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Original Article

Evaluation of Battery-based and DC Generator Power Sources for High Voltage

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Abstract - *High-voltage power systems are not well understood, motivating this research to examine performance differences of battery-based versus DC generator power sources on a hexacopter. With more high-performance Unmanned Aerial Vehicles (UAVs) on the market, the need to understand high-voltage power systems is increasing. A battery-based 12S LiPo system (15C and 20C) was compared with a 4000 W DC generator, and thrust, current, and power were measured with 24, 26.5, and 29-inch propellers. The battery-powered system produced more current and power and therefore more thrust at the same voltage than the DC generator system. The optimal configuration for the 12S20C battery was the 29-inch propeller, which produced 79.36 N of thrust. In contrast, the DC generator had to operate at a higher voltage (50.4 V) to achieve a comparable thrust of 79.17 N, which illustrates the differences between the two power sources. In high-voltage UAV applications, the power source selection guidelines are crucial.*

Keywords - *Tethered drone, Uncrewed Aerial Vehicle (UAV), Quad rotor, Power characteristics, Thrust testing.*

1. Introduction

Recent developments in the technologies related to Unmanned Aerial Vehicles (UAVs) in areas like industrial inspections, agriculture (including fertilization, pesticide spraying, and crop surveying) have revealed the malfunctions in UAVs and the need for more adaptable and reliable energizing systems [1]. As more human operators continue to stretch the working boundaries of UAVs, the need for stretchable and energized sources of UAVs continues to grow [2, 3]. Presently used low-voltage battery systems have a lot of shortfalls in relation to growing energy requirements. Such shortfalls have left the limits of current transfers and power transfers unbroken, thus stretching the limits of the UAVs [4].

For the purpose of this work, high-voltage power systems are defined as the power systems employed with the electric propulsion of the UAVs operating at nominal voltages of 12S (around 44.4 V) and above. These include the systems that are based on LiPo batteries and DC generators. Such constraints mean that different power systems are needed that will meet the demands without significant loss of operational efficiency and system reliability. Regardless of the multiple challenges involved, UAV researchers continue to explore different types of energy systems [5, 6]. Each type of energy system has its own set of power attributes and advantages. In spite of this, more demanding missions that require the transport of heavier payloads and longer flight times tend to use power systems that operate at higher voltages. This is because such systems are more effective at meeting power needs. Having tethered drone systems that utilize DC generators and low KV motors that can take high volts, along with configurations like 12–14S LiPo batteries and 14S LiPo batteries, can provide high thrust and longer flight times. These systems are crucial for the high-volatility and electrically efficient missions like drone spraying (fertilizer/pesticide), seed (aerial) dispersal, heavy payload cargo drone operations, and other UAV agricultural applications. Still, the performance features of these systems are poorly defined, and there is a lack of clear empirical studies comparing battery systems and high-voltage, tethered systems. Also, there is a gap in empirical studies of high-voltage systems and propeller size efficiency, whereby the performance of large versus small propellers is not clearly defined.

Notwithstanding the developing interest in high-voltage UAV power systems, the empirical comprehension of their electrical attributes and propulsion performance when contrasted with alternative power delivery mechanisms is still sparse. Existing research primarily concentrates on battery-based systems, and only a handful of works provide direct comparisons on quantifiable performance metrics in controlled operating conditions. In this work, thrust generation is defined as the static axial force, under controlled conditions, produced by the motor-propeller system, and it is measured as the direct indicator of propulsion performance. This study addresses the research gap by aiming to understand how higher voltage levels affect thrust, current draw, and power consumption within the context of the operational performance of propulsion systems at high power.

This study is different from the majority of existing studies that look at high-voltage battery systems or tethered power systems separately, as this study strives to achieve a propulsion-level, controlled, and comparative study between high-voltage battery and tethered power systems with the same motors, propellers, and operating parameters.

This makes it possible to conduct a thorough comparative study between different methods of power delivery with respect to thrust generated, electrical efficiency, operational Endurance, and overall real-world operational applicability of the UAV with respect to sustained hovering, cumbersome payload combat, or industrial inspection and cleaning.

This study is important because it aids UAV designers and operators in power system architecture selection and decision-making concerning power source choice, propulsion size, integration, and overall system architecture of next-generation, high-performance, long-endurance UAVs.

2. Literature Review

The need for improved performance and more prolonged operational Endurance for Unmanned Aerial Vehicles (UAVs) has fueled substantial research in cutting-edge power system technologies. Of all the strategies examined to date, the use of high-voltage systems as a means of optimizing efficiency and increasing the power of electric propulsion systems has become a prominent strategy [7].

This section will analyze the aerospace academic literature for UAVs utilizing high-voltage battery power systems and high-voltage tethered power systems, outlining advancements, primary issues, and relative benefits.

2.1. High-Voltage Battery-based Power System

Using high voltage creates greater power at a lower current. Also, with a low KV-rating motor configuration and an ESC with high voltage capability, large thrust can be produced, commonly seen in agricultural drones. This can improve efficiency, reduce heat, and conserve energy [8].

