

Dragon-15 UAV (PAYLOAD 15 KG) Dragon-25 UAV (PAYLOAD 25 KG)

Medium Altitude, Long Endurance (MALE) UAV

# Strength Endurance Reliability



UAVE

D-15

Equipping Defenders Worldwide since 1854

**British** 

Quality



A Fixed-wing UAV that delivers.



Medium Altitude, Long Endurance (MALE) UAV



Mk 3 - 015



# ENDURANCE

Maximum 13 hours flying time Up to 1000 Kilometres flight range 150 Kilometre radio data telemetry Unlimited satellite range



# FLEXIBLE PAYLOAD

Payload agnostic Payloads - up to 25 kilos Protected space for sensitive payloads Payloads internally or externally mounted.



# AGILE

Launch & land on most flat surfaces with wheels Skids can replace wheels for uneven ground Landing distance with skids is just 10 metres Take off with launcher is only 6 metres



## SECURE

Software integrity - No back door SIGINT frequency scanning or mobile phone IMSI grabber



## ADAPTABLE

Super compact take-off from a launcher Launcher can be mounted on a flat-bed vehicle Interchangeable: 6, 12 or 16 litre fuel tank Effective day or night



## ROBUST

Proven and reliable Flying since 2007 NATO approved 10,000 feet (> 3 kilometres) proven altitude



## EFFICIENCY

Powerful 'PUSHER' British Engine
VALUE FOR MONEY Per mile

**100% BRITISH** DESIGN, MANUFACTURE & SERVICE



# tough



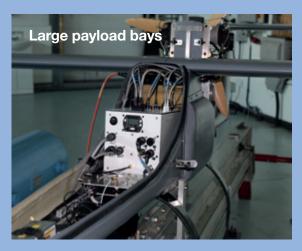










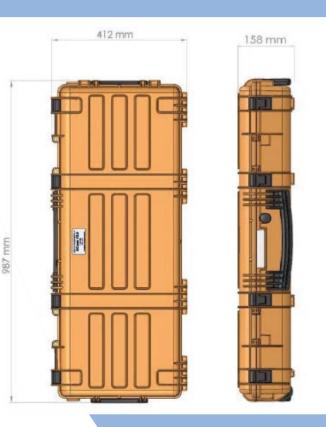


## **Portable Ground Control Station**

### Ground Station Suitcase/Transit Case/Super Lightweight

- This portable Ground Station is a ready to use command and control station designed to be customizable for different missions and configurations.
- This allows control of multiple, different payloads or UAVs with one ground case and with minimum changes.
- This Ground Station can monitor and control any remote sensor. The screens are high brightness, allowing it to be used both indoors and outdoors.
- The user will find several ports to connect different systems and interfaces such as the autopilot or USB connectors.





#### Wheeled Suitcase type system



Up to 25 kilos

We have flown with many different payloads including:

TOTAL PAYLOAD:

47.7

geophysical, meteorological, EW, methane detection, LiDAR surveying, photogrammetry, humanitarian aid, inspections, wildlife counting and many other applications.

Protected space for sensitive payloads the airframe is weatherproof, providing a dry, safe area for any type of payload.

- Large, flexible storage space inside
- Easily removed lid: easy payload access
- Area 1: (under COG) is approx. 18.1 Litres
- · Area 2: (nose) is approx. 29.6 Litres

## Configured Payload examples:

#### **ISR 'EYE IN THE SKY'**

# - intelligence, real-time video surveillance, reconnaissance:

Electro Optical and Infra-Red (EO/IR) capabilities can be delivered when using specialised camera systems with smart detection software.

#### Photogrammetry

- mapping, aerial photography, surveillance, search & rescue. Uses a gimbal-mounted, medium format camera to produce high-resolution orthomosaic images.

#### Hyperspectral

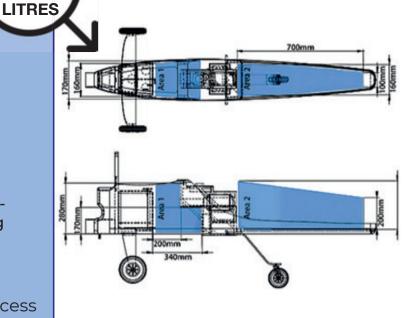
## - surveying, surveillance, reconnaissance, intelligence

Detects heat and light data to create hyperspectral VNIR images.

