Electric Aircraft Power Test Solutions

NH Research

Charger & Power Generation
AC Generators, Chargers

Battery/Fuel Cell
Life Cycle, Performance, Charge/Discharge, BMS Development

Electric Propulsion
Battery Emulation, Fuel Cell Emulation, Motor Emulation

Power Distribution
Primary PDU, Secondary PDU

Electrical Systems
AC-DC, DC-DC Power Converter/Inverter Auxiliary Loads, Actuators

NH Research (NHR) provides power test equipment for electric aircraft components and systems including battery modules/ packs, electric propulsion and electronic systems. Our customers include commercial, military aircraft and private manufacturers and suppliers across hybrid and fully electric aircraft, e-VTOL, drones, and urban air mobility (UAM) platforms. NHR's test solutions include battery test systems, battery emulators, AC/DC loads and sources, and test system software.

Electric flight raises unique and unprecedented challenges that engineers must address. A major limitation for electric-powered planes is the weight and capacity of the battery. Electric planes will require lighter weight batteries with more energy density to make electric flight feasible. Similar to electric vehicles, higher voltages permit faster charging and increase power transfer while reducing vehicle weight. These factors are driving development for higher performing and higher power electric aircraft systems including batteries, electric motors, power distribution units (PDUs), power converters/inverters and chargers.

Today, customers desire test solutions with modular configurations, expandable power, integrated safety, wider operating envelopes, built-in measurements, and faster transient response-times for today's and tomorrow's products. NHR's advanced test solutions substantially reduce development and test time, reduce cost and increases energy efficiency.

Image Source: *"The Grid" electric power systems lab at Collins Aerospace in Rockford, Illinois*

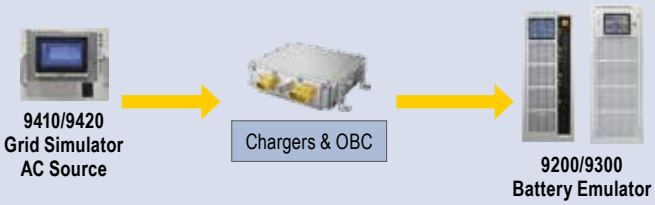
NHR has been selected by Collins Aerospace to supply the high-voltage DC power farm for The Grid electric power systems lab. The high-power, high voltage facility will be used to design and test systems for the future of electric flight. NHR's 9300 regenerative, bi-directional DC source is being used as a load and power source to recreate an aircraft environment for testing.

Complete Electric Aircraft Test Solutions

1. Batteries, fuel cells, capacitors
2. Electric propulsion systems
3. Power distribution units
4. Power generation
5. AC/DC electrical systems (Auxiliary loads, switches, electric actuators, etc.)

NHR Electric Aircraft Test Solutions

CHARGER & POWER GENERATION

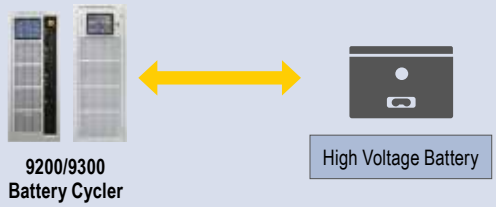


Charger, V2G, ESS & Grid Tied Products

AC Source for testing inverters, V2G, ESS & grid-tied products

- **9410 Grid Sim/ 9420 AC Source** – 4 to 96 kW, programmable 1, 2, 3 phase
- **9200/9300 Series** - Bi-directional DC Power to simulate load & battery emulation

BATTERY MODULE/PACK



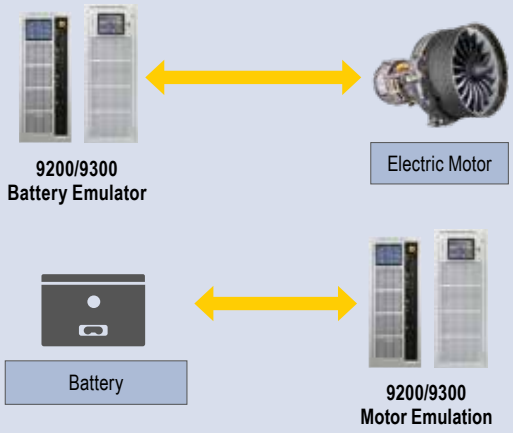
NHR's battery test systems enable scalable power and flexible configurations for rigorous life-cycle, drive cycle and performance testing with built-in safety.

- Modular power configuration for traditional & electric flight systems
- Fast transient capabilities
- Easy third-party integration & data management (optional software)

High Performance Battery Cycler with fast transient speed

- **9300 Series** - 100 kW modules up to 2.4 MW, Dual range (600 V, 1200V)
- **9200 Series** - 12 kW modules parallel up to 21 channels

ELECTRIC PROPULSION SYSTEMS



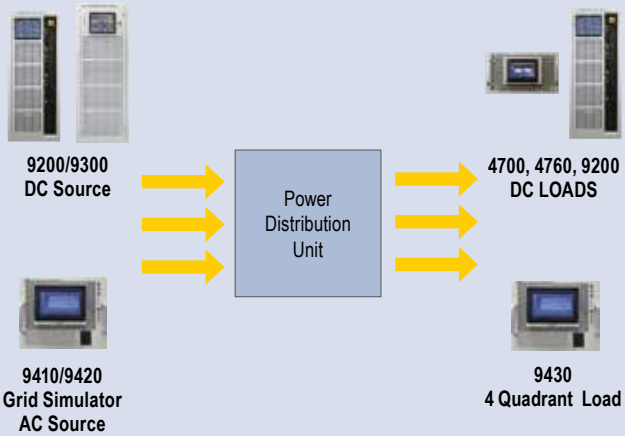
NHR's electric propulsion test solutions provide a bi-directional approach with the speed and accuracy to emulate real world conditions.

- Battery/Motor emulation sinks & sources to maintain voltage regulation
- Accepts back EMF & prevents safety hazards
- Isolated input & output paths eliminates single points of failure

Scalable Bi-directional DC Source with fast transient speed

- **9300 Series** - 100 kW modules up to 2.4 MW, Dual range (600 V, 1200V)
- **9200 Series** - 12 kW modules, parallel up to 21 channels

AIRCRAFT ELECTRICAL SYSTEMS (AC & DC)



NHR offers AC-DC, DC-DC products for testing aircraft electrical systems such as auxiliary loads, switches, electric actuators and PDUs. Safely test PDUs which route multiple high power sources and loads throughout the aircraft.

- Modular power configuration for traditional & electric flight systems
- Fast transient capabilities
- Built in safety isolation relays and contactors

Bi-directional DC Source for Battery Emulation

- **9300 Series** - 100 kW modules up to 2.4 MW, Dual range (600 V, 1200V)
- **9200 Series** - 12 kW modules, parallel up to 21 channels

DC Load for transient & accessory load inrush simulation

- **4700/4760** for 120 VDC & 600 VDC
- **9200/9300** Series - Regenerative DC load mode (discharge) > 90%

AC Sources/Loads

- **9410** Grid Simulator/**9420** AC Source – 4 to 96 kW, 1, 2, 3 phase
- **9430** Regenerative 4 Quadrant Load – 4 to 96 kW, 2 x reactive power

NH Research

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