A high voltage system on a UAV can deliver sufficient power to the electric propulsion system with good current, which has a significant high resistive loss (I2R loss) on the wiring and other components [9].

Monitoring operational safety in this energy-dense environment is done through an Advanced Battery Management System (BMS) [10]. These systems monitor and manage individual cell voltages, which at full charge can reach 4.2V, while also managing discharge levels, which typically means landing at a specified voltage. High-voltage battery systems have the potential to improve drone performance in several ways, such as increased flight speeds, greater diversity of operational tasks (e.g., surveillance), the ability to support higher discharge rates, and enhanced overall flight durations.

2.2. Tethered-based System

Tethered Uncrewed Aerial Vehicles (UAVs) are unusual for providing a simple solution to the challenges battery-powered drones face in situations where extended periods of operation are required. This review will focus on the development of tethered drones, the advantages of tethered drones, and the potential tethered drones can provide in the future.

Alternative drone power supply methods have been researched by Walendziuk et al. [11], who have documented tethered systems as providing a solution for long operational time. From their research, Walendziuk et al. documented two primary tethered drone systems.

Ground-station tethered: In this configuration, the UAV is connected to a stationary ground station or a mobile terrestrial platform via a cable. This cable serves multiple purposes, including power transmission, data transfer, and mechanical support.

Load-connected tethered: This setup involves one or more free-flying UAVs connected to a load through a tether, which primarily provides a mechanical connection between the vehicles and the load.

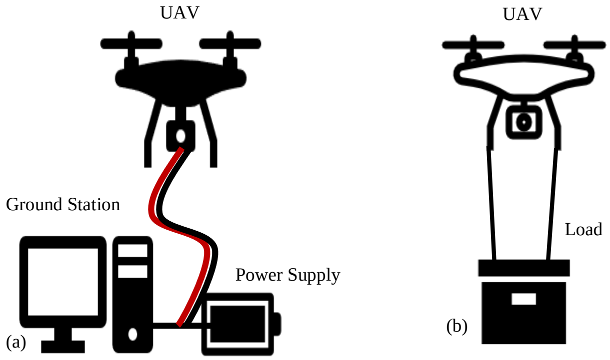

Fig. 1 Two main types of tethered systems (a) Ground power supply copter, and (b) A copter transporting a load.

One of the most significant benefits is the extended flight time. While battery-powered drones typically have flight times ranging from 5 to 45 minutes, depending on the battery capacity, tethered drones can potentially operate for hours or even days without interruption.

2.3. Battery-Based vs Tethered Power System Drone

Table 1. Comparison between battery-based and tethered system drones

Aspect	Battery-Based System	Tethered System
Flight Time	Limited (typically 5-45 minutes)	Extended (potentially hours or days)
Operational Range	Unrestricted within battery life	Limited by tether length
Power Capacity	Limited by battery size and weight	Higher (can transmit several kilowatts)
Maneuverability	High	Restricted by tether
Setup Time	Quick	Longer (requires tether setup)
Payload Capacity	Limited by battery weight	Potentially higher due to reduced onboard battery weight
Data Transmission	Wireless (potentially less secure)	Secure and high-speed via tether
Recharging/ Refueling	Requires landing and battery swap/recharge	Continuous power supply
Detectability	May be higher due to heat signature	It can be lower, especially with fiber optic tethers
Weather Resistance	Affected by extreme temperatures	Less affected by temperature
Scalability	Easily scalable for different sizes	May require significant ground infrastructure
Initial Cost	Generally lower	Higher due to ground station equipment
Operational Cost	Higher (battery replacements)	Lower (continuous power supply)
Redundancy	Limited by the onboard battery	Higher (can switch to onboard battery if tether fails)

3. Methodology

3.1. Drone Features

24-inch to 29-inch propellers are commonly used for propulsion parameters. For this experiment, the following parameters were as shown in Table 2. Manufacturers usually specify drone propellers using two dimensions in the format A × B [12]. The first specifies the diameter of the propeller from tip to tip, while the second, the pitch, is the distance the propeller would move forward in one complete rotation under ideal conditions, which is determined by the blade angle, as described by manufacturer specifications. In Figure 1, props of 24, 26.5, and 29 inches have been used for the high voltage hexacopter, obtained from the motor specifications, to comply with the safe operational and preventive component damage manufacturer recommendations.

Table 2. Drone propulsion specifications

Propeller length		1) 24-inch
		13 pitches
		2) 26.5-inch
		9.2 pitches
		3) 29-inch
		9.5 pitches
Motor	Model	T-Motor
	Rating (Kv)	115
	Idle Current (A)	0.4
	Max Continuous current (A)	28
	Weight (g)	188

Fig. 2 24-inches, 26.5-inches and 29-inches propellers

3.2. Testing Rig

The tests were carried out indoors in a typical laboratory environment to avoid the influence of wind and other external factors. The testing rig was firmly secured on a level laboratory table with the propulsion system facing straight upwards. This arrangement enables thrust to be applied directly along the rotor axis, as illustrated in Figure 3.