#### Lidar

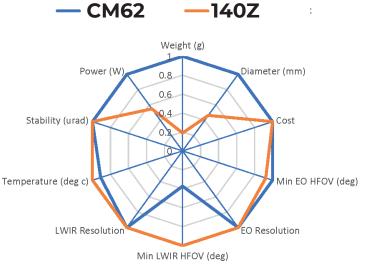
#### - surveying geographical, topographical and biomass data over land or water.

Uses specialist laser light technology to measure and create 3D point cloud models of a target.



#### Camera Comparisons

	CM62	140Z
Weight (g)	265	1400
Diameter (mm)	65	140
Min EO HFOV (deg)	1.2	1.3
EO Resolution	1920	1920
Min LWIR HFOV (deg)	18	6.7
LWIR Resolution	640	640
Temperature (deg C)	50	55
Stability (urad)	100	100
Power (W)	11	20



140Z is best for Temperature

**Min LWIR HFOV** 

CM62 is best for Power, weight, diameter Mmin EO HFOV

# **PAYLOAD Camera and gimbal:**

DAYLIGHT (EO)		THERMAL (IR)	
_		. ,	
Туре	CMOS	Туре	LWIR
Resolution	1080p, 720p, 640 x 480	Resolution	640 x 480
HFoV	58° to 1.2°	HFoV	32°
Zoom	56 x zoom	Focal Length	19 mm
Encoder Resolution	30 Hertz	Encoder Resolution	30 Hertz

#### Camera Option 1

### CM62 : Multi-Sensor, Gyro-Stabilized System

• Experience high-quality performance - day and night, with the miniature, multi-sensor, gyro-stabilized imaging system.

#### This is a compact, lightweight system

VIDEO SPEC. Video processing features	Multi-Sensor Streaming Encoding Recording on Board Object Tracking E-Stabilisation	<ul> <li>x 56 zoom</li> <li>LWIR multi se</li> <li>IP67 rating</li> <li>HD EO</li> </ul>	nsor	Belly -mounted 76mm diameter 260 grams	
leatures	Roll Stabilisation	GIMBAL SPEC.			
	Scene Steering	Mechanical Axes	2 (Pan ar	nd Tilt)	
	J.	Elevation	+90°, -225	5° from horizonta	al
	GEO-Lock	Azimuth	±172°		
Digital output	H.264 MPEG2 TS / H.265	Slew Rate	360°/s (ac	celeration 1500°	2/s <sup>2</sup> )
	MPEG2 TS	Encoder Resolution	16 bits (0.		,,
Snapshot resolution	1920x1080 or 1280x720 (EO)			,	
Stored on board	640x480 (IR)	Gimbal Features		trol & Gyro stabi	
		Communication	Ethernet	/ RS232 & Comm	n. Libraries Available
Standards	MISB (0601.7, 0603.2, 0604.3 & 0903.3)	Ingress Protection	IP67		
Stanuarus	& STANAG (4609) Compliant	Shock limit	40G		

### Camera Option 2

### 140Z : Image Stabilized, long range imaging

- Leading stabilization- Over 100Hz bandwidth, low gyro noise,
- Exceptional image performance 1080 Full HD video, 24 fps, full processing
- Leading LWIR performance sensitivity sensor, large aperture F1.2, 5 x optical zoom lens, 15-75mm focal length
- Non-ITAR- for maximum exportability
- Meta data MISB compliant video stream with KLV meta data
- Powerful onboard processor target tracking, scene steering and moving target indicator
- H.265 Encoder Enables longer radio link ranges and SATCOM operation with real time video
- Integrated high precision GPS/OINS, providing platform and target location
- Direct drive stabilization-brushless motors with low friction, custom bearings.
- Artillery fire adjustment, integrated software.
- Rugged design advanced magnesium structure

