

Avionics Power Distribution Management System

Scope

Provide a custom power distribution management system for an avionics application where an off the shelf solutions didn't meet the Size, Weight and Power and Performance (SWaP) requirements.

Solution

Spark Product Innovation created a multi module solution to enable the packaged electronics to fit into the space envelope allowed by the application, custom wiring harness were also designed and manufactured to connect the various electronics modules.

Contact Details

Spark Product Innovation Ltd
Bristol & Bath Science Park
Dirac Crescent, Emersons Green
Bristol, BS16 7FR
T: +44(0)1172441915
info@sparkpi.co.uk
www.sparkpi.co.uk
[Linkedin](#)



Spark Product Innovation were approached by an aerospace customer to design a power distribution management system for a game changing aviation platform they are designing. A bespoke product was required to deal with the challenging size, weight and Power (SWaP) requirements as well as the demanding technical specifications.

The customer needed a power distribution management system to manage multiple power sources (700V primary battery, 24V secondary battery, fast charger, ground power unit), consolidate these and switch via a redundant configuration with 2oo3 majority voting. The system operates in hot-standby and can seamlessly change the power routing in the event of a fault.

Spark Product Innovation approached this by sitting down with the client and fully understanding their requirements, a detailed proposal was made and accepted.

- High reliability, ruggedized electronic Printed Circuit Board (PCB) assemblies with base plate cooling, designed for a high shock and vibration environment and fitted with durable Amphenol connectors.
- Packaged in light weight strengthened plastics for high thermal transfer and structural integrity.
- Power electronics for switching large DC currents between primary and auxiliary power sources
- Rechargeable lithium ion phosphate cells for very high discharge rates.
- Microcontroller based electronics and embedded software to collect housekeeping data, system status and to provide external communications to the Avionics system.

The detailed engineering, prototyping, testing and technical demonstrations followed. Spark Product Innovation is also working with the client post-delivery to help facilitate the integration into their wider aviation platform.

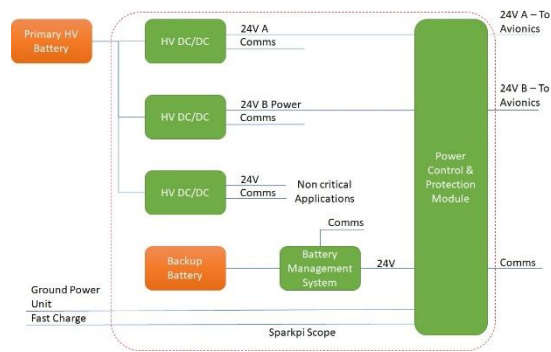
The design consists of several fully packaged electronic PCBs with interconnecting harnesses. The electronics is packaged in lightweight ruggedized plastics with high reliability Amphenol connectors. The battery pack uses rechargeable lithium ion phosphate cells for very high discharge rates and avoids the problems of thermal runaway associated with standard lithium ion batteries.

The individual electronic PCBs have been designed with redundancy built in, the system architecture is flexible and allows the number of modules used to scale with minor software and connector adjustments.



SPARK PRODUCT
INNOVATION

System Architecture



The system consists of three light weight high reliability enclosures. One houses the multi cell lithium ion phosphate batteries and the battery interface electronics.

The second enclosure houses the HV DC/DC converters and the third houses the Power Control & Protection Module.

Electronics and Battery



Battery Pack & Battery Management PCB

- Rechargeable lithium ion phosphate battery with very high discharge rates and reduced risk of thermal runaway.
- 160A peak, 80A continuous discharge current.



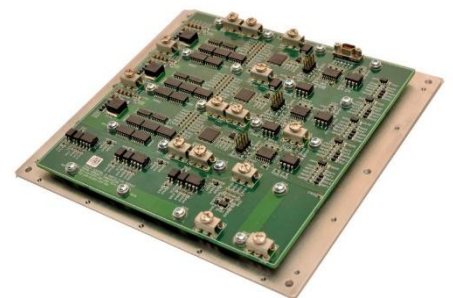
Power Control & Protection Module – rear side

- Power MOSFETS switching 600A
- Base plate cooling of the power electronics



High Voltage DC/DC

- 400V-700V to 24V
- Redundant architecture
- Very high power density for SwaP applications.



Power Control & Protection Module – Front side

- 2oo3 majority voting system
- Dual redundant architecture for increased system MTTF figures.

About

Spark Product Innovation is a multi-discipline team specializing in electronic PCB design, software, embedded firmware, DSP, power electronics, inverters, FPGAs. We also offer product packaging to give our customers a complete turnkey solution.

Services

- Electronic and software design services
- Mechanical packaging
- Prototyping
- System, electronic and motor testing
- Low and medium volume Manufacturing
- Automatic Test Equipment
- Feasibility studies

Contact Details

Spark Product Innovation Ltd
Bristol & Bath Science Park
Dirac Crescent, Emersons Green
Bristol, BS16 7FR

T: +44(0)1172441915

info@sparkpi.co.uk

www.sparkpi.co.uk

[LinkedIn](#)



SPARK PRODUCT
INNOVATION