ITECH

YOUR POWER TESTING SOLUTION

FCEV TESTING SOLUTION

With the environmental pressure brought by the long-term use of traditional fossil energy, the development and utilization of clean energy has become an important direction for the development of countries around the world. Hydrogen energy is regarded as the most important energy in the 21st century. The clean energy has the advantages of zero pollution, high efficiency, abundant sources and wide use.

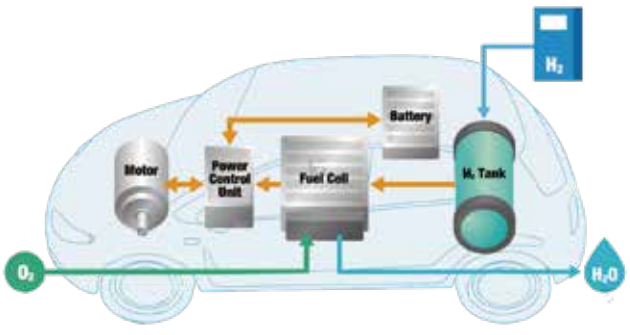
Fuel cell is an important way to utilize hydrogen energy efficiently. With the continuous maturity of fuel cell technology, related products gradually enter the stage of commercialization. It can be applied to transportation field, such as automobiles, ship and rail transit. Also, in the field of fixed power generation, it can be used as the building cogeneration power supply, the reliable power supply of micro grid and the standby power supply of mobile base station. Further more, combined with the digital technology, it can play an important role in many fields, such as UAV, deep-sea equipment, etc. Among these applications, transportation will be an important breakthrough in the development of hydrogen energy.

Fuel cell industry chain / Test requirement

Hydrogen producer	Fossil energy Chlor alkali industry Electrolysis water	Fuel cell manufacturer	PEM Fuel cell stack	Fuel cell EV manufacturer	Fuel cell system DC-DC booster Motor Electronic control	Fuel cell EV supplier	Hydrogen EV manufacturer UAV ...

Challenge

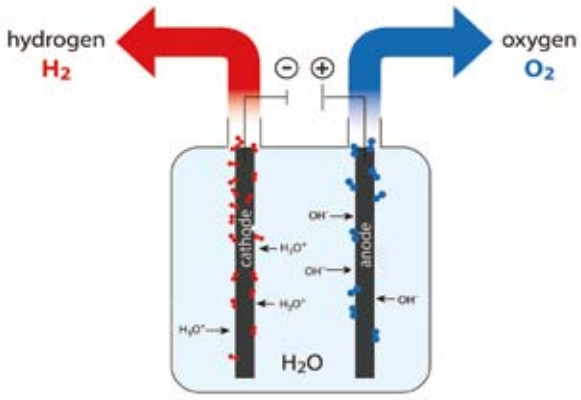
The commercialization of hydrogen energy vehicles has driven the development of a series of new supporting industries, including hydrogen production / storage / transportation and new fuel cell engine and DC-DC boost converter. Due to the core components and working principle of hydrogen energy vehicle are different from traditional fuel vehicle, the traditional test equipment with simple function can not meet the requirement of performance test and simulation of fuel cell vehicle and related products. ITECH has been following the development trend of the industry, provides high power, high performance and economic testing solutions for hydrogen fuel cell vehicles and other related applications through innovative technology.



ELECTROLYSIS FOR HYDROGEN PRODUCTION

Product Recommended

— IT-M3900D DC power supply(10,000+A current output)
— IT6600D/IT6000D High power DC power supply (1,000+A current output)
— IT-M3100 DC power supply (10+ A current output)



Advantage

— Ultra-high power density, 510A can be output by 1U unit, 10,000+ A can be output after parallel connection
— Stable output, low ripple and noise
— Full protection
— CC mode and current adjustable

FUEL CELL STACK TEST

Product Recommended

— IT8900A/E high power DC electronic load
— IT8000 regenerative DC electronic load

IT8900A/E

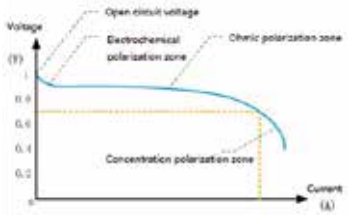
IT8000

Advantage

— High precision
— Ultra-low internal resistance
— Built-in CAN interface
— Master-slave parallel power extension
— Working condition simulation

Solution

— Stack activation test
— Fuel cell polarization curve test
— Fuel cell dynamic operating test
— Low-temperature startup test
— Fuel cell stack rated power / peak power test
— Stack durability / life test



How to achieve low voltage and high current discharge test?

