



## PD-2 Unmanned Aerial System

One stop UAS solution for military  
and civil applications



Up to 10 hours



4700 m ceiling



7 kg standard  
payload



11 kg maximum payload



Up to 180 km stable video  
and control link



1300 km maximum  
operation range

ITAR free

Fast supply

Wide mission geographic range

Low operational cost

\*All numbers effective with UAV fully loaded (payload + fuel)

# Our evolution



**2014**

**UKRSPECSYSTEMS  
company  
foundation**

Largest volunteering  
project in Ukraine  
emerging into a  
UAV manufacturer

**2016**

**Building trust**

First contract to  
supply PD-1  
fixed-wing UAV to  
the MoD of  
Ukraine

**2017**

**New products**

PD-1 VTOL and  
new gimbals  
development  
started

**2018**

**First foreign  
contract**

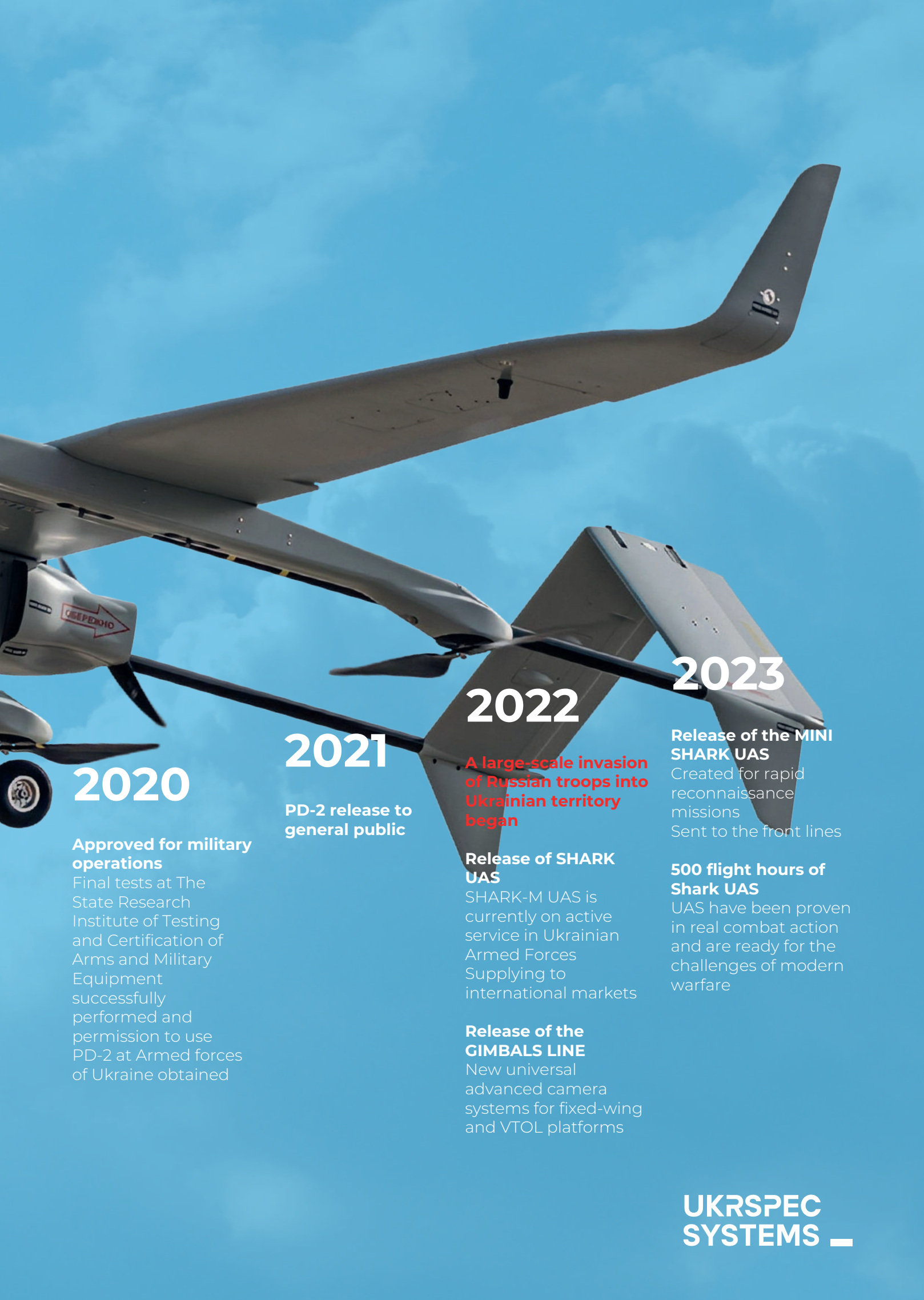
PD-1 VTOL  
delivered to the  
foreign MoD

**New facility**

Relocation to  
new production  
facilities with  
more than  
1800m<sup>2</sup> of space