FEATURES:	
Automatic object tracking	Adjustable bitrate and resolution
Moving Target Indicator	DHCP or static IP address
Onboard video recording (32Gb)	Unicast and Multicast video stream
Onboard h.265 & h.264 compression	Field upgradable firmware
Picture-in-Picture dual video	Electronic video enhancement
Sky Up functionality	



Nose or Belly mounted 140 x 189 millimetres 1.4 Kilograms

pх

IR SENSOR D	RI - according to JOHNS	ONS CRITERIA
		NATO target (2727m)

	HOMAN Larger (1.7,0.5 m)	<b>NATO target</b> (2.3,2.3 m)
DETECTION	2500 m	3382 m
RECOGNITION	781 m	1057 m
IDENTIFICATION	469 m	634 m

DAYLIGHT (EO)	
Sensor	CMOS
Resolution	1920 x 1080 pixels
HFoV	63.7° to 2.3° @ 1086
Optical Zoom	x53 (480p), x30

C S F



## **GPS DENIED OPS**



# GPSD Level 1 Operations in GPS Denied Areas

The Dragon UAS is not solely reliant upon GPS to provide a navigation position. An Inertial Measurement Unit (IMU) within the Collins Aerospace Piccolo II autopilot estimates the position of the UAS using the last known position and the sum of the UAS movements measured using 3-axis accelerometers & gyroscopes. This enables the UAS to navigate without GPS.

Level 1 is our standard product It is EAR controlled

## GPSD Level 2 GPS Anti-Jamming + GPS Denied Ops

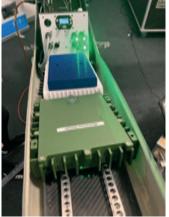
Anti-jamming systems work by increasing the resilience of the GPS system to the jamming signal. The Level 1 system is upgraded with a 4 or 7 element CRPA ( 4 or 7 GPS antennas combined to form a Controlled Reception Pattern Antenna) and additional electronics which measure the differences in received GPS signals between the antennas to null the direction of jamming (also known as null-steering or beam forming).

**Level 2** hardens the GPS system to jamming reducing the radius of the jammers effectiveness against the UAS significantly.

If the GPS signal is denied, the IMU provides the navigation as Level 1.

Hexagon GAJT-AE-N GPS Anti-Jam Technology (GAJT) Antenna Electronics 4 element CRPA RF Performance: Active Gain 40 dB Weight 1.2kg EAR Controlled









## **GPS DENIED (GPSD) OPS**

## Level 2B GPS Anti-Jamming + GPS Denied Ops

- SABR-Y Strategic Anti-jam Beam forming Receiver
- 7 element CRPA
- RF Performance: Active Gain 100 dB
- Weight 1.9kg
- ITAR controlled solution

## **GPSD Level 3 GPS**

## Anti-Spoofing, Anti-Jamming GPS Denied Ops

GPS spoofing is targeted and attempts to deceive a GPS receiver by broadcasting counterfeit GPS position signals.

Level 3 provides a GPS anti-spoof capability which works in conjunction with both Level 2 and Level 1. It is EAR controlled.

## **Electronic Warfare (EW)**

EWI Signals Intelligence (SIGINT) payload on 3 UAVs can deliver accurate triangulation on enemy spectrum emitters

## EW Payload EW2

- CRFS 40-8 EW Node
- The RFeye Node 40-8 offers leading RF performance for advanced capability, real-time spectrum scanning operations for deployment on any spectrum critical site.
- Uses the latest superheterodyne receiver technology
- A complete spectrum scan, monitor and geolocation system designed for remote deployment in distributed networks in hostile environments.
- Outstanding noise figure, channel re-tune time and spurious free dynamic range parameters

## Command and Control (C2) Jamming

The Standard Dragon UAS uses two C2 Frequencies providing C2 redundancy.

Either when the C2 signal is weak or if being actively jammed, having redundancy allows C2 frequency switching over a range of 15km to defeat C2 jamming.

