

# CENTRE FOR JOINT WARFARE STUDIES



## CENJOWS

### CHINESE ELECTRICALLY POWERED HELICOPTERS

1. **Electrically Powered Helicopter Development by China.** Electrically powered helicopter if successfully operationalised will have several advantages over conventional design. Power transmission problems associated with mechanical design will give way to a simple, easy to maintain system. Many benefits of an electric car design could be incorporated in the helicopter design as well. A team of Chinese engineers are reportedly working on an electric helicopter. The team is hoping that the use of electric motors could not only save fuel but make helicopters lighter and easier to control<sup>1</sup>. According to chief designer Deng Jinghui from the China Helicopter Research and Development Institute in Jingdezhen, Jiangxi province, the team will first replace the tail rotor of a traditional helicopter with an electric motor for exploring and verifying the technical feasibility of an all-electric helicopter. If all goes well, the team will experiment with replacing the main engine and rotor as well. The removal of transmissions and the use of electric motors are likely to reduce a helicopter's weight, streamline its structure, make control easier and also improve reliability.

2. It wouldn't be the first electric helicopter in existence. Connecticut-based Aviation Company Sikorsky Aircraft's 'Sikorsky Firefly' all-electric helicopter has been referred to as the first of its kind when it was announced in 2010. The Sikorsky Firefly is an all-electric helicopter built for research purposes by Sikorsky Aircraft. It has been called the world's first all-electric helicopter<sup>2</sup>. The Firefly is a modified Sikorsky S-300C helicopter with its engine replaced by an electric motor and two lithium-ion battery packs. The helicopter can accommodate only the pilot, no passengers, and operate for 12 to 15 minutes. It has a top speed of about 92 mph.

<sup>1</sup> <https://futurism.com/the-byte/chinese-researchers-electric-helicopter>; JULY 31ST 19\_\_ VICTOR TANGERMANN \_ FILED UNDER: ADVANCED TRANSPORT

<sup>2</sup> [https://en.wikipedia.org/wiki/Sikorsky\\_Firefly](https://en.wikipedia.org/wiki/Sikorsky_Firefly)

3. Companies are planning on electric and hybrid-electric engines to increase the transportation capacity of traditional helicopters and make them quieter, more fuel efficient and safer. Airbus Industries reportedly will fly an H130 with a 100-kilowatt electric motor and batteries, attributes which will allow much easier autorotation to improve safety. One passenger could also be carried due to extra power<sup>3</sup>.



(Courtesy Airbus Helicopters)

4. Rolls-Royce Electrical is also developing modular and scalable systems that can be used on a number of emerging as well as existing flying platforms encompassing pure electric, hybrid-electric and more electric solutions<sup>4</sup>. For instance, a combination of electric motor, energy storage battery and associated power management and control electronics can provide turbo-boost as well as an emergency landing system to provide the pilot with an effective means to carry out a controlled landing of the aircraft.

5. United Technologies' Collins Aerospace reportedly intends to spend \$150 million on electric systems in the next three years. Recently, the company announced it is investing \$50 million in a lab that will design and test megawatt class motors, power electronics, and generators for electric aircraft for commercial and military purposes<sup>5</sup>.

6. Safran, which is building the hybrid-electric engine for the Bell Nexus eVTOL vehicle, is also exploring uses for its electric and hybrid-electric engines on traditional helicopters. While Safran is targeting its ENGINEUS 45 motor for future eVTOL aircraft,

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<sup>3</sup> Frank Wolfe; <http://interactive.rotorandwing.com/hybrid-electric-helicopters/>

<sup>4</sup> *ibid*

<sup>5</sup> *ibid*

the engine may also have uses in traditional helicopters<sup>6</sup>. The engine, which has a continuous power of 45 kilowatts, has built-in, dedicated control electronics with an energy efficiency of more than 94 percent and a power-to-weight ratio of 2.5 kilowatt per kilogram at 2,500 rpm, according to Safran.

7. Chinese designers of the electric helicopters are likely to exploit all available technologies and come up with a much improved version in a compressed timeframe as has been seen on several occasions in the past.

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<sup>6</sup> *ibid*