

Jane's International Defence Review

## IAI, Cella Energy tasked with SUAS fuel cell development

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Israel Aerospace Industries (IAI) and Cella Energy have been tasked with developing a fuel cell system to be integrated on board IAI's Bird Eye 650 small unmanned aircraft system (SUAS).

The funding for the research project has been provided by Space Florida - the state's aerospace and spaceport development authority - and Israel's Industrial Center for Research and Development, MATIMOP.

Cella Energy has developed a solid hydrogen fuel system that utilises the company's proprietary hydrogen storage material, the primary benefit of which is its ability to be shaped into any form.

The use of hydrogen fuel cells for powering SUAS is not new, and significant work has been undertaken in this area. The key selling point for the use of fuel cells in SUAS is extended endurance, which can translate to greater area coverage, and ultimately could enable smaller systems to take on some missions usually undertaken by larger aircraft.

In-service SUAS have demonstrated the extended endurance benefits of fuel cells. Lockheed Martin has achieved endurances of between eight and 12 hours for its Stalker XE aircraft, and successfully deployed the aircraft on operations in Afghanistan with a fuel-cell system. Fuel cells have also been integrated on AeroVironment systems, notably the Puma.

The major drawbacks with fuel cells are that they are more expensive than lithium batteries and also larger. While they offer greater endurance, they are less power dense and therefore are often used in a hybrid configuration alongside lithium batteries, with the batteries providing the power surge required for certain aspects of the flight profile, such as take-off and climbing.

However, an IAI spokesperson told *IHS Jane's* that in this particular platform the fuel cell power system is sufficient for all operational aspects, adding "It's a standalone system, but since we need high levels of reliability, like in any other IAI aerial platform, Bird Eye also has a lithium battery for redundancy."

For SUAS applications Cella Energy has formed the material into small pellets which are held in a matrix of insulating material and built into a single cartridge. Each pellet is individually heated to release the hydrogen and when heated above 100° Celsius is released within minutes. According to Cella each gramme of its material can store around one litre of hydrogen gas.

The spokesperson said that the project will last around 1 year for the research and development stages under which the teams evaluate the project. Subject to the success of the effort and the receipt of another grant, the companies will consider taking the project to the next step and developing an operational product at the end of a second year.

The Bird Eye 650 is designed to provide close range intelligence, surveillance and reconnaissance capability and is carried in two backpacks. It is equipped with a ventrally mounted and gimbaled IAI Tamam Micro-POP day/night sensor that is supported by a real-time imagery downlink.

The air vehicle is powered by an electric motor that drives a hinged two-bladed pusher propeller and is launched from a rail unit; it is recovered via a deep stall landing with the impact being absorbed by the platform's three dorsally-mounted shock-absorbing legs.

#### COMMENT

While fuel cells are already mature and demonstrating their utility, a number of factors are holding back how useful they can be. Notably, fuel cells are being adapted to fit into airframes developed for battery-powered systems, this means that the optimum design for the fuel cell is not used and therefore the best performance is not achieved. The properties of Cella's hydrogen storage material may go some way to addressing this issue.



*The Bird Eye 650 system will be used in the research effort. (IAI)*

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