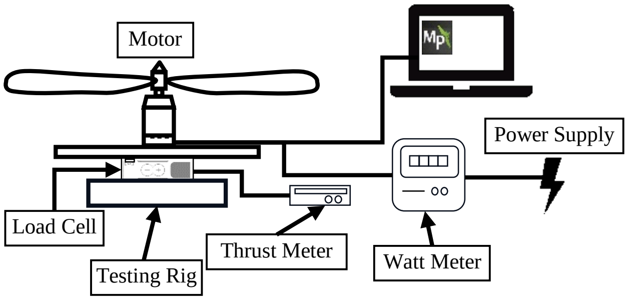

Fig. 3 Testing rig diagram

Thrust measurement was conducted using a single-point load cell (Mavin NA4) with a 2000 N maximum load capacity. The load cell was connected to a thrust meter that provided real-time force feedback. For each test, the load cell was calibrated after each power cycle to guarantee accuracy in measurement. A watt meter, which was set up between the power source and the propulsion system, logged electrical quantities: voltage, current, and power.

Table 3. Testing rig specification

Thrust meter		ProAce A20
Load cell	Model	Mavin NA4 (Single point)
	Max thrust	2000N
Watt Meter	Model	ABS
	Max Current	150 A

3.3. Testing Parameter

A 4000 W DC power supply and 12S lithium polymer (LiPo) batteries with varying discharge ratings (12S15C and 12S20C) were examined as possible power sources. Each battery was charged to capacity prior to the tests. The DC power supply was also adjusted so the output voltage matched the 12S LiPo system.

To ensure consistency, the same make and model of motors, propellers, and ESCs were used for each test. In accordance with the specifications provided by the manufacturer, the propellers were tested in order of size (24, 26.5, and 29 inches). The tests were executed with a throttle input of 100%.

Each test was performed in a stable 10-second window, and the maximum thrust was recorded, then used to analyze the average values of thrust, voltage, and current for the 10-second interval. All tests were completed within the manufacturer-specified operating conditions.

3.3.1. Lithium Polymer Battery

Batteries with a 12S voltage rating and different C-ratings, specifically 12S15C and 12S20C, were used in this test. All batteries were fully charged prior to testing to ensure maximum power output. The battery specifications are listed in Table 4.

Table 4. Battery specifications

Battery Specs	Cell (S)	C-Rating (C)	Capacity (mAh)
12S 15C	12	15	22000
12S 20C	12	20	22000

3.3.2. Direct Current Power Supply

A DC power supply was utilized in this research in comparison with the battery-based power system. The output voltage can be adjusted to match the voltage of the LiPo battery. The specifications of the DC power supply are presented in Table 5.

Table 5. DC generator specification

Parameter		
INPUT	Maximum Power Output	4000W
	Input Voltage	180-264 VAC
	Frequency	45-63 Hz
OUTPUT	DC Voltage	54 V
	Voltage Adjustable Range	V
	Current Output Range	0-74 A

4. Results and Discussion

This research investigates the propulsion performance and electrical response of a high-voltage hexacopter with two different electrical supply system configurations: 12S lithium polymer (LiPo) batteries with varying C-ratings and a DC generator-based power source, and three different sizes of propellers. The research was confined to the analysis of the system's propulsion configurations that are the same for both systems, with a few sizes of propeller, and these are thrust, current, and power for optimal comparison.

4.1. Thrust and Power Characteristics of Battery-based Systems

The 12S20C LiPo battery paired with the 29-inch propeller provided the best thrust performance with 79.36 N.

Table 6. 12S Battery result

Factor 1	Factor 2	Response 1	Response 2	Response 3
A: Battery Specs	B: Propeller Size (inch)	R1: Thrust (N)	R2: Max. Current (A)	R3: Power Output (W)
12S 15C	24	55.23	13.18	626.71
12S 15C	24	52.48	13.01	622.3
12S 15C	24	53.07	13.92	614.6
12S 20C	24	57.58	13.65	672.3
12S 20C	24	58.76	13.72	674.6
12S 20C	24	56.31	13.61	668.3
12S 15C	29	77.4	25.33	1133.5
12S 15C	29	75.73	24.24	1103.9
12S 15C	29	76.71	24.68	1107.3
12S 20C	29	79.36	26.46	1241.4
12S 20C	29	76.52	25.12	1209.4
12S 20C	29	75.54	25.19	1202.5
12S 15C	26.5	66.2	26.62	1249.3

12S 20C	26.5	66.81	30.82	1439.4
12S 15C	26.5	63.86	26.39	1246
12S 20C	26.5	64.55	29.37	1417.7
12S 15C	26.5	65.63	27.14	1258
12S 20C	26.5	66.61	29.25	1341.3