The polarization of a fuel cell characterizes a process in which the output voltage of the fuel cell gradually decreases with increasing current. In order to measure the complete polarization curve, the DC electronic load needs to work at the point of low voltage and high current. Under extreme conditions, the output voltage of the fuel cell may be 0V. In order to ensure the minimum operating voltage of the load, the test can be implemented by using a boost power supply in serial connection in the loop.

FUEL CELL SYSTEM TEST

Product Recommended

- IT6000D/IT6600D high power programmable DC power supply
- IT8900A high power DC electronic load
- IT8000 regenerative DC electronic load

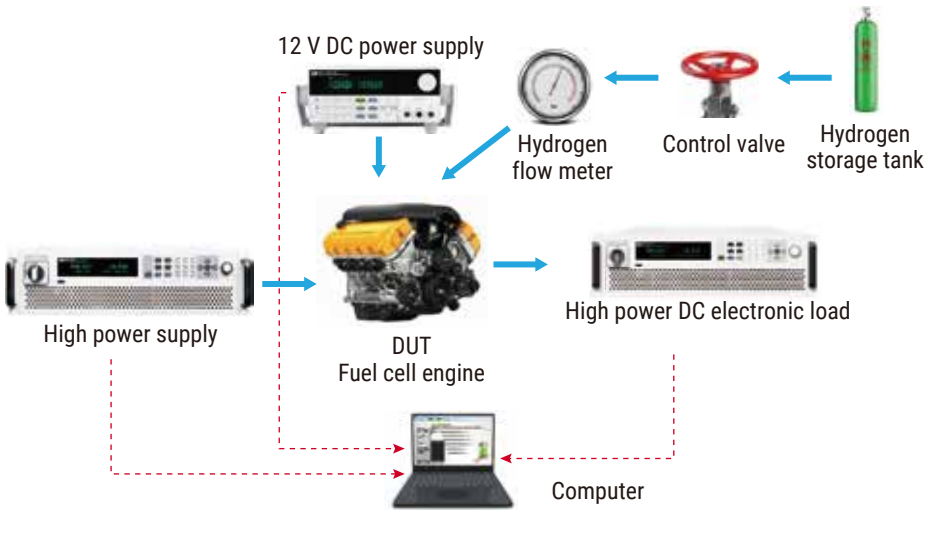
Advantage

- High precision
- Built-in CAN interface
- Master-slave parallel power extension
- DOE simulation
- Ultra-high power density (Max. 42kW in 3U)

Solution

- Starting test
- Steady state test
- Peak power test
- Dynamic response test
- Running test under dynamic cycle conditions

Test principle



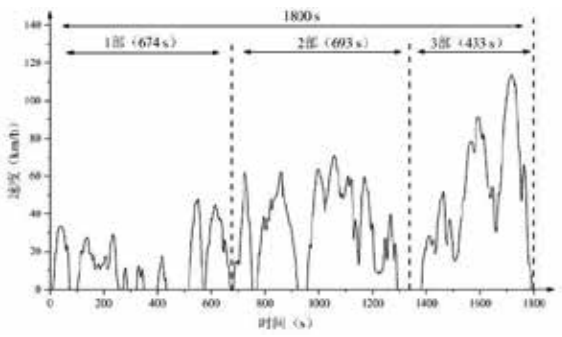
High power DC power supply
-power the engine auxiliary system

12 V DC power supply
-power FCU

Electronic load
-Simulation of steady-state and dynamic operating conditions, research on engine system efficiency, rated power, peak power and other parameters to optimize system design

DYNAMIC CYCLING CONDITIONS TEST

In order to truly reflect the durability under working conditions, the road conditions need to be simulated in the experiment. The simulation includes idling, acceleration, deceleration and rapid driving. As the road conditions change, it will cause the system to run out of hydrogen and frequent changes in voltage, which will eventually lead to a decline in service life. Due to the rapid changes of the vehicle's driving speed and the presence of certain irregularities, traditional loads cannot achieve high-speed on-vehicle simulation, and manual editing will be very tedious and time-consuming. IT8000 regenerative load can not only provide regenerative solution, but also simulate the actual road conditions and support 10,000,000 points simulation,allow to import user-defined driving scenarios simply via front panel USB port.