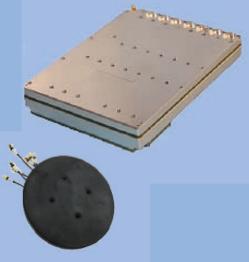
- 2.4GHz range 15km
- Iridium Satellite

   range Unlimited dependent on satellite constellation

### Optional alternative / additional C2 Frequencies

- 900 MHz range 20km
- Long range S Band (2.2-2.5 GHz)
   -range up to 150km using steered dual dish antenna
- 3G\4G mobile phone
   range unlimited dependent on 3G/4G coverage

e.g. combining Long range S Band C2 with Iridium C2 would allow for C2 frequency switching over a range of 150km.



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Band	Frequency Range
UHF	310-390 MHz
4G / LTE	800 MHz
UHF	900 MHz
GSM / 3G	900 MHz
L	1350-1390 MHz
Iridium	1616-1626 MHz
GSM / 4G / LTE	1800 MHz
BAS	2025-2150 MHz
3G / 4G / LTE	2100 MHz
S	2200-2500 MHz
S	2400 MHz
4G / LTE	2600 MHz
4G / LTE	3500 MHz
4G/LTE	3700 MHz
Lower C	4400-5000 MHz
Upper C	5100-6000 MHz

# PAYLOAD

## **GPS DENIED (GPSD) OPS**

## **Spectrum Monitoring**

Spectrum monitoring can deliver essential intelligence on potential adversaries, their equipment, intentions, movement and general situational awareness.

By using a network of three or more RF receivers these emissions can be geolocated from many hundreds of kilometres away.

## Angle Of Arrival (AOA) is a

geolocation technique which triangulates location using two or more Lines Of Bearing (LOB) generated from direction finding techniques. Where many LOB are available, quality thresholding allows these to be used selectively, removing poor quality multipath affected signals to maximise geolocation accuracy.

Two or more LOB can be generated using a network of two or more antenna arrays.

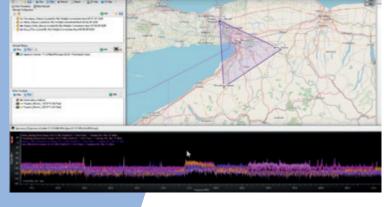
## Time Difference Of Arrival (TDOA) is

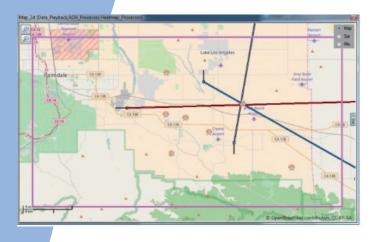
a method to geolocate RF transmissions. For a two-dimensional geolocation, three or more RFeye receivers, connected to omnidirectional antennas, are placed in a spatially separated network.

The different receiver sites measure the difference in signal arrival times. Each pair of receivers outputs a probable geolocation along a hyperbolic curve. Where these curves intersect is the highest probable site of the transmission.

## **FREQUENCY SCANNING & LOCATION**

- Signal Intelligence System (SigINT)
- Weight 1.4 Kilograms
- SCAN frequencies 10 MHz TO 6 GHz











Both Dragon UAV models can launch and land on most flat surfaces with 3 wheels.

For uneven ground like sand, ice, grass or snow, skids can replace the wheels and a compressed-air, inclined launcher is used.

Take-off distance using the launcher is **6 metres**. The landing distance with skids is just **10 metres**.

The lightweight, aluminium launcher can be easily and quickly clipped together, and disassembled. It can be used from ground level or mounted to a flat-backed vehicle.

The Launcher is quickly and easily primed with compressed air.

The Dragon Mk3 UAV compacts to 2-metre sections and can be easily transported once packed into the wheeled case.



Dragon-15 with wheels can take-off and land on most flat surfaces.



Dragon-15 with skids taking off from catapult launcher.





Dragon-15 Wingspan: 3.8 Metre Payload 15 kg.

AIRCRAFT - D-15 Wingspan - 3.8 metres Naked weight - 28 kg Max Take-off Weight - 45 Kilos Payload - 15 Kilos

×

D-25

4.5 metres 30 kg 55 Kilos 25 Kilos

Dragon-25

Wingspan: 4.5 Metre Payload 25 kg.