**2019**

**New products  
PD-2  
development  
started**



# 2020

## Approved for military operations

Final tests at The State Research Institute of Testing and Certification of Arms and Military Equipment successfully performed and permission to use PD-2 at Armed forces of Ukraine obtained

# 2021

PD-2 release to general public

# 2022

A large-scale invasion of Russian troops into Ukrainian territory began

## Release of SHARK UAS

SHARK-M UAS is currently on active service in Ukrainian Armed Forces Supplying to international markets

## Release of the GIMBALS LINE

New universal advanced camera systems for fixed-wing and VTOL platforms

# 2023

## Release of the MINI SHARK UAS

Created for rapid reconnaissance missions Sent to the front lines

## 500 flight hours of Shark UAS

UAS have been proven in real combat action and are ready for the challenges of modern warfare

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# The philosophy of PD-2 UAS

While developing PD-2 UAS UKRSPECSYSTEMS team pursued a simple goal – to develop an efficient and versatile solution that may be operated in any environment or weather conditions, consumables and spare parts should be available worldwide, the configuration of the system should be changed within minutes to fit mission requirements as well as production time and export procedures should be reasonable.

## PD-2 UAS is ITAR free, easy export and to transport

Historically Ukraine faced issues while importing UAS. That was the reason why UKRSPECSYSTEMS was founded – it was way easier to manufacture UAS, than to import it. We understand that export/import procedures may be rough and time-consuming so we designed PD-2 UAS to be ITAR free.

Components do not require any additional permission to export to third-party countries. The whole systems can be easily transported via civil flights.

## Wide geographic range

UKRSPECSYSTEMS did its best to design a solution, that may be operated despite of heat, cold and harsh environment or weather conditions.

## Versatile and modular design

Order is an authoritative mandate. We can't afford the mission to be delayed or postponed due to lack of screwdriver. PD-2 UAV was designed to change its configuration within 15 minutes with no tools required, depending on the mission factor.



## All consumables must be available worldwide

The mission may lead you to the middle of nowhere and we want you to be sure there are no fancy, hard to get parts or equipment required to operate. UAV uses regular gas same as your car (A-95).

## Reasonable maintenance cost

We had the opportunity to work with various budgets and found that the costs associated with operating foreign systems are inflated. That's why one of our priorities was to create an economically efficient complex with a reasonable and justified cost.

# Tests and trials

Our team is sure, that the success of the product comes only with the correct and adequate numbers related to unmanned aerial system. In order to be sure in the technical details we state, we've performed numbers of relentless tests of the PD-2 UAS with the help of State Research Institute for Testing and Certification of Arms and Military Equipment of Ukraine. Most of the trials performed may be compared to big aircraft standards.

## Vibration test for ground equipment.

The ground equipment withstood vibrations in the frequency range 5-80 Hz with a transition frequency of 22 Hz, a vibration amplitude of 2.0 mm, a vibration acceleration amplitude of  $39.2 \text{ m/s}^2$  (4 g). 5.37 g per UAV.

## Vibration test for UAV.

The analysis of the random vibrations that occur during the flight of the unmanned aerial vehicles is important, as these random vibrations have random characteristic properties and have the ability to decrease the endurance of such systems. Both UAV and the payload withstood 20 mechanical impacts with a peak impact acceleration of  $59 \text{ m/s}^2$  (6 g), a shock pulse duration of 15 ms as well as the ground equipment withstood 20 mechanical shocks with a peak shock acceleration of  $147 \text{ m/s}^2$  (15 g), the duration of the shock pulse was 5-10 ms.

## Impact tests.

- ☑ Peak impact acceleration 20 g, duration of impact acceleration 5-10 ms, number of impacts 40;
- ☑ Peak impact acceleration 15 g, duration of impact acceleration 5-10 ms, number of impacts 400;
- ☑ Peak impact acceleration 10 g, duration of impact acceleration 5-10 ms, number of impacts 2000.

## Temperature tests.

- ☑ UAS may operate within the temperature range from  $-40^\circ \text{C}$  to  $+50^\circ \text{C}$ ;
- ☑ Capable of withstanding changes in ambient temperature  $-20^\circ \text{C}$  to  $+40^\circ \text{C}$ .

## As for various weather conditions:

- ☑ Resistant to high humidity of  $93 \pm 3\%$  and atmospheric reduced pressure;
- ☑ May operate during rain.

All the trials performed correspond to GOST V 20.39.304 with all necessary documents approving this fact. It's worth noting, that after each testing series, the UAS was turned on to check its state and ready to work. We test our products without remorse, for our clients to be 100% sure of mission success.



**Video of tests**



# PD-2

## vertical takeoff and landing unmanned aerial vehicle



PD-2 is versatile advanced aerial vehicle designed to conduct various missions in wide geographic range and approved by militaries for militaries.

