation (5 Minutes)

Category	Points available	The Judges would like to know
Choice of Materials	5	What is the main wing made from?
Additional Structures	5	Material used for the fuselage, tail etc.?
Cargo	5	How are the cubes held in place?
Design Innovations	5	Any special structure and airframe concepts to show
Manufacturing Innovations	5	Any processes or techniques developed to make the parts?
Novelty Factor	5	Show styling, theme, humour, aesthetics
Total Max Points	30	

Flight Competition

	Circuit 1	Circuit 2	Circuit 3	Cubes	Flight time
Round time starts as Aircraft is launched	Fly empty and land	Load 2 cubes fly circuit and land. Transfer cubes to "in-box"	Load 4 cubes from "out-box" and fly final circuit. Aircraft is landed and the 4 cubes transferred to the "in-box" and the clock is stopped.	Total number of cubes is recorded	Flight time is recorded

Scoring examples

	Presentation Score	Round 1 Flight time for all three circuits in seconds	Round 2 Flight time for all three circuits in seconds	Round 3 Flight time for all three circuits in seconds	Number of Cubes Round 2	Number of Cubes Round 3	Cube Score (Number of cubes x 5)	Adjusted time (1080 - total flight time)	Normalised time (Adjusted time x 100 / largest adjusted time)	Score (sum of Presentation Score, Cube Score and Normalised time)	Penalties	Position
Team A	25	270	265	245	6	4	80	300	58	163	0	4th
Team B	22	195	190	180	6	4	80	515	100	202	0	1st
Team C	19	200	210	200	6	6	80	470	91	190	0	3rd
Team D	28	220	230	200	6	6	90	430	83	201	0	2nd

Summary

Presentation	Max Possible score	30
Cube score	Total over 3 rounds	90
Normalised Flight Score	Fastest Team aggregate of 3 rounds scores 100 points others as a percentage	100
Penalty 1	No aircraft at presentation	-10
Penalty 2	Protest not upheld	-20

C 8 ENTRY

PLEASE SEND YOUR COMPLETED ENTRY FORMS TO THE CHALLENGE CO-ORDINATOR AT:

The British Model Flying Association
Challenge Co-ordinator
Chacksfield House
31 St Andrews Road
Leicester
LE2 8RE

Or by email marked for the attention of the Development Officer (Manny Williamson) at admin@bmfa.org

To facilitate planning, we must receive, by 1st April 2020, a formal notification of your intent to enter the 2020 competition and payment of the required entry fee.

NOTE: On receipt of your completed entry form you will receive a confirmation and also your unique team designation reference; this reference must be quoted in **all** correspondence.