The performance of this configuration can be explained by the battery's discharge rate, which allows large instantaneous currents to be supplied without considerable voltage drop, even at high loads. The findings also show that larger propellers can sustain larger thrust at higher voltages. For the same thrust, larger propellers tend to rotate at lower speeds compared to their smaller counterparts. This improves the aerodynamics of the system while reducing the in the system, particularly at high voltages. Here, the system can produce the same amount of torque without the excess losses un that are caused by the resistors in the system. As shown in the Figure 5, the interaction between propeller size and battery C-rating shows that larger propellers combined with higher C-rating batteries lead to increased power and current output. The 29-inch propeller required less current than the 26.5-inch propeller when using the same battery, indicating better energy efficiency. Although the current difference was minimal, the 29-inch propeller produced 79.36 N of thrust with 1241.4 W, whereas the 26.5-inch propeller paired with a 12S20C battery delivered the highest power output of 1439.4 W but with a lower thrust of 66.81 N. These results suggest that the power system provides sufficient torque to overcome the drag generated by the 29-inch propeller. According to the Figure 6, the result of the interaction between factor A (battery specification) and factor B (propeller size) is different depending on whether the propeller is 24 inches or 29 inches in diameter. When utilizing a battery with a higher C-rating, the thrust produced by a 24-inch propeller will increase; however, a 29-inch propeller will not experience a substantial increase in thrust value when switching to a higher C-rating value. This data demonstrates that the most efficient configuration for the battery-powered hexacopter is a setup that consists of a 12S20C battery and a 29-inch propeller. Figure 6 shows that the interaction between battery specification (factor A) and propeller size (factor B) varies depending on whether the propeller is 24 inches or 29 inches in diameter. For the 24-inch propeller, a higher C-rating battery increases thrust output, whereas the 29-inch propeller shows minimal thrust improvement when switching to a higher C-rating. These results indicate that the most efficient battery-powered hexacopter configuration is a 12S20C battery paired with a 29-inch propeller.