Maximum take-off weight .....	55 kg
Wingspan .....	5 m
Endurance .....	8 hours
Encrypted radio communication distance .....	up to 180 km
Maximum flight altitude .....	3800 m
Engine type.....	4-stroke carburetor
Fuel type.....	gasoline
Maximum climb rate .....	3 m/s (10.8 km/h)
Cruising speed.....	27.8 m/s (100 km/h)
Maximum flight speed .....	39 m/s (140 km/h)



### Airframe configuration

Rapidly change airframe configuration on-the-go wherever you are within 15 minutes. No tools required. You can change take-off and landing methods, wingspan, endurance, MTOW, payload weight.

	 <b>VTOL configuration</b>	 <b>Conventional fixed-wing configuration</b>
Takeoff and landing	Vertical, using 4 electric motors. No runway needed, able to takeoff and land on a ship deck.	Catapult launch and parachute recovery. No runway or chassis needed.
MTOW (UAV weight changes upon different configurations)	55 kg	45 kg
Maximum payload weight, kg	11 kg	11 kg
Maximum flight altitude, m	3800 m	4700 m
Endurance, h	8	10

# UAV

## features and technologies

During the years of constant improvement our team received comprehensive feedback from the end-users. Based on our experience and expertise we've made a conclusion that first and foremost human factor should be eliminated to decrease critical issues and failures. We want you to have one of the most reliable drones on the market.



### Low radar visibility

Due to fully composite airframe and absence of large metal parts, it is hard to detect and track the UAV with radars and anti-aircraft systems.



### Navigation lights

Designed for drone to be visually detectable despite of various weather conditions. If the mission requires may be turned off to keep stealthy.



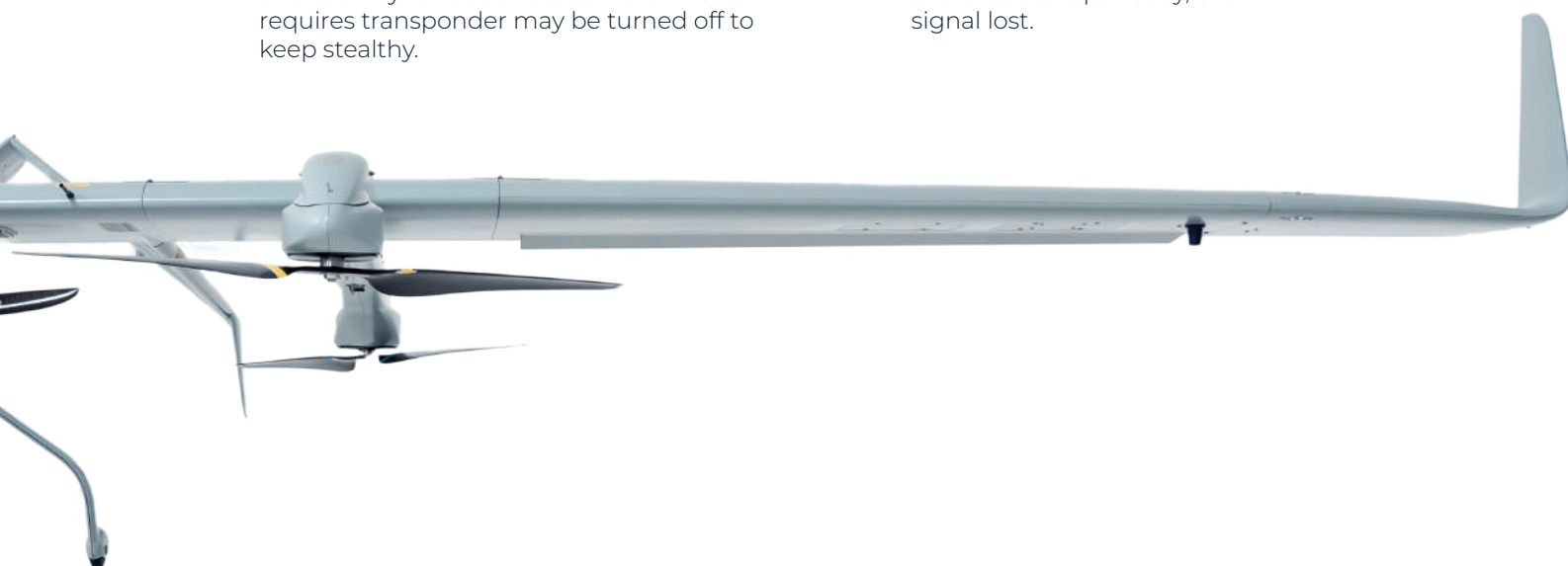
### ADS-B IN/OUT transponder

Implemented for UAV to be recognized and seen by various aircrafts. If the mission requires transponder may be turned off to keep stealthy.



### Automatic flight

Plan the mission beforehand and execute it perfectly, even if signal lost.



### Automatic take-off and landing

Simply place the UAV and give the command from the safe place. No human factor, fully automatic.



