Intelligent Energy®

Case Study ISS Aerospace IE-Soar™ 800W

ISS Aerospace

ISS Aerospace designs, builds and operates cutting edge unmanned aerial systems for a wide-range of international clients. Their systems are designed to collect meaningful information or to work as autonomous or semi–autonomous effectors under challenging conditions. ISS Aerospace work closely with clients to provide an end-to-end service from specification to operational service

Why use a hydrogen fuel cell to power a UAV?

Fuel cells and hydrogen provide much higher on-board energy density than lithium battery solutions. That's why they create value to the end user. A lower mass energy solution means more mass is available for payload and/or fuel. The hydrogen fuel cell powered drone therefore has the following benefits compared to batteries:

- Much longer flight time compared to batteries
- Less downtime with rapid refuelling (circa five minutes)
- Increased productivity

In the fuel cell solution, power and energy are decoupled. If you need more flight time, then fit a bigger fuel store. If you need higher payload/MTOW (more power required) then fit a bigger IE-Soar™ module. This flexibility enables power systems to be optimised for the UAV design.

Case Study Hydrogen SENSUS UAV

Developed by ISS Aerospace the SENSUS UAV is a hydrogen powered drone. The SENSUS is a modular unmanned aerial system. Capable of taking a range of payloads including EO/IR optical systems, chemical sensors, LiDAR, gamma/neutron detectors and ground penetrating radar. It is a rugged, MIL-SPEC platform capable of operations in harsh environments.

Intelligent Energy's IE-Soar™ 800W was selected by ISS Aerospace to power the UAV.

Application example gas detection

Routine work for ISS Aerospace is inspection and detection for the Oil and Gas Industry. A recent field survey was undertaken in Iraq for a global energy company. The fields are 'sour' fields, which means there is H_2S gas in with the oil. The gas naturally seeps from the ground. Detecting the gas gives indications as to where seeps are, so areas close to the surface, or where there is a natural route to the oil.

There is also a second very significant purpose of the survey. Even at low concentrations H_2S gas can be deadly. The survey was used to set a baseline and regular follow-up surveys will be used to monitor H_2S gas concentrations. The UAV survey therefore completed two duties. Oil and gas exploration and continued site safety monitoring.

Sensors used for this survey were parts per billion H_2S and $S0_2$ gas sensors, developed in partnership with Flux Labs. These are the most sensitive UAV mounted sensors currently available.

SENSUS UAV Configuration Options

Range, flight time and payload can be traded via gas cylinder selection.

Product Variant	Maximum Take Off Weight	Flight Time	Payload	Range
Lithium Polymer Battery	8 kg	30 Minutes	2 kg	25 km
Hydrogen Fuel Cell 2L Tank	8 kg	60 Minutes	2 kg	50 km
Hydrogen Fuel Cell 3L Tank	8 kg	90 minutes	1.68 kg	75 km

Intelligent-Energy Fuel Cell Configuration

IE-Soar™	800W / 1400W continuous / peak power
IE-Soar™ 800W	930g mass
300bar to 0.5bar hydrogen regulator	250g mass
Hybrid battery	300g mass
Cylinder options	
AMS 2ltr	1,300g mass (6,87Wh stored energy)
AMS 3ltr	1,620g mass (1,030Wh Stored Energy)

"To date large area detection with battery powered UAVs is simply not possible. With the long flight time a hydrogen drone offers we can easily cover 100km+ of surveying per day whilst still carrying the required payloads. The IE-Soar™ 800W has been straightforward to integrate and operate. Refilling the gas cylinders was also relatively straight forward and is achieved in minutes."

Ryan Kempley, CEO ISS Aerospace

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