C 9 PRIZE AND AWARD DETAILS

1st Place

The Innovation Trophy*

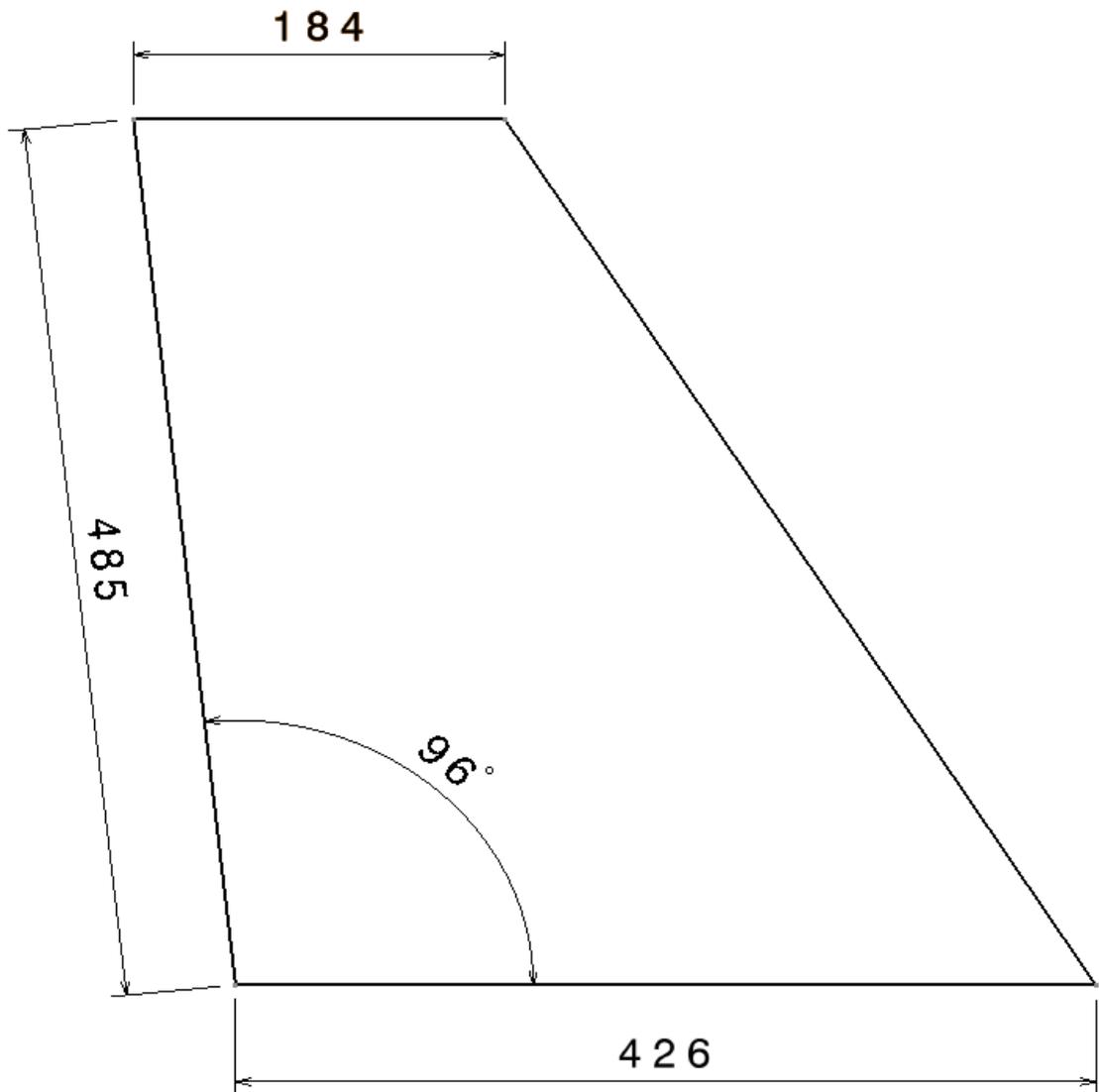
£100.00 Cash prize, paid to department or school.

£25.00 Cash prize, paid individually to each team member (up to a limit of five persons).

Certificates will be awarded to all competitors.

* Note: the Innovation Trophy is presented to the winning team on an annual basis and remains the property of the British Model Flying Association. The trophy must be returned 28 days prior to the competition of the following year in order that it is available to present at the event.