### Anti-jamming technology

Allows to operate UAV despite datalink or navigation system jamming or other attempts of interference.



### Laser rangefinder for automatic takeoff and landing

Designed for precise process of landing and takeoff.



### Capable of operating in harsh weather conditions

From -40 ° C to +50 ° C, despite of rain, fog, wind or mist.



### Charge batteries during flight

Onboard generator automatically recharges all the batteries of the UAV during the flight (both onboard and VTOL).



### Various advanced payloads

Versatility is the key. 300W onboard generator and considerable payload compartment gives the opportunity to choose.

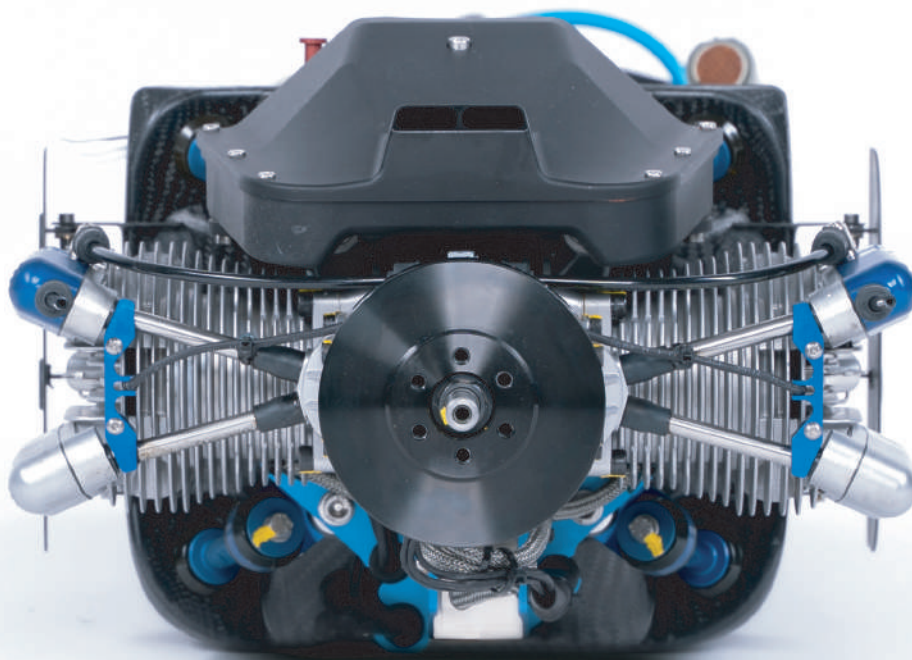
# PD-2 UAV

## engine unit

Our UAV propulsion module is a fully integrated solution. All systems come as one block for easy installation and maintenance.

Historically, it was created to operate in harsh environments, be trouble-free and reliable aggregate. That's why its basis is an easy-to-use and maintain gas engine, that may be fueled by the mixture of A-95 gas with oil.

- 4-stroke internal combustion engine 100 cc;
- Remote start from GCS with a single button;
- Emergency engine start feature (automatic start during the flight in case of failure);
- Upgraded muffler to reduce acoustic signature;
- Active engine temperature control system (may operate in temperature range from -40 to +50);
- Air intake filter;
- Air intake temperature control sensors;
- 300 W onboard generator;
- Carb heating to prevent icing.



**One may be curious why we used carburetor instead of fuel injection technology in our engine unit. The reason is simple and resonates with the philosophy of the UAS itself:**

the product should operate excellent in harsh environment, increase vitality as well as decrease

points of failures. Fuel injection may face issues due to nozzle size and its possible pollution while fueling low-quality gas. Based on our experience carburetor is preferable, taking into account, that it may operate at 5700 m+ altitude with tuning once per 6 months.

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# USG-400

## camera system

ISTAR USG - series payloads were designed by our company for UAVs, small manned aircraft, helicopters, autogyros, and aerostats. It's perfect for long - range, surveillance, search and rescue, and security applications.

Full HD EO/IR with 30x optical zoom

Scene lock

Target tracking

Digital video stabilization

Anti-fog feature

On-board recording and storage

Other high-end options from third-party manufacturers are also available (SWIR, MWIR and LWIR sensors were successfully integrated).



# Payload types

PD-2 UAV has modular construction and flexibility allow to change the payload on-the-go depending upon mission tasks.

## Optional payloads

### LiDAR

industry standard tool for collecting accurate and dense topographic data at very high speed. Commonly used to make high-resolution maps, with applications in surveying, geodesy forestry or laser guidance.

### SAR

is capable of high-resolution remote sensing, independent of flight altitude and independent of weather, as SAR can select frequencies to avoid weather-caused signal attenuation. SAR has day and night imaging capability.

### IMSI catcher

is a telephone eavesdropping device used for intercepting mobile phone traffic and tracking location data of mobile phone users. May be used to locate smugglers, trespassers or enemy troops.