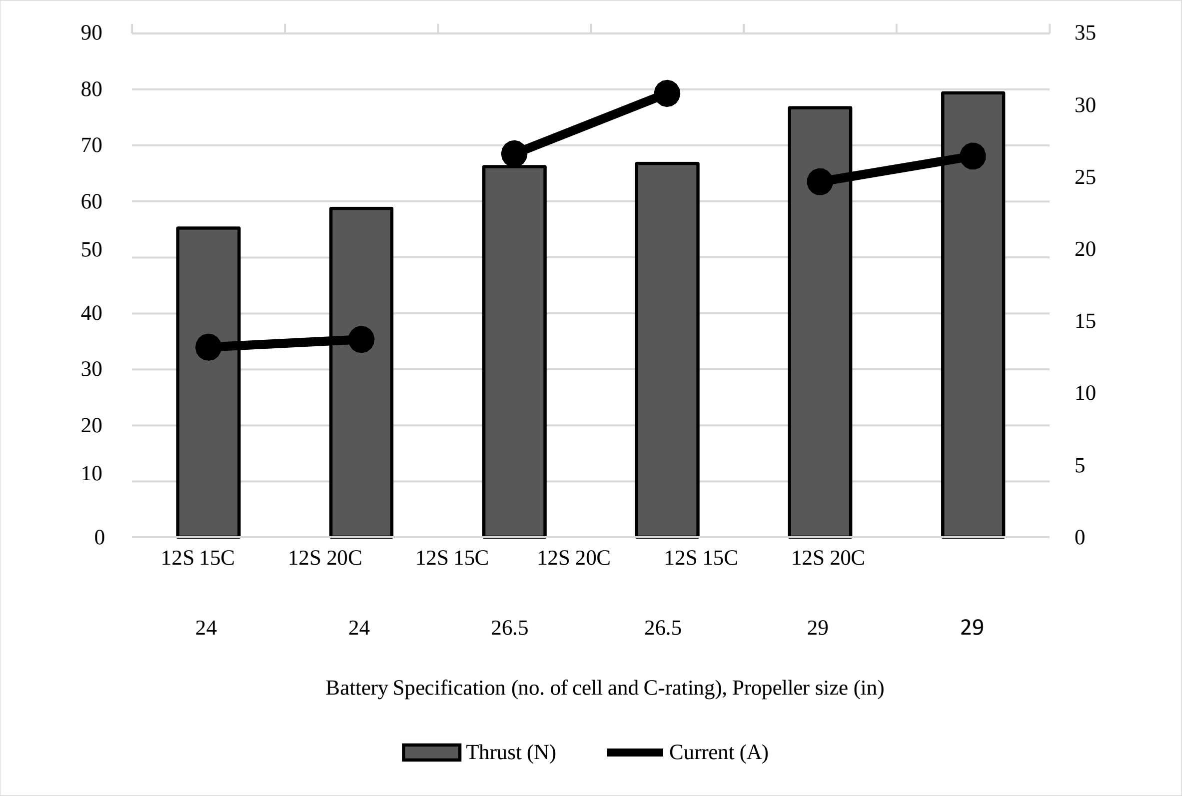

Fig. 4 Maximum thrust and current produced by the 12S battery

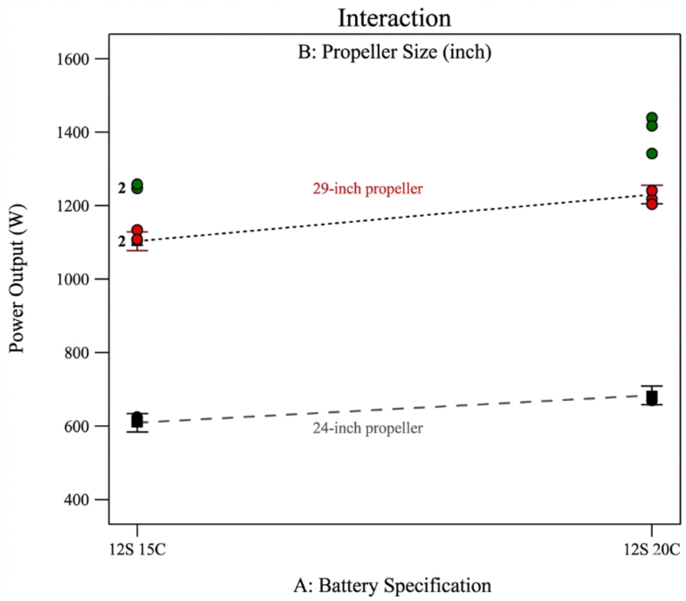

Fig. 5 The influence of interaction factors A and B on the maximum power output for a 12S battery-based

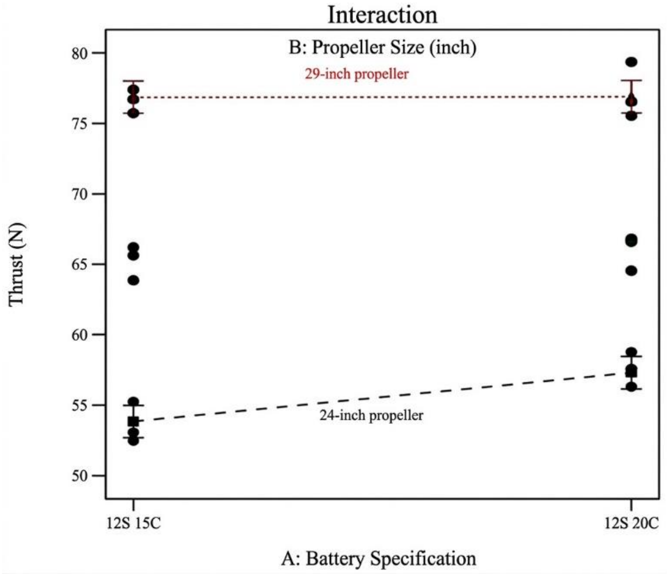

Fig. 6 Influence of interaction factors A & B on thrust for 12S battery

4.2. Electrical Behavior of DC Generator Power System

On the other hand, the system with the DC generator exhibited different electrical behaviours. Although it was able to provide a similar propulsive force, the generator had to operate at about 50.4 V to deliver comparable thrust to the battery-based configuration. This demonstrates the generator's capability to supply a given current at low voltages, which in this instance necessitates a significantly high voltage due to low current. The requirement for the generator to function at high voltages indicates that, due to internal regulation, power conversion losses, and the sluggish dynamic response of the generator system, the system's ability to react to large and sudden changes in load caused by the propeller is constrained. Although relying on a generator within a system offers the advantage of delivering continuous power for extended-duration missions, in this case, it exhibited poor electrical response compared to high C-rate batteries that supply the necessary power for short durations.

The 24-inch propeller produces the lowest current output and thrust. At a voltage rating of 38.4 V, the lowest thrust recorded is 39.34 N, while the highest thrust of 60.23 N is achieved at 50.4 V. Although the nominal voltage for a 12S battery is 44.4 V, the voltage must be increased to 50.4 V to achieve an equivalent thrust output. Figure 7 illustrates the influence of interaction factors A (voltage rating) and B (propeller size) on thrust for the DC generator.

Table 7. DC generator result

Factor 1	Factor 2	Response 1	Response 2	Response 3
A: Voltage Input	**B: Propeller Size (inch)**	**R1: Thrust (N)**	**R2: Max. Current (A)**	**R3: Power Output (W)**
38.4	24	39.34	9.23	350.2
38.4	24	39.24	9.22	352.9
38.4	24	38.95	9.24	350
50.4	24	58.86	13.96	690.7
50.4	24	59.84	14.06	695.3
50.4	24	60.23	13.96	691.4
38.4	29	61.31	16.27	606.5
38.4	29	61.02	16.24	603.4
38.4	29	61.02	16.21	606.2
50.4	29	79.17	23.56	1142.5
50.4	29	76.71	23.39	1137.7
50.4	29	77.6	23.27	1133.8
44.4	26.5	61.61	20.31	876
44.4	26.5	61.61	20.4	872.2
44.4	26.5	61.51	20.41	881.7