DC-DC BOOST CONVERTER TEST

Product Recommended

— IT6000C/IT6600C bidirectional DC power supply
— IT8000 regenerative DC electronic load


IT6000C


IT8000

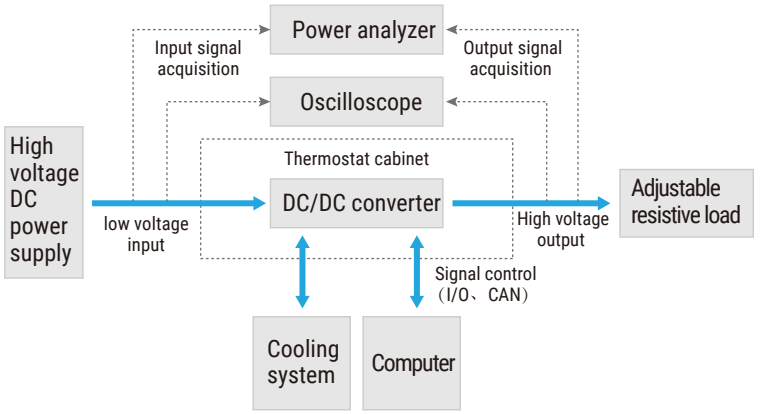
Advantage

— I-V curve simulation
— Built-in CAN interface
— Master-slave parallel power extension
— Working condition simulation

Solution

— Input/output test
— Output precision
— Protection function test
— Cycle durability test
— Peak power and duration
— Dynamic response time
— Cycle operating curve test
— Residual voltage release

Test principle



High voltage DC power supply
-Output simulation of fuel cell stack

Power analyzer
-Measure input and output voltage, current and power

E-load
-Simulate different roading conditions

Oscilloscope
-Measure output ripple and noise

Thermostat cabinet
-High/low temperature simulation

FUEL CELL SIMULATOR, SIMULATION OF DC-DC INPUT PERFORMANCE

Due to the front end of DC-DC modules in fuel cell vehicles is powered by the fuel cell engine, so its input performance evaluation is related to the factors like polarization characteristics of the stack, system efficiency, cold start at low temperature, and leakage of the residual voltage of the stack, etc. ITECH provides fuel cell stack simulation solution for fuel cell DC-DC modules, which can verify the input-output performance of DC-DC at different input operating points.


FCS3000 Fuel cell stack simulation software

BATTERY SIMULATION MODE, NO ADDITIONAL POWER SUPPLY NEEDED

The DC-DC boost converter needs energy to trigger the output. Traditionally, a power supply is required in addition to the electronic load. ITECH gets rid of the traditional way and built-in professional battery simulation mode in the IT8000 series electronic load, which provides a power signal before loading, thus saving your costs.

AIR COMPRESSOR TEST

Product Recommended

— IT6000C/IT6600C bidirectional DC power supply

IT6000C

Advantage

— High power density
— Fast response speed

Solution

— Overload test
— Response time test
— Durability and life test
— Environmental adaptability test

HIGH VOLTAGE POWER BATTERY TEST

Product Recommended

— ITS5300 battery charge & discharge test

ITS5300

Advantage

Emergency stop, anti-reverse connection, anti-ignition, power failure without dead, seamless current switching, statistical analysis, flexible power extension.

Solution

— Over charge/discharge rate test
— Durability and life test
— Roading conditions simulation
— Discharge test at different temperature
— HPPC test

SEAMLESS SWITCHING, ROADING CONDITIONS SIMULATION

High-voltage power batteries are another power source for hydrogen fuel cell vehicles. They provide power during vehicle startup and acceleration, and recover back-EMF during braking. In order to simulate the working conditions of the vehicle, the traditional solution is using a power supply with a load, but the positive and negative current switching time is more than 100ms, and the test process is complicated. ITECH provides you with a bidirectional instrument which can realize seamless switching of positive and negative currents, and the fastest switching time is 2ms.