### Radio repeater

enables signal relay to ensure stable communication and support for field troops.

## Custom payload integrations

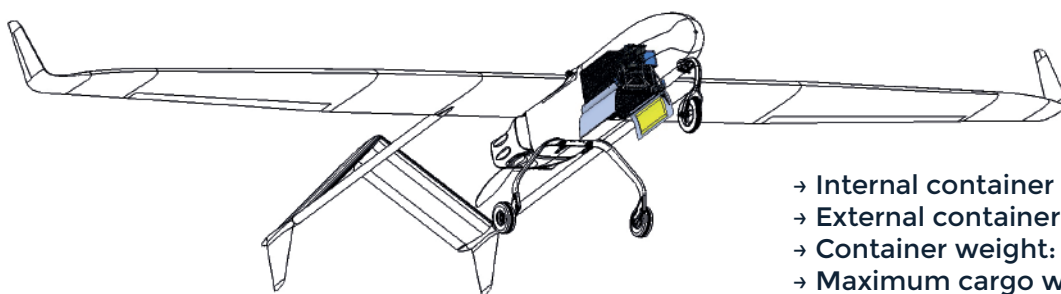


Having the biggest payload compartment within the class and 300W generator (32.5 l, 600\*223\*243 mm) gives the opportunity to be flexible.

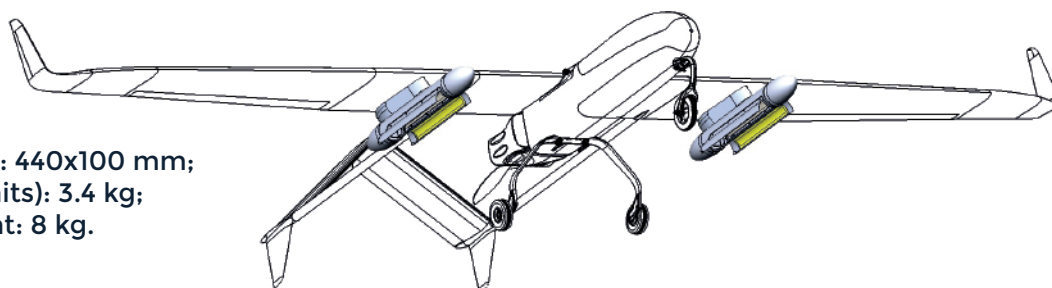
**Contact us for more info if interested in integration.**

## Cargo delivery

PD-2 UAV is capable of cargo delivery in different ways: dropdown via fuselage/wing modules or even landing the drone for load/unload and further takeoff. Cargo delivery may be executed by command or at a predetermined point.



- Internal container size: 250x210x180 mm;
- External container size: 316x220x225 mm;
- Container weight: 1.2 kg;
- Maximum cargo weight: 8 kg.



- External container size: 440x100 mm;
- Container weight (2 units): 3.4 kg;
- Maximum cargo weight: 8 kg.

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# Communication

## options

Control and communication are vital for the mission success. While designing PD-2 UAS our team did its best to ensure capability of working under different circumstances. This affects not only the weather conditions, but relief complexity and the communication channel preferred for mission success, depending upon various factors.

### Line-of-sight communication



**Effective range -  
Up to 180 km**

Standard communication configuration contains line of sight ground control station, using radio connection. It has two datalinks (the main one, used for video and telemetry exchange within up to 180 km range, and the backup one, for telemetry only), with the feature of automatic hopping between them in case of GNSS or signal loss and AES-256 encryption.

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### 3G/LTE communication



**Effective range -  
unlimited (depends  
upon cellular  
network)**

Data transmission is carried out using secure VPN technologies using TLS, IPSec, PPTP, L2TP protocols. This option allows you to establish communication with the UAV without range restrictions, provided that the cellular network coverage is stable. To ensure reliability, the modem registers itself simultaneously in the networks of two different operators of the cellular network and automatically selects the best one.