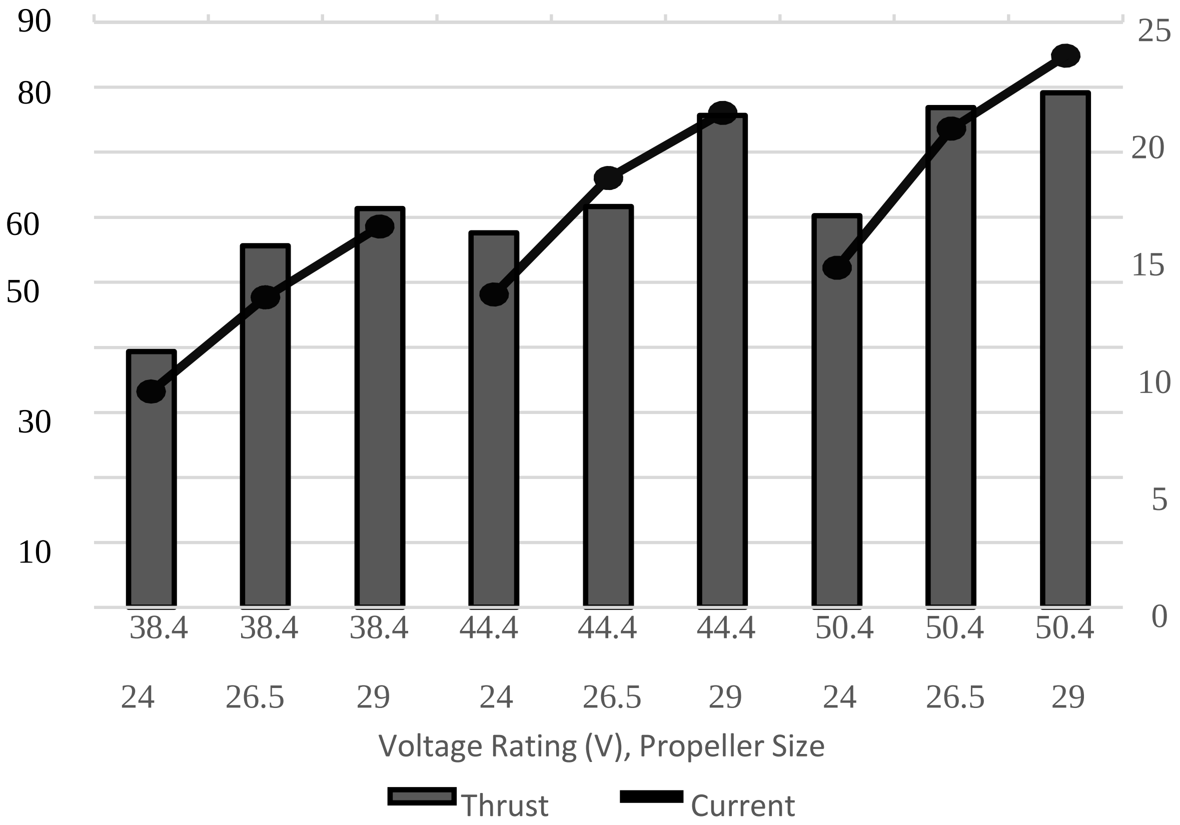

Fig. 7 Maximum thrust and current produced by the DC-generator

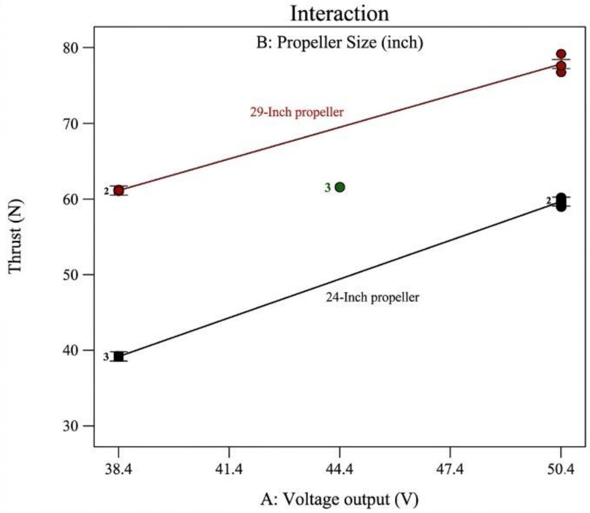

Fig. 8 The influence of interaction factors A and B on the thrust for DC-generator

Figure 9 shows that increasing the voltage output leads to higher thrust. The 29-inch propeller demonstrates the most significant improvement, producing 624.77 W at 38.4 V and rising to 1187.42 W at 50.4 V, the highest thrust recorded.