BIDIRECTIONAL MOTOR TEST

Product Recommended

— IT6000C/IT6600C bidirectional DC power supply

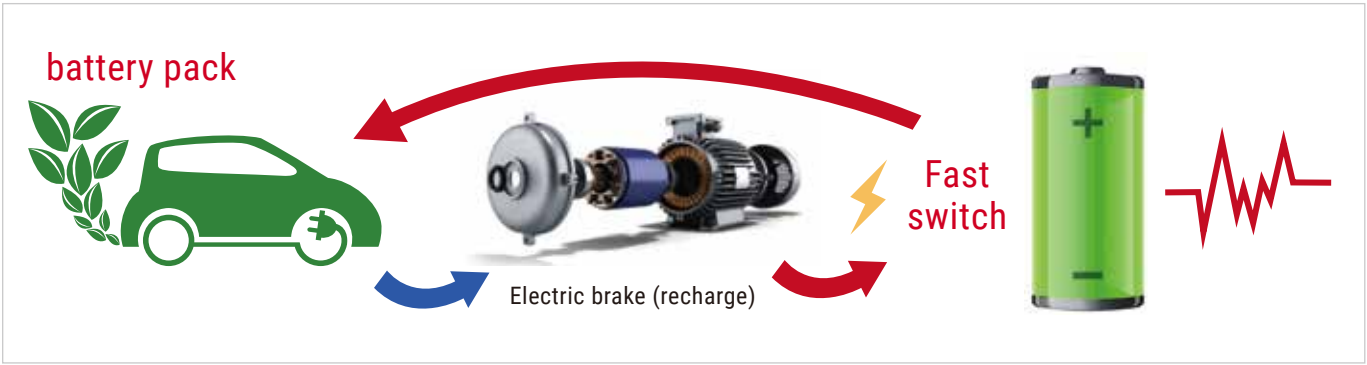
Advantage

— Bidirectional power supply — Absorb back-EMF — High power density

Solution

Performance verification of bidirectional motors under no-load, full-load, blocked rotor, etc. Under real condition, the bidirectional motor works in a state where the motor and generator are constantly switching. Under power generation state, the energy can be recharged to the battery, thereby increasing the vehicle's mileage. If the test solution includes a power supply as well as an electronic load, the switching between them is slow and cannot meet the requirements. IT6000C bidirectional DC power supply can realize seamless current switching and thereby effectively protect motor controllers and related equipment.

Test principle



BATTERY SIMULATION

Product Recommended

— IT6000C/IT6600C bidirectional DC power supply+BSS2000

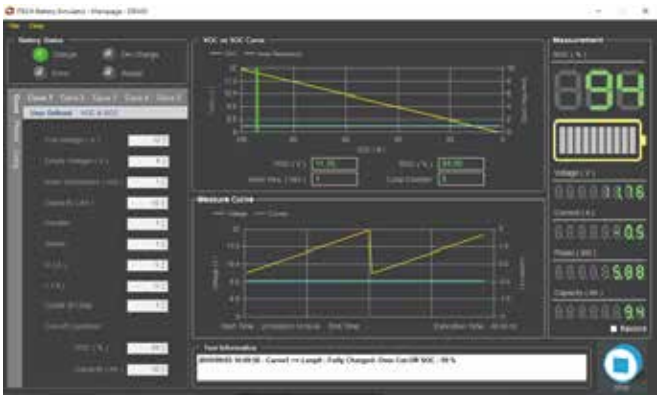
IT6000C

Advantage

— Bidirectional power supply — Modeling to simulate battery characteristics — Curve import

Battery Simulator

In the vehicle simulation platform of the OEM, in order to improve the testing efficiency and facilitate data collection, simulation instruments are usually used to replace real parts. Power battery simulator is one of them and is used to replace real power batteries.
ITECH battery simulator BSS2000 provides two functions of curve import and model parameter setting. Under the model parameter mode, the user only needs to set the key parameters of the battery (number of series and parallel nodes, no-load and full-load voltage, internal resistance value, etc.), and the corresponding characteristic curve can be automatically generated. So the simulation can be easily and efficiently completed.



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