### SATCOM



**Effective range -  
unlimited**

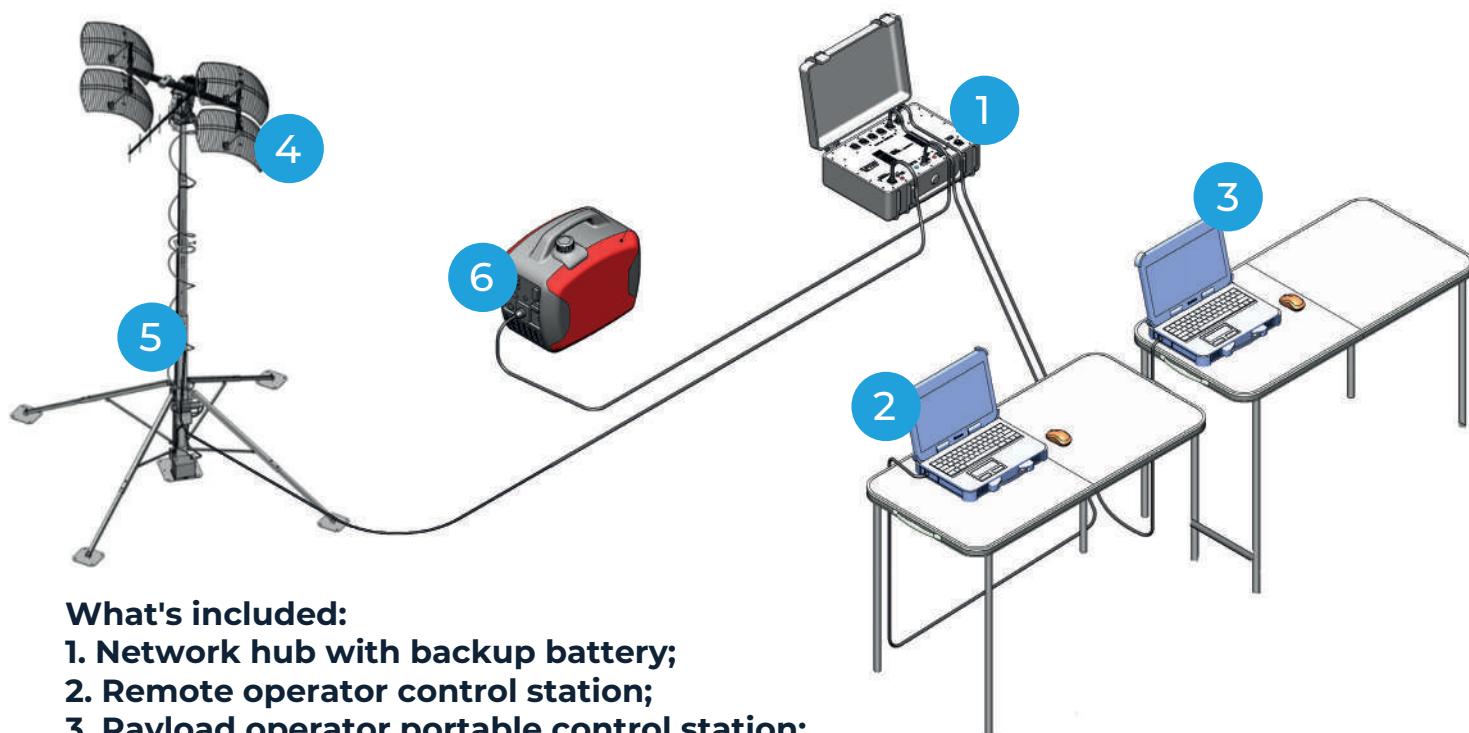
Line of sight type links certainly have their limitations due to range and weather interference. Satcom has historically stable connection and data transmission at respective ranges. Provides low radio signature due to a narrow directional L-band antenna. Compatible with government grade encryption and secure communications standards, STU-IIIB, STE, TACLANE, KIV-7 and BRENT.

# GCS

## Ground Control Station

Ground control station is designed for remote control of PD-2 UAV and payloads carried.

GCS has two laptops for easy integration wherever you need (truck, container, etc). If the relief is flat and open it's enough to use quadropod, once mission faces difficult terrain motorized mast comes in hand. Ground control station automatically enables frequency hopping in case of GNSS or signal loss. Moreover, there's advanced software, that ensures features mentioned above to work perfectly on-the-go with no human intervention.



### What's included:

1. Network hub with backup battery;
2. Remote operator control station;
3. Payload operator portable control station;
4. Tracking antenna unit;
5. Automatic mast;
6. Power generator.

## Tracking antenna unit AT-2

- 5 m mast to increase range and signal strength;
- Two communication channels;
- Up to 180 km main datalink;
- Up to 180 km backup datalink;
- Built-in video camera;
- Powered by Silvus Technologies;
- More than 2 hours of autonomous work at full battery charge;
- MESH technology support (any UAV can be used to extend communication range of second drone);
- AES-256 encrypted.

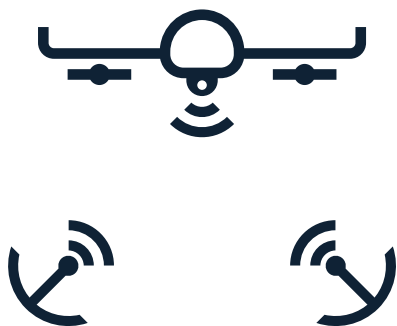


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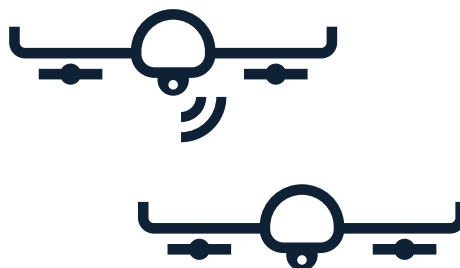


