CableWalker

FutureLab LLC

Robotic system for monitoring and local maintenance of power lines

Product

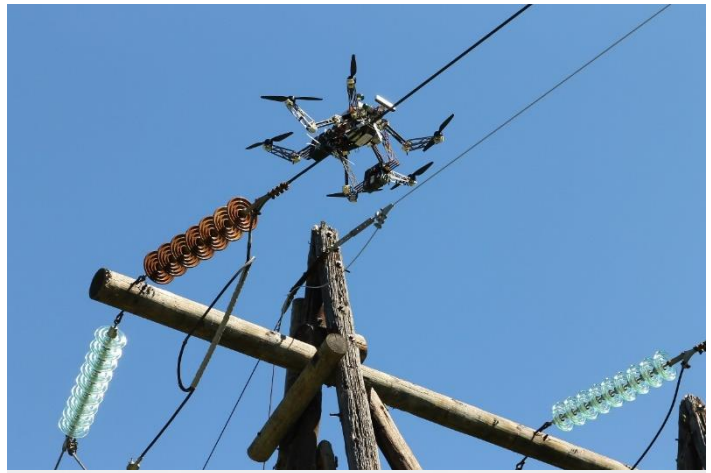
Value proposition

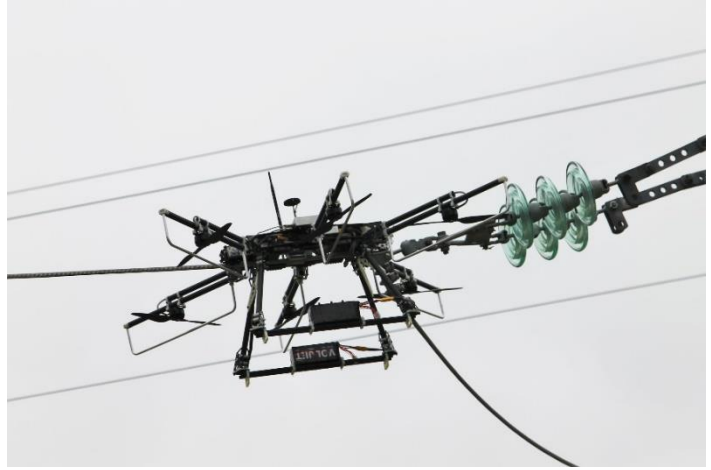
The monitoring and local maintenance system for power lines based on the CableWalker complex provides high quality monitoring and maintenance, absolute safety and opportunities for staff, improving the efficiency of business processes.

Functions:

- Creation of a high-quality digital model of high-voltage overhead lines and landscape
- Instrumental monitoring and maintenance of overhead lines
- Installation and maintenance of sensors (short circuit indicators) on overhead lines
- Local repair on overhead lines

Architecture





Architecture:

1) Basic transport platform ("Dragonfly")

2) Maintenance and repair platform ("Spider")

3) Platform for installing equipment on a wire and local repair ("Bumblebee")

4) Local repair platform ("Wasp")

Architecture

Basic Transport Platform ("Dragonfly")

The «Dragonfly» is unmanned drone with 6 rotors (hexacopter).

This platform has two wheels of specialized design located in the front and rear, allowing the platform to move along the cable (wire).

Diagnostic modules of the platform:
- video control module;
- ultraviolet scanner;
- thermal imager;
- magnetic scanner;
- laser scanner.

Architecture

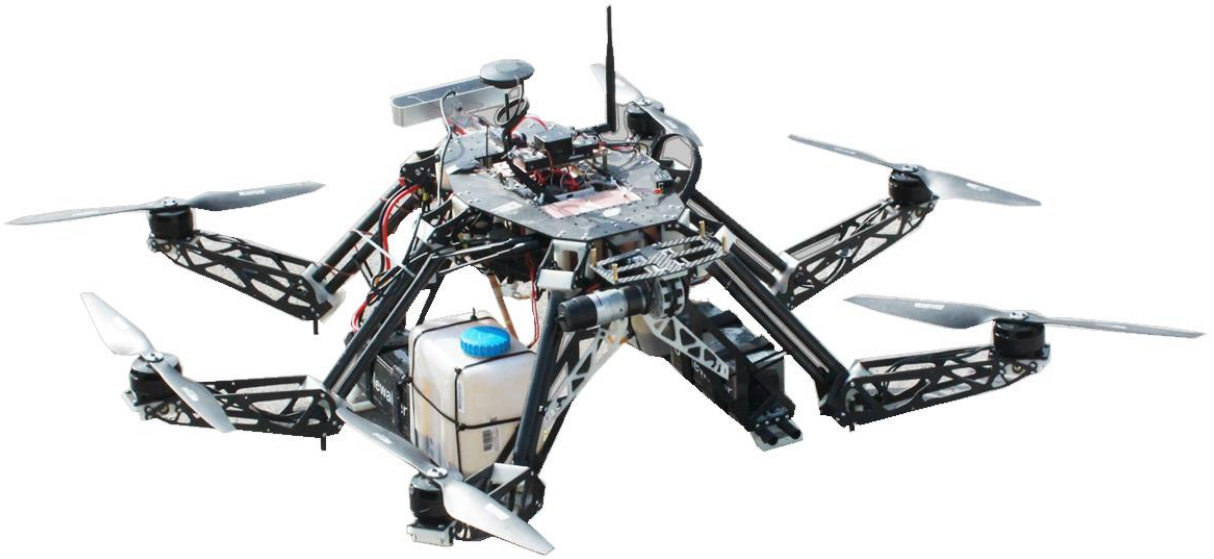
Maintenance and Repair Platform («Spider»)

The «Spider» platform is an unmanned with 6 rotors (hexacopter).