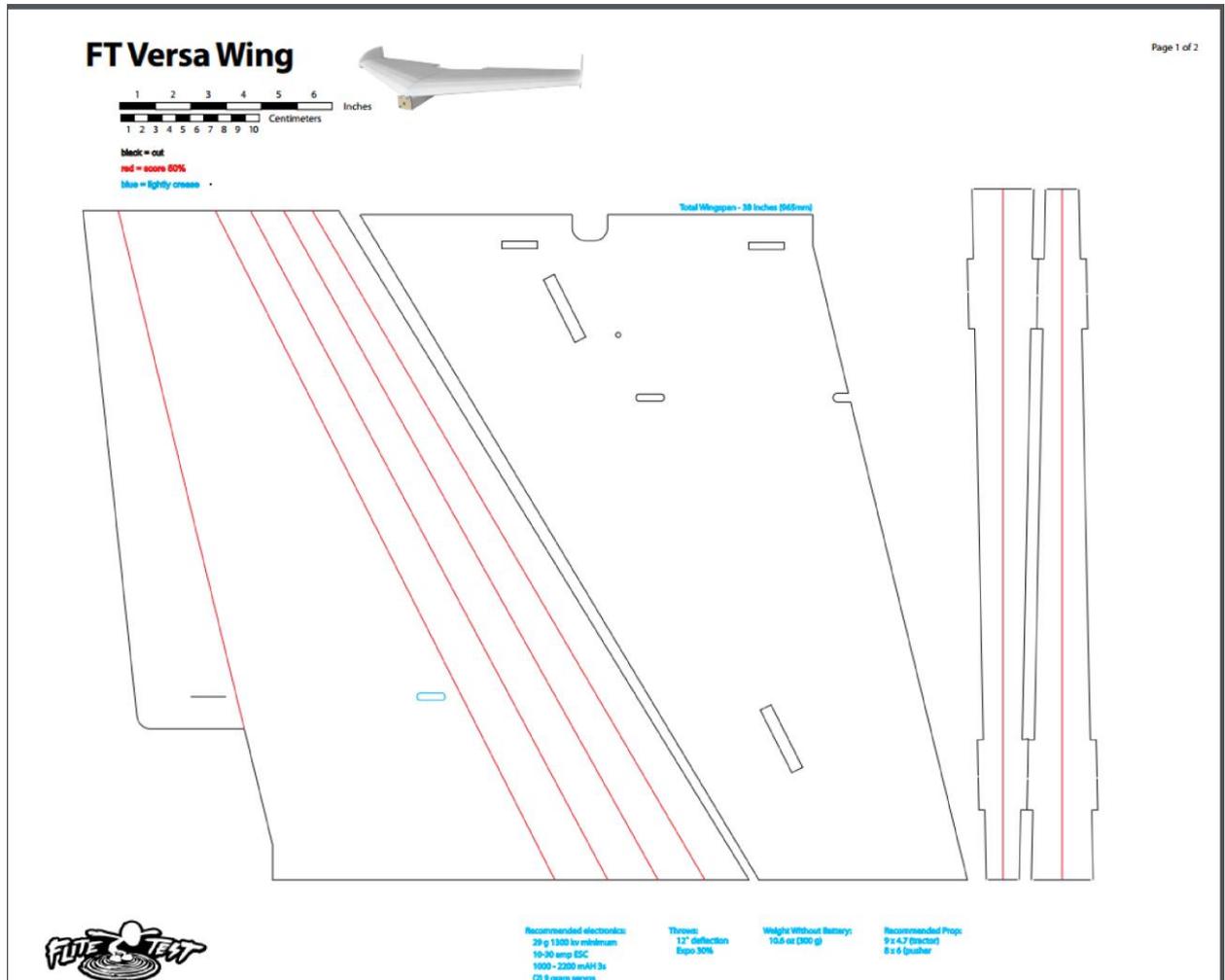
C10 Specified Wing Planform:



The wing is to be made within a tolerance of +/- 10mm and +/- 1degree from these dimensions.

Competition Wing Specification

Teams may choose to build an open source wing such as this to meet the wing criteria