**Ground control station is powered by advanced software solution providing features like:**



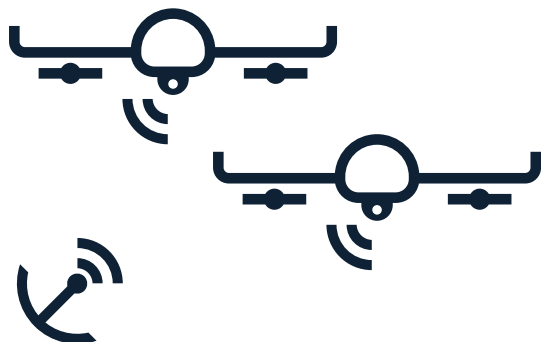
### **Control one UAV using multiple GCS**

Extend mission range, hopping the control from one GCS to another during the flight.



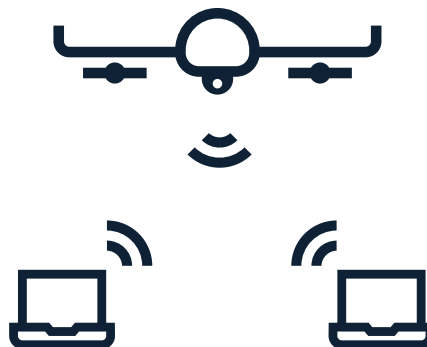
### **Signal relay from one UAV to other UAVs**

Several UAVs may be operated via one GCS.



### **Control of several UAVs from one GCS**

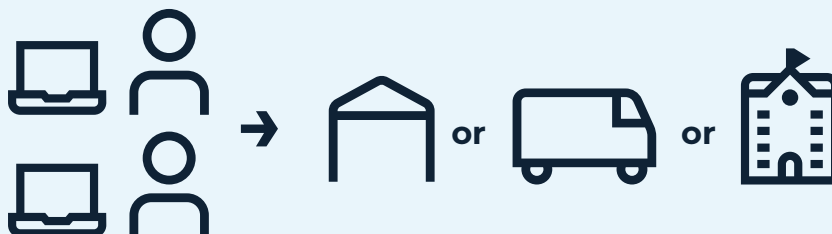
One GCS may easily operate several UAVs in range in case if operation needs full cover of the area for precise data.



### **Live streaming to multiple GCS and RVT**

The necessary information is available for operators, HQ and field troops at the same time.

**GCS may be integrated separately or mounted into military vehicle trailer system or bus.**

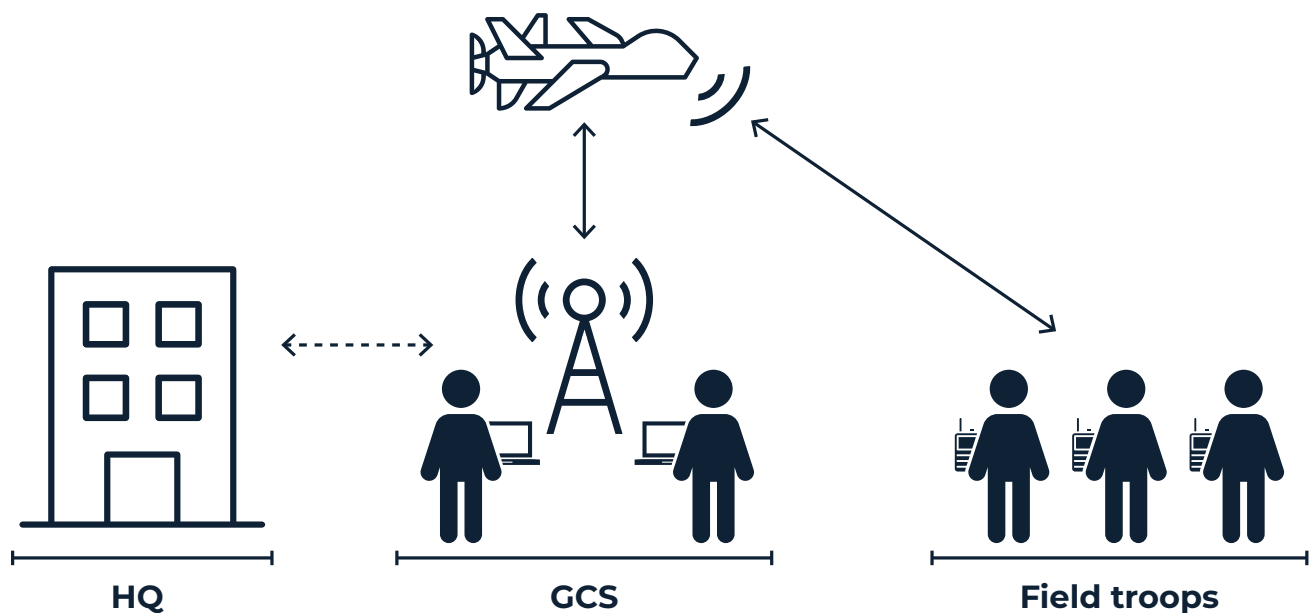


# Strix

online software

Strix-online is specialized software developed for mission planning, processing gathered information, report generation and further transfer to external sources using API.