This platform is designed for cleaning and lubricating the wire.

Tanks with anti-corrosion, anti-icing or other types of grease are installed on the platform.

The platform moves along overhead ground wire or wire, cleans the wire and applies grease.



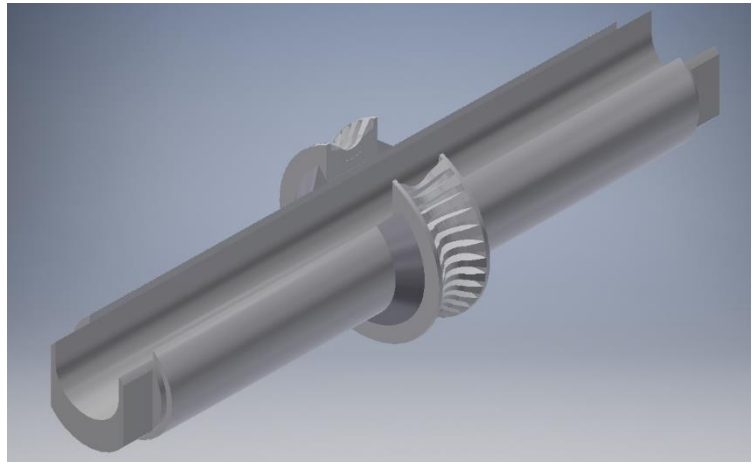
Architecture

Local Repair Platform ("Wasp")

The Wasp platform is an unmanned drone with 6 rotors (hexacopter).

This platform is designed for local wire repair operations.

The platform can be installed using special devices: repair clamps and repair installations.

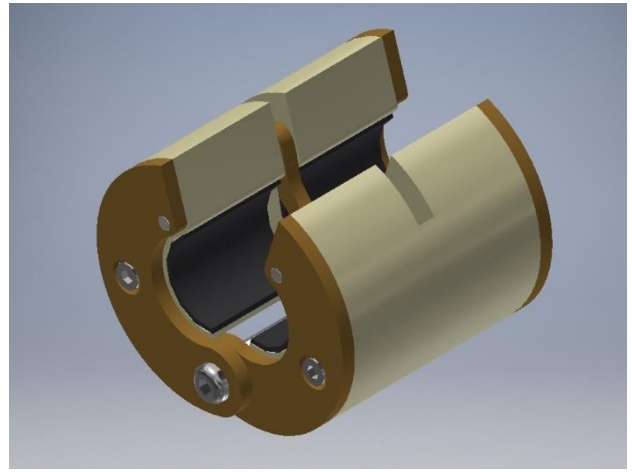


Architecture

Platform for installing equipment on a wire and local repair ("Bumblebee")

The Bumblebee platform is an unmanned drone with 4 rotors (quadrocopter).

This platform is specialized for maintenance operations on lines by installing various devices on the OHL (overhead lines): different types of repair clamps and short circuit indicators.



The value of “Cablewalker”

Problems of maintenance of power grid

1) Safety problem: Mortality and industrial injuries.

2) The problem of efficiency: High costs for the maintenance and operation of electrical grid.

3) The problem of reliability and controllability: Damage from accidents in the energy sector is estimated from 1 to 3% of the GDP of developed countries, the high complexity of engineering control, there are no effective means of monitoring the quality of personnel in the field

Solution of this problems by “Cablewalker”

There is significant reduction of the influence of the human factor and ensuring complete safety due to the lack of direct contact of personnel with wires of power lines.

There is comprehensive increase on the efficiency of power grid due to an accurate and local approach to the search and elimination of defects in electrical grid.

It is possible to reduce the number of accidents, ensuring high controllability and monitoring compliance with each operation in terms of maintenance and repair of electrical network elements due to the high quality of monitoring and maintenance

Competitive advantages of the product

- Physical contact with the wire, access to the OHL elements
- Low power consumption
- Easy to move around the wire, the ability to fly around anchor supports
- Safe, human factor excluded
- High speed
- Potential for cost reduction
- Contains many patented unique inventions

Work examples

During the work, a potential customer:

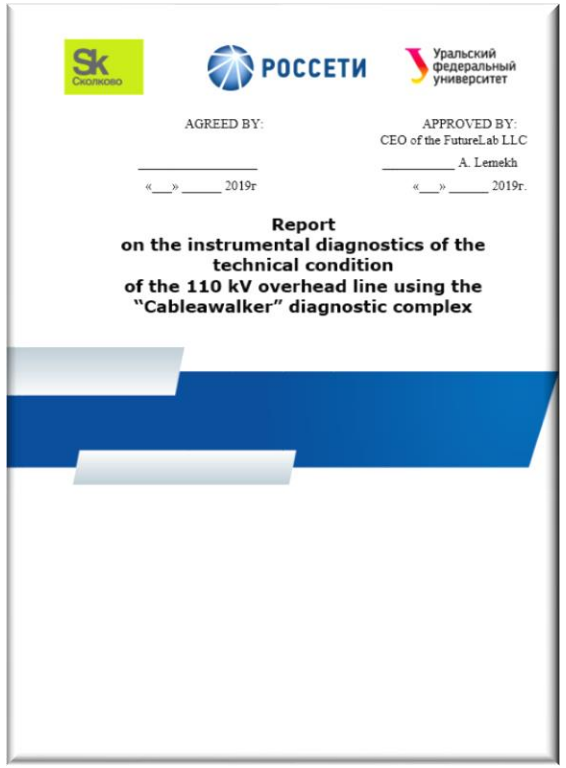
-selects a pilot project object (overhead line);

-determines the details of the pilot project (number of supports);

-provides to the executor the passport of overhead line;

-determines the dates of work (dates are agreed in official correspondence);

-accepts work in the form of a received report.



Work examples

The report, which is generated as a result of the implementation of the pilot project, depending on customer requirements, may contain the following sections:

1) Video monitoring results

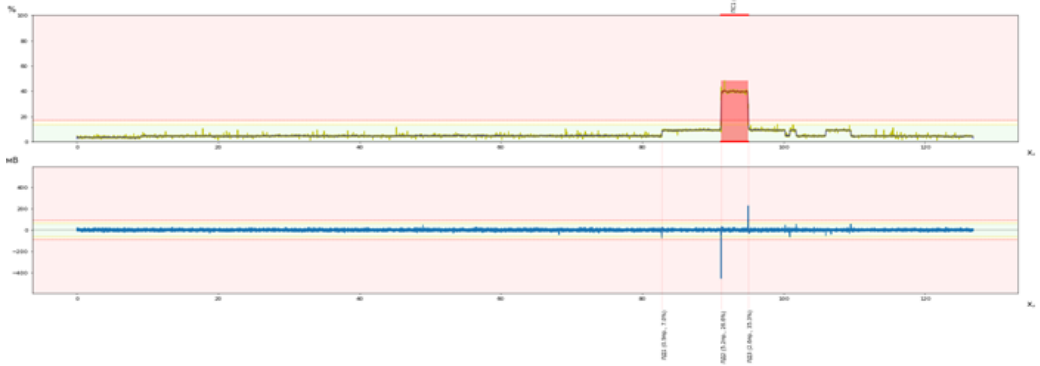
Table 5. Violations and malfunctions detected during the videoscanning

№	Violations and malfunctions	Designation	Paragraph of RD 34.20.504-94	Quantity, pieces	Possible cause	Recommendations in accordance with RD 34.20.504-94
	Stand Condition (Concrete)					
1	The deviation of the support across the track more than 1: 150	Excessive tilt	Table.4.4. p.1	7	Violation of installation technology	Straighten the rack. Reinforce ground embedment
2	Longitudinal crack with an opening width of more than 0.6 mm	Crack	Table. 5.1 p.4.	21	Violation of manufacturing and installation technology, alternating loads and atmospheric effects	Strengthening the stand by installing a bandage
3	Porous concrete	Pores	Table. 5.1 p.6.	1	Violation of installation technology	Close up with polymer cement solution
4	Scratches, delaminations in concrete	Scratches		22	Violation of manufacturing and installation technology	Close up with polymer-cement mortar; On supports No. 84, 96,100,102 and 105, repair the headband

Work examples

2) Magnetic scanning results

Span	Defects	Max. defect, wire breaks	Section loss max., %	Section loss avg., %	Condition
1-4	Not scanned under the terms of the contract				
5-4	0	0	4.5	3.9	No defect
5-6	0	0	4.8	4.2	No defect
6-7	1	2	19.5	4	Defect exceeds critical (p. 4.7.1 RD 34.20.504-94-1)
7-8	0	0	5.8	4.5	No defect
8-9	0	0	7.1	5.5	No defect
9-10	0	0	5.8	5.2	No defect
10-11	0	0	6.3	5.7	No defect
11-12	0	0	6.2	5.6	No defect
12-13	0	0	6.1	5.4	No defect
13-14	0	0	6.4	5.2	No defect
14-15	Strong interlacing of the wire of the external layer, operation of the magnetic scanner is impossible				Wire break visually detected
15-16	No overhead ground wire				
16-17	3	5	40.6	6	Defect exceeds critical (p. 4.7.1 RD 34.20.504-94-1)
18-17	0	0	6	5.3	No defect



Work examples

In addition to the report with the analysis of information, the customer is provided with electronic media all the data collected during the pilot project (video recordings from the cameras of the complex's platforms, magnetic scanning data, photo-recording of defects, etc.)