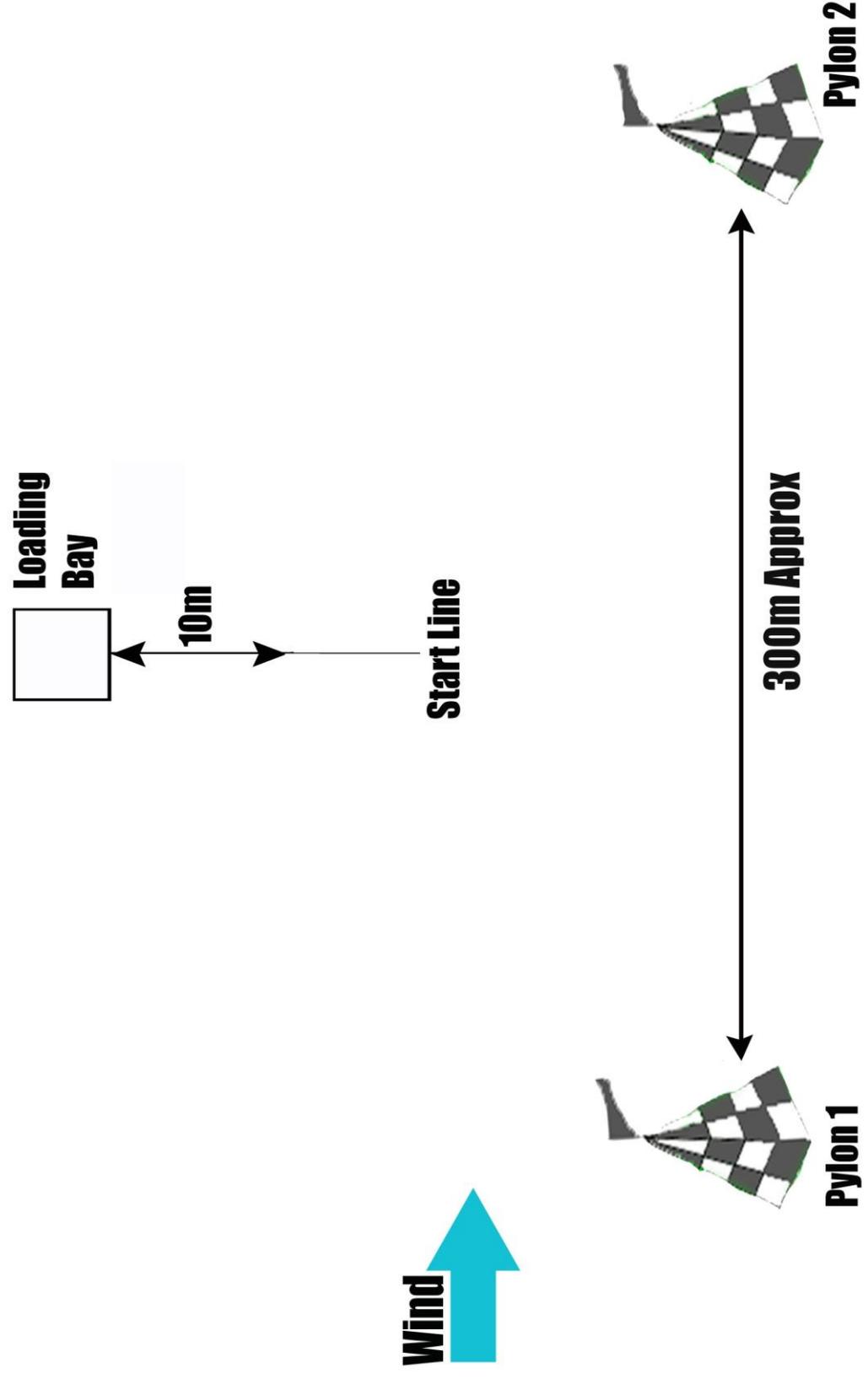


Do not scale this drawing. It may be downloaded from FT website

<https://www.flitetest.com/articles/ft-versa-wing-build>

BMFA is not responsible for content of this website

Flight Pattern Subject To Wind Direction



Entry form for 2020 Payload Challenge 2

Cube Lift

Note: Please copy this form and complete one form per team.

Forms to be received by 1st April 2020

Name of School, youth group or organisation:

Name of Tutor/Teacher responsible for entry: _____

Team Name: _____

Names of 5 Team Members:

1. _____

2. _____

3. _____

4. _____

5. _____

Pilot: _____

Name and Address of Team Manager

Name: _____

Address: _____

Contact Number: _____

Email: _____

All correspondence relating to the 2020 Challenge will be conducted through the addresses and numbers given on this form

Do you require technical assistance from local aeromodellers? YES / NO

Do you require a pilot? YES / NO

Please note a fee of £75.00 is payable per Team entered (non refundable).

Cheque to be made payable to BMFA or alternatively to pay by credit/debit card please contact the office.

Cheque enclosed

Flight Challenge Co-Ordinator
BMFA
Chacksfield House
31 St Andrew's Road
Leicester
LE2 8RE

Telephone: 0116 2440028

Please note on receipt of completed Entry Form and payment each team will be issued with a unique reference number which must be quoted in all correspondence including submissions to the judges and also displayed on each aircraft as detailed in the Rules Brochure.

Office Use Only

Payment Received:

Date: _____

Signature: _____

Reference Number: _____