Client-server architecture ensures that the main asset of the mission - information, will be promptly transferred and processed. All the data may be gathered and worked up locally as well as sent to dedicated server at headquarters and backed up. In order to fully control the mission our team designed HQ-mode that allows to observe the current state of mission, at get live online footages. Advanced interface allows simultaneous work of several users with different access rights and storing all the information on predetermined dedicated server.



## Features



Mission planning



Detect, identify and analyze targets



Transfer to external sources via API



Moving live map



Augmented reality support



Security protocols



Add objects with one click



Automatic combination of route with photos



Get coordinates of the object



Pdf report generation

# Spare parts

## accessories and support

UKRSPECSYSTEMS provides its customers with full training course to operate UAS. Moreover, there's an aftersales support and deep training of product, based on military experience gained at the East of Ukraine. We will teach you and your staff how to operate UAS to reach maximum efficiency.

**Also, purchasing PD-2 UAS grants everything one may need for successful mission execution during 900 hours.**



### What you get

- PD-2 UAV VTOL;
- Ground control station (including antenna tracking unit AT-2 with automatic mast, rugged GCS for drone operator, rugged GCS for payload operator, network router, batteries);
- Payload (USG series gimbal, high-resolution camera with camera control system)
- Software license;
- Spare engine unit;
- Spare parts, tools and accessories (from engine spark plug, polarized sunglasses, USB flash drives, headphones with ear defenders and set of probes to battery voltage analyzer and various fuel and air filters).

**All one may need is fuel for UAV!**

[ukrspecsystems.com](http://ukrspecsystems.com)

# Applications

## Military use

PD-2 UAS easily handles ISR missions, artillery fire correction (spotting) and general support missions.

### Features



Low radar & acoustic signature



Secure encrypted connection and anti-jamming features



Live video from drone to multiple groups via remote terminal



Integration with BMS and artillery spotting software



Advanced payloads

## Border control and coast guard

Get clear view of the border with 24/7 air surveillance. A fleet of PD-2UAVs allows for continuous surveillance over specific areas. Motion detection software allows to detect and track objects of interest to maximize effectiveness both from UAV and stationary CCTV. In case of water incident PD-2 UAV may deliver and drop the lifesaving kit, fixate coordinates of dropdown and share it to rescue team.

### Features



Over 1000 km of border controlled by UAV



Real-time information to ground troops for situational awareness



Cover border with stationary cameras



Instant alert on suspicious activity



IMSI payload to locate smugglers and intruders

## More applications



Agriculture

Crop health inspections. NDVI inspections, real-time surveillance and much more.



Gas and oil

Real-time inspections and monitoring with high-resolution camera.



Firefighting

You can detect current fire locations, provide more reliable information and identify hot spots in wildland fires.



Mining

Creating detailed images of the mining locations.

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## Intelligence, Surveillance, Reconnaissance & sight

PD-2 UAS is capable of carrying wide range of payloads, including EO/IR payload, SIGINT equipment or other equipment to support your operation.

### Features



Support your operations with in-depth intelligence



Precisely detect cell phone location



Support ground forces by carrying a radio repeater for their radios



Find people by their cell phones



See location changes and routes for cell phone movement

## Police and law enforcement

The police and law enforcement operations could be supported by “eye in a sky” offering real-time situational awareness and reduce time to take important decisions.

### Features



Plan law enforcement operations using real-time information



Traffic management



Rapidly deploy VTOL drone in urban environment



IMSI catcher to find individuals

## More applications



Energy

Sun battery farm inspections.



Power lines inspection

Real-time inspections and monitoring with SIGINT payload to locate energy leaks.



Wildlife

Wildlife monitoring to prohibit poachers' operations.

# Technical detail

UAV configuration	PD-2 VTOL	PD-2 fixed-wing
Full length, m.	2,85	2,85
Height, m.	1,02	1,02
Wingspan, m.	5	4
Type of engine	4 stroke	4 stroke
Type of mixture preparation	carburetor	carburetor
Glide ratio	15	14
Maximum takeoff weight, kg.	55	45
Payload weight inc. fuel, kg.	20	20
Max payload weight, kg.	11	11
Max. operation ceiling, m.	3800	5000
Max. climb rate, m/s.	3	4,5
Volume of the fuel tank, (liters) dm3.	11	11
Max Flight Speed, km/h.	140	160
Cruising speed, km/h.	100	110
Stall speed, km/h.	65	65
Flight time with max payload weight, h.	8	10
Approximate length of the maximum route, km.	800	1300
Radio range (C2 & Video), km.	Up to 180	Up to 180
Operating temperature, degrees Celsius	-40/+50	-40/+50





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