CASE STUDY

Brunel University London

POSITIVE PROBLEM SOLVING

WHEN BRUNEL UNIVERSITY LONDON DEVELOPED AN ELECTRIC RACING CAR FOR THE PRESTIGIOUS FORMULA STUDENT COMPETITION, THEY NEEDED TO TEST THEIR OWN CUSTOM BATTERY PACK.

The Motorsport Centre at Brunel University London has fielded high scoring entries in the Formula Student event's petrol design category, and was one of the few and first universities to race in the TT Zero, an Isle of Man category for electric racing motorcycles. The Centre sits at the centre of a campus known for advanced combustion engine research and its motorsport curriculum.

A new internal initiative is concentrating attention from power electronics, control, and electrochemical specialist faculty around deeper activity in electric and autonomous vehicle design. Owing to the cost, volume and weight constraints of vehicle design, graduate students at Brunel had conceived an approach to the connection, cooling, and arrangement of cells inside a custom battery module.

Initial tests of their module's performance were promising, but only a test at a full power draw of hundreds of amps of current would confirm the intended capabilities were present and repeatable. The associated power of more than 5kW required kit of a higher rating than had previously been used for battery testing at Brunel.

Dr Barry Rawn, a faculty member, explained: "As faculty advisors, we insisted on safe but exhaustive testing of the student's design. We needed high-power dissipation capability that was as realistic and flexible as possible, to do early evaluation of our electrical and thermal but at a stage mid-way through construction".

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BRUNEL RACING

DRIVING ELECTRIC VEHICLE RESEARCH

Rather than hope and wait for the full battery pack to be assembled, the design process requires testing and iteration of each battery module, for a lower risk, higher success design process and future battery pack performance and health.

After reviewing controlled loads on the market, lecturer in power systems, Dr Rawn, identified a unit that can become part of a modularly expanded larger test setup, and has multiple uses. “The ELP-34000 not only makes our module testing possible, but also supports a range of other lab activity, enhancing work by multiple departments, from student experiments on our rooftop PV array to hydrogen fuel cell testing.” elaborated Dr Rawn.

The first evaluation of a loaned unit from ETPS confirmed that the student’s design exceeded expectations, and warranted replication of 5 more battery modules, with some design refinements. Brunel moved forward with an order to acquire an ELP-34000 and involve it in the critical path of battery pack development, and the unit has also been integrated into hydrogen fuel cell research experiments.

The flexibility of programming drive cycles, applying ramps, and logging data all facilitate advanced development of electric vehicle technology for Brunel’s students, staff, and their industrial and academic partners.

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ABOUT THE ELP-34000 SERIES

The ELP-34000 is a series of heat dissipative DC loads. Nominal voltages of 60V, 600V or 1000V are possible per system. Each unit provides an extremely wide operating range, such as the ELP-36360 which can sink its full 600A nominal current from 1000V all the way down to 20V without derating.

An inbuilt master/slave interface allows users to parallel up to 8 units in dynamic loading mode. DC sink powers up to 480kW can be achieved. It is possible to connect 600V or 1000V models from the same product family in parallel with different power nominals. For example, a 5kW system and a 40kW system can be operated together.

A Battery Management System (BMS) testing option is now available. Two complete test routines are provided for testing and certification. Actual operational parameters can be simulated such as over charge/discharge current, over/under temperature and response time.

This allows the BMS to be characterised, so that it can be safely combined with the battery to form a finished product.

Other useful features include over voltage and current tests, dual operating ranges, 150 state memory as well as CC, CV, CR & CP operating modes as standard.

Besides new systems, ETPS also provide a selection of rental DC electronic loads. This includes power recycling models up to 1500V/128kW and heat dissipative models up to 30kW/6000A.

If you’d like to discuss how an electronic load from ETPS could accelerate your testing, then please contact us today.