

## ANALYSIS OF POWER PLANTS USED IN UNMANNED AIRCRAFT

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The purpose of the research is to improve the tactical and technical characteristics of commercial unmanned aerial vehicles (UAVs) by developing the engine with promising indicators. The research is based on current and future developments of both domestic and foreign manufacturers. One of the most important tasks in the development phase of a UAV is the proper selection of the power plants. It involves the selection of such a system which enables the best use of the characteristics of the airframe and produces appropriate thrust to meet all the tactical requirements for an unmanned aerial vehicle. Expected scientific and practical results: significant increase in autonomy and reliability of promising models of domestic UAVs, expansion of the range of their tactical, technical and operational characteristics

A special place among modern complexes and innovative technologies are occupied by unmanned aerial vehicles. An unmanned aerial vehicle is an aircraft without a pilot, crew or passengers on board, controlled automatically or remotely using unmanned aerial systems. Classification of unmanned aerial vehicles is carried out based on its intended purpose, technical characteristics and parameters depending on its type, dimensions, weight, flight height, range, power plant, control method, etc.

The subject of research is the analysis of power plants used in unmanned aerial vehicles. The analysis of promising developments and already existing power plants will allow to significantly speed up the development of a promising plant of domestic production and will solve urgent problems. Today, the use of unmanned aerial vehicles saves people from the need to be in dangerous conditions, to perform work that goes beyond the physical and psychophysiological capabilities of a person, and also opens up a wide range of such functions that previously might have seemed impossible.

According to the type of power plant, unmanned aerial vehicles are divided into electric motors and internal combustion engines, including rocket ones. Each of the specified types of engines has its own disadvantages, advantages and features. One of the main advantages of engines (piston, rotary, gas turbine and jet) running on liquid fuel (gasoline, hydrogen) is the drone's operating time without refueling, which allows performing tasks even within 8-10 hours. In turn, unmanned aircraft powered by electric motors, depending on weather conditions and ambient temperature, can perform their functions for 3-4 hours. Electric drones are more reliable and safer to operate. They have less weight, which improves their handling and maneuverability, and better cushioning functions during landing, which prolongs their performance. Electric drones mainly use lithium-polymer batteries (Li-Po). The energy stored in Li-Po is much less than in internal combustion engines, but electric engines are cheaper to manufacture and lighter and quieter in operation.

Consider some unmanned aerial vehicles with different types of power plant systems produced by different countries presented in the Table 1.

Table 1 – Unmanned aerial vehicles with different types of power plant systems produced by different countries

Country of manufacture and name of the device	Engine, power	Flight duration, hours	Maximum speed, km/h	Flight range, km	Curb mass, kg
Camcopter S-100 Austria (2005)	1×Austro AE50R Wankelrotary 2000 kHz, rotary	6	222	180	200
CQ-10B Canada (2001)	Rotax 914 110 hp, piston	19	120	300	270
FlyEye Poland (2010)	1 × electric motor	2-3	160	50	11
RQ-11 Raven USA (2001)	Engine Aveox 27/26/7-AV electric motor	1-1,5	56	10	1,9
Bayraktar Kızılelma Turkey (2022)	1 × AI-25TLT air-jet	5	900	926	4 000
A-100 (UAV) Ukraine (2014)	electric motor 6.5 hp	1,5	160	50	6,5
Sperwer France (2001)	Bombardier-Rotax 562UL, 65 hp, two- cylinder	6	240	200	212

Consider the disadvantages and advantages of electric and internal combustion engines presented in the Table 2.

Table 2 – The disadvantages and advantages of electric and internal combustion engines

Indicator in operation	Electric motors	Internal combustion engines
Time of use	3-4 hours	8-10 hours
Energy source	Electric current accumulator batteries	Liquid fuel (gasoline, hydrogen)
Weight	Lighter	Heavy
Production price	Cheaper	More expensive
Cargo	A small load	Big cargo
Difficulty in operation and noise	Lighter and quieter during operation	Complex and noisy during operation

It can be noted that the power plants that are used on unmanned aerial vehicles play a big role. For example, depending on the range of the pallet, it is better to use an air-breathing engine. Best pallet durability is powered by piston motors. Air jet engines can also provide maximum pallet speed.

When analyzing the power plants that are used in unmanned aerial vehicles, it is necessary to take into account other characteristics and components of these devices. Without this, there will be no complete understanding of which device is best to use.

### References

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