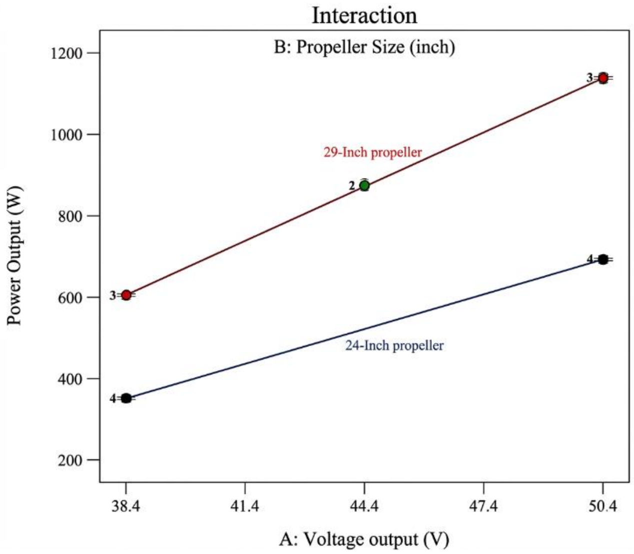

Fig. 9 The influence of interaction factors A and B on maximum power output for DC-Generator

4.3. Current Draw and Power Efficiency Comparison

Current measurements have shown that battery-based systems produce greater mechanical power and thrust with higher delivered currents at the same voltage. This characteristic confirms that LiPo batteries of higher C rates lose less voltage and resistive losses during peak thrust, making them more electrically efficient at higher thrust. Compared to the DC generator, battery systems have greater thrust-per-watt under higher voltage, which is confirmed by the voltage-to-current ratio. This means that the DC generator suffers more electrical losses when trying to match the thrust levels of battery systems, which worsens the propulsion efficiency. This shows that, aside from voltage, there is greater electrical efficiency in UAV propulsion related to the dynamic current supply of the source.

Table 8. Comparison of Current characteristics at a 44.4V voltage

Propeller Size	**Output Current (A)**		
	Battery-based		**DC Generator**
	12S 15C	12S 20C	
24”	13.17	13.66	11.61
26.5”	26.72	29.81	20.37
29”	24.75	25.59	19.82

Table 9. Comparison of Power characteristics at a 44.4V voltage

Propeller Size	**Output Power (W)**		
	Battery-based		**DC Generator**
	12S 15C	12S 20C	
24”	621.2	671.7	521.75
26.5”	1251.1	1399.5	876.00
29”	1114.9	1217.7	871.68

Table 10 presents the power characteristics of different high-voltage power systems when producing comparable thrust. For the same propeller size, similar power is required to achieve similar thrust. However, in all high-voltage configurations, the battery-based system consistently demonstrates a higher voltage-to-current ratio than the DC generator system.

Table 10. Comparison of power characteristics closely similar thrust and propeller size

	High Voltage Power System		
Thrust (N)	77		
Propeller Size (Inch)	29		
Type of Power Supply	12S 15C	12S20C	DC-Generator
Voltage Input (V)	44.4	44.4	50.4
Current Output (A)	24.68	25.12	23.39
Power (W)	1107.3	1209.4	1137.7
Voltage-to-Current Ratio (V/A)	1.78	1.76	2.15

4.4. Implications for High-Voltage UAV Design

Recent tests on battery-based systems show they deliver greater mechanical power and thrust output at the same voltage due to the rate of current provided. This indicates why, at high thrust, the LiPo batteries are more efficient than battery systems. Because at high thrust, they tend to avoid the greater voltage drop and resistive losses caused by the thrust. In the case of the battery system, the voltage-to-current ratio confirms higher thrust-per-watt at a high voltage. On the contrary, the DC generator suffers greater electrical losses when trying to match the thrust levels provided by the batteries. This worsens the overall propulsion efficiency. This indicates that the electrical efficiency of UAV propulsion is not solely dependent on the voltage. The dynamic current supply is equally important.

5. Conclusion

Given what has been presented and discussed, we can conclude that the battery-based power systems provide superior thrust and power generation while maintaining comparable or lower voltage levels. For the different sizes of the propellers tested, the system composed of the 12S LiPo battery outperformed the others and recorded the greatest level of thrust, 79.36 N, with the combination of the 12S 20C battery and the 29-inch propeller. In contrast, the greatest level of thrust produced by the DC generator system was 79.17 N, which was achieved at the operating voltage of 50.4 V, signifying that battery-based systems are able to transform and convert energy more effectively due to the increased mechanical thrust associated with the higher voltage operational conditions of the UAV. In the same vein, the different propeller sizes had a marked difference in the thrust efficiency from both power sources.For both the DC generator system and battery, the system recorded the greatest length of thrust for the 29-inch propeller. For the 24-inch propeller and the other smaller propellers, these smaller propellers required either higher voltage, or higher current, or both, to obtain comparable levels of thrust, and therefore lower levels of thrust efficiency. This established the fact that for the high-voltage, high-thrust applications on UAVs, larger-diameter propellers are the more appropriate choice, especially when teamed with low KV motors. Compared a 20C battery to a 15C battery, the 20C battery always provides more current and better power output. But, in conjunction with limited configurations, increasing the thrust is insignificant. This suggests that there is a current level at which there is no further benefit in increasing the current. It means that while a higher C rating improves electrical stability and power, the selection of the propeller and the voltage at which it operates has more to do with the thrust it produces. The configurations that performed the best in this study can be encapsulated as follows. The highest thrust was achieved with a 20 °C 12S battery and a 29-inch prop, which produced a thrust of 79.36 N. For the DC generator system, with a 29-inch prop, the best high thrust and most efficient configuration was at 50.4 V to give 79.17 N of thrust. The 26.5-inch prop offered a good compromise between thrust and current draw, making these configurations good for high performance and high electrical load.