## **SECURE** COMMUNICATIONS



### NO back door to the suppliers.

- Autonomous control for take-off and landing
- 2.4Ghz radio link for command and control
- Iridium satellite link for command & control for longer over the horizon communications
- Fully compatible with Mavlink communication protocol

## **Radio Telemetry Communications**

- Video camera Images will be sent from the UAV via an encrypted radio link to the ground station in near real time using the Radio UAV video telemetry system.
- This system allows HD data with 50 frames per second to be received from anywhere within a 50 kilometre radius, increased to 150 km if used with a directional aerial.
- Satellite connections NOT required, if directional aerial used.
- The maximum bandwidth is 15,000 Kbps. (kilobytes per second)

#### Control

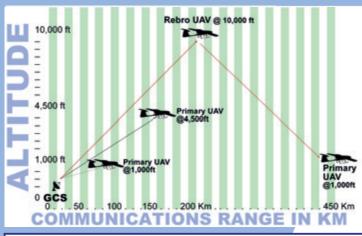
- Autopilot system and Ground station with Sat-phone link for beyond horizon flight.
- Real-time telemetry for aircraft, engine and data on separate screens. Real-time feedback of fuel consumption and capacity.
- Pilot's consul for manual control.

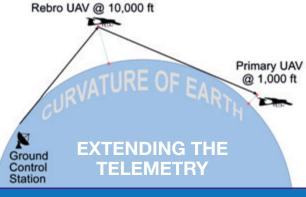
#### **Communications Rebroadcast - RANGE V HEIGHT**

The MANet radio installed provides communications back to the Ground Control Station (GCS).

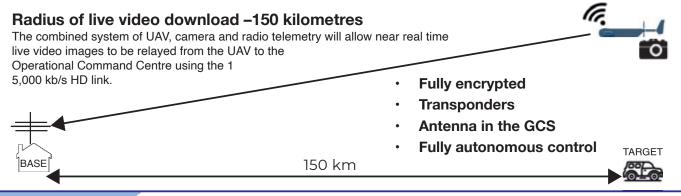
**REBROADCAST** - The communication distance, known as the radio line of sight, is limited by the curvature of the earth. Each MANet radio system installed on the Mk3 UAV has the capability to act as a rebroadcast (rebro) hub for any other radio node.

Hence the telemetry range can be extended by utilising the rebro capability of a second UAV.





UAV at 10,000ft = radio line of sight of 197km at 4,500ft = radio line of sight of 132km at 1,000ft = radio line of sight of 62km



- Encrypted system
- Geo-fencing
- Loiter
- Return to base command
- Auto land

## SECURE COMMUNICATIONS



Software integrity - No back door Signals Intelligence System (SIGINT) tracking and identification via mobile



# GPS Automatic Tracking Pedestal for live video telemetry range up to 150km

- The OS-PT-100 system is a heavy duty rugged Pan and Tilt pedestal based on the OS-PT-25 tracker system.
- This automatic tracking system has been designed to provide GPS based positioning of high-gain antenna systems to support real-time airborne video and telemetry transmission requirements.
- The OS- PT-100 pan and tilt pedestal are air-filled and are excellent for above water applications where rain, humidity and dust are issues.
- The Automatic tracking system has been fully integrated with Piccolo autopilot from Cloud Cap Technology (CCT), Mavlink communication protocol and FlighTEK from L3 Communication.
- The tracking system operates directly from Piccolo Command Centre, MissionTEK as well as OS antenna tracker software.
- Allows video telemetry up to 150Km with no satellite connections.
- Fully compatible with Mavlink communication protocol.

### Receiver - Standalone Antenna Tracker software

#### The positioner GPS coordinates on the ground can be provided by:

- A GPS coordinates distributed through Cloud Cap Technology' Piccolo Command Centre or Operator Interface (OI) IP server.
- Fixed values of latitude, longitude and altitude MSL entered by the operator

#### The Aircraft GPS coordinate can be provided by

 The aircraft' GPS coordinates using NMEA 0183 format distributed through ports UDP socket











# ADAPTABLE

## LAUNCH ADAPTABLE

Super compact 6 metre take-off from a catapult launcher Launch at any location, using the catapult mounted on a flat-backed vehicle Effective day or night

## **PAYLOAD** ADAPTABLE

Payloads can be mounted to suit task:

- EXTERNALLY ISR equipment on the underside
- INTERNALLY Electronic devices that need to stay safe and dry are stored within the nose or body frame.

## Autopilot system

- Ground station with 150km radio link.
- Real-time telemetry for aircraft, engine and data on separate screens
- Pilot's consul for manual control.
- Real-time feedback of fuel consumption and capacity.
- On-board companion computer coding of systems control and GUI interface.
- The Dragon Mk3 is proven to an altitude of 10,000 ft with an on-board payload whilst maintaining real time data telemetry with the Ground Control Station.

## Electronics

- Video streaming to the ground station and aerial telecommunications rebroadcast hub.
- The new avionics cassette provides ground station operator control of on-board payload and systems via companion computers.
- The Avionics cassette condenses the footprint of all on board systems to preserve the maximum available space for payload.









# ROBUST

- Proven and reliable
- Flying since 2007
- NATO approved (number 1550-99-217-6625)
- Cruising altitude of 10,000 feet (3 kilometres)
- Quickly assembles for flight.
- Easily dis-assembles into 2 metre sections
- Fits in a wheeled storage case, for transporting.

#### Case dimensions:

Length: 2.07 metres

Width: 0.8 metre

Height: 0.9 metre (including wheels)

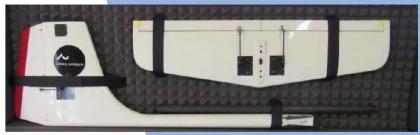








Dismantles into 2 metre sections







#### **PUSHER ENGINE**

- Dragon Mk3 uses a 'PUSHER' 4-STROKE, 120cc British-made Engine
- EFI and oxygen sensor controls fuel and ignition for optimum performance in all weather at all altitudes
- Engine data logged by ECU and external removable logger on continuous loop.
- Real-time feedback for fuel, temperature, airspeed, alternator performance, engine condition, etc.
- On board companion computer w/data recording as required
- Goods delivery actuator control system

# fuel efficient = better performance

## VALUE FOR MONEY

Efficiency of fuel per mile Pilot controls performance, fuel capacity & weight to ensure safe returns Exceptional power to weight ratio

### **ELECTRICAL POWER**

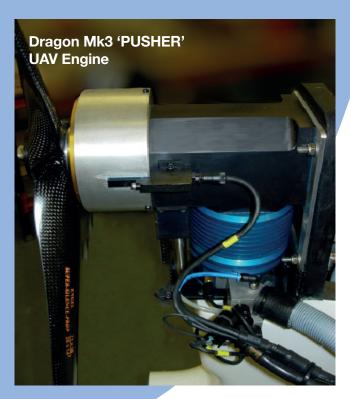
- External plug-in ground power from 12v supply.
- Alternator power to PMU to deliver 24 v, 12 v and 5 volt to support all on board systems
- Emergency battery charging system
- Onboard battery with 2 hours endurance (approximately)



**Engine options:** SINGLE CYLINDER Longer range, and duration.

TWIN CYLINDER Higher RPM for more demanding missions





## **APPLICATIONS**





Security Surveillance OFFSHORE/ONSHORE, INTELLIGENCE, **RECONNAISSANCE, ISR, BORDER SECURITY** 

Aero magnetic surveying

METEOROLOGICAL, OIL, GAS AND MINERALS, MAPPING





**Military/Police** FRONT LINE SUPPLY, RECONNAISSANCE, TACTICAL OPS



Humanitarian AID DROPS, EMERGENCY SUPPLIES, SEARCH & RESCUE



Industrial grade LiDAR KINEMATIC LIDAR SYSTEM, INTEGRATED IMU/GNSS SURVEY-GRADE ACCURACY





**Aerial Photography** HI-RESOLUTION PHOTOGRAPHY, THERMAL IMAGING, PIPELINE MONITORING



**Air Pollution Monitoring** 











The Dragon is a versatile UAV for civilian, police or military use

# Secure Pilot Training Academy

Theory and practical courses Crew training **Operator courses** System configuration **Pilot training** 