Ethical Considerations

The study does not involve human subjects, personal data, or live animals/ organisms. All experiments were conducted in an indoor laboratory environment kept under control for the safety of the operators and to avoid unintentional crossing of the controlled environment. The UAV propulsion tests were conducted using a static test rig to mitigate the risks associated with free-flight testing. The primary aim of this study was to aid the defensible design and deployment of the UAV systems, especially for applications that are close to the infrastructure and the public. Operational safety, system reliability, and the pertinent regulatory compliance of the aviation and safety were taken into consideration for the design of the experiments. No ethical issues or safety violations were apparent in this study.

Conflict of Interest

The authors have no disclosure conflict of interest to declare and are satisfied with their own contribution to the whole project and writings

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References

[1] Gopal Dutta, and Purba Goswami, “Application of Drone in Agriculture: A Review,” *International Journal of Chemical Studies*, vol. 8, no. 5, pp. 181-187, 2020. [CrossRef] [Google Scholar] [Publisher Link]

[2] Dharmendra Prakash, Alkesh Agrawal, and Saifullah Khalid, “Comparative Analysis of UAVs: A Study on Payload Capacity and Performance,” *New Innovations in AI, Aviation, and Air Traffic Technology*, IGI Global, pp. 128-149, 2024. [CrossRef] [Google Scholar] [Publisher Link]

[3] Seamus B. Carey, “*Increasing the Endurance and Payload Capacity of Unmanned Aerial Vehicles with Thin-Film Photovoltaics*,” Thesis, Monterey, CA; Naval Postgraduate School, 2014. [Google Scholar] [Publisher Link]

[4] Johannes Weniger et al., “Emerging Performance Issues of Photovoltaic Battery Systems,” *32nd European Photovoltaic Solar Energy Conference and Exhibition*, 2016. [Google Scholar]

[5] Darren A. Dehesa, and Shyam K. Menon, “Modeling of Hybrid-Electric Powertrain for Unmanned Aerial Systems,” *AIAA Propulsion and Energy Forum and Exposition*, 2019. [CrossRef] [Google Scholar] [Publisher Link]

[6] Lionel Dongmo Fouellefack, Lelanie Smith, and Michael Kruger, “Development of a Novel Supervisory Controller on a Parallel-Hybrid Powertrain for Small Unmanned Aerial Systems,” *Aircraft Engineering and Aerospace Technology: An International Journal*, vol. 95, no. 3, pp. 401-415, 2023. [CrossRef] [Google Scholar] [Publisher Link]

[7] Yavinaash Naidu Saravanakumar et al., “Power Sources for Unmanned Aerial Vehicles: A State-of-the Art,” *Applied Science*, vol. 13, no. 21, pp. 1-27, 2023. [CrossRef] [Google Scholar] [Publisher Link]

[8] Why High Voltage Batteries?, Grepow, 2020. [Online]. Available: https://www.grepow.com/blog/high-voltage-batteries.html

[9] Aerowingfly, Revolutionizing Flight: How High-Voltage ESCs Elevate UAV Performance, Aerowingfly, 2018. [Online]. Available: https://www.aerowingfly.com/html_news/?8-Revolutionizing-Flight-How-High-Voltage-ESCs-Elevate-UAV-Performance-8.html

[10] R. Suganya, L.M.I. Leo Joseph, and Sreedhar Kollem, "Understanding Lithium-Ion Battery Management Systems in Electric Vehicles: Environmental and Health Impacts, Comparative Study, and Future Trends: A Review," *Results in Engineering*, vol. 24, pp. 1-18, 2024. [CrossRef] [Google Scholar] [Publisher Link]

[11] Wojciech Walendziuk, Daniel Oldziej, and Maciej Slowik, "Power Supply System Analysis for Tethered Drones Application," *2020 International Conference Mechatronic Systems and Materials (MSM)*, Bialystok, Poland, pp. 1-6, 2020. [CrossRef] [Google Scholar] [Publisher Link]

[12] Pei-Hsiang Chung, Der-Ming Ma, anmd Jaw-Kuen Shiau, "Design, Manufacturing, and Flight Testing of an Experimental Flying Wing UAV," *Applied Sciences*, vol. 9, no. 15, pp. 1-22, 2019. [CrossRef] [Google Scholar] [Publisher Link]