Incoming or UK support & training







## Dragon Mk 3 - D15 Specification:







Ariennir yn Rhannol g Lywodraeth Cymru Part Funded by Welsh Government

- Wingspan 3.8 metres
  - Length 3 metres
- **Take-off Weight -** 45 Kilos (max)
  - Payload 15 Kilos
  - Fuel capacity 6.5 to 16 Litres
- Fuel consumption (cruising) 1.1 to 1.3 litres/hour
- Cruising speed (for surveying) 80 kilometres/hour (50 miles/hour)
  - **Operational range -** 1000+kilometres (621+ miles)
    - Engine 120cc 4 stroke petrol
    - Engine control Fuel injection ECU
      - **Propeller -** 28×14 3 blade, carbon fibre
  - Landing gear options Tricycle wheels/Skids with launcher

Mk 3 - 015

- Cruising Altitude 3,000 to 5,000 feet
- Maximum Altitude 10.000 feet

# **Partners in Innovation and Manufac-**











## **BCB INTERNATIONAL**

LRQA

CERTIFIED

**Expert Supply, Distribution and Delivery.** Exclusive distributor of Dragon Mk3 worldwide.

- Established in 1854
- 60 years supplying UK Ministry of Defence (MoD)
- 30+ years supplying the United Nations (UN)
- Approved NATO Supplier
- Export Sales in over 50 countries.
- Supplier to Security Services: Police, Ministry of Justice, Maritime & Coastguard Agency, French MoD, US Department Homeland Security.
- BCB started designing and making UAV's in 1999
- In-house and collaborative R&D, development.

Export Sales 45% of Global Sales

UΚ

RoV

EU



2 QUEENS AWARDS FOR EXPORT



## UAVE

Fixed Wing UAV Design, Manufacturing, Operational and Training services to both civilian and defence markets.

- Flying this model since 2013.
- · In-house design, development and production of the Dragon Mk3 UAV.
- Established manufacturer of long flight endurance, fixed wing UAV.
- UK CAA Operational Authorisation.
- Supported Dragon Mk3 use by UK MoD for AWE20 and AWE23



## PROUD BRITISH PARTNER



- FLIGHT TIME: up to 13 hours
- FLIGHT RANGE: 500 KILOMETRES (2-way)
- PAYLOAD: up to 25 KILOGRAMS

# Dragon Mk3 - A well-proven, versatile and mission-ready UAV Platform.

#### **OVERVIEW:**

- · LARGE PAYLOAD WEIGHT
- HIGH POWER TO WEIGHT RATIO
- HIGHER RESOLUTION IMAGES
- MINIMAL OPERATIONAL FOOTPRINT
- OPERATES IN EXTREME CONDITIONS: +55°C TO -30°C
- VERSATILE & RELIABLE

#### The key strengths of the Mk3, identified by the UK Army in their Army War fighting Experiment test:

"Ability to integrate a plethora of payloads into the UAS in a relatively short period.

Most of the consumable items on the system are COTS.

Simplicity of operation and maintenance.

Ability to operate in demanding climatic conditions."



#### Dragon-15 Wingspan: 3.8 Metre Payload 15Kg.

Dragon-25 Wingspan: 4.5 Metre Payload 25Kg.

## **BCB**:



## www.uas.wales www.bcbin.com

 Approved suppliers to UK MoD and NATO for many decades

NATO number: 1550-99-217-6625

## **UAVE:**



### www.uave.co.uk

Experienced instructors

- Flying UAV's since 2013
- Training programmes tailored to your needs
- Customer focussed turnkey LEASING solutions
- Bespoke evaluation, system configuration and survey design for data acquisition

#### All sales enquiries: uav@bcbin.com enquiries@uas.wales

A VERY BRITISH PARTNERSHIP

All Service enquiries: info@uave.co.uk

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