

ULTRA

BE ENERGY SMART...
AT ANY TEMPERATURE

CaseStudy

TEST CHAMBERS FOR EV BATTERY TESTING, RESEARCH & DEVELOPMENT

MAHLE

- Client: MAHLE Powertrain
- Product: CO² Refrigeration systems and air-handlers
- Temperature Stability: ±0.2 degrees Celsius

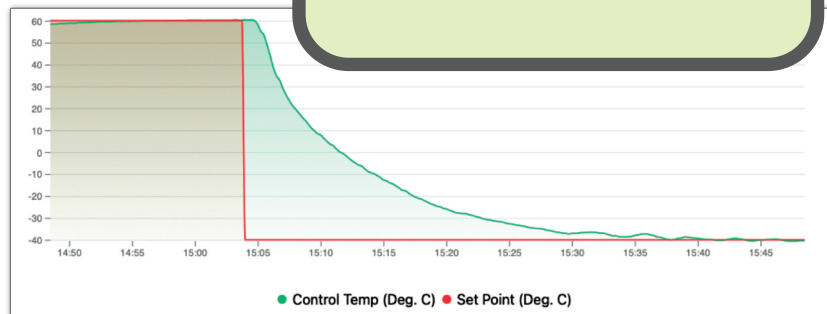
Background:

MAHLE Powertrain, an international engineering partner to the automotive industry, provides research, development and testing services to a wide range of vehicle manufacturers. MAHLE have developed capabilities and techniques to support the development of EV technologies as well as building a new facility for the assembly and testing of battery modules and full-size battery packs. MAHLE approached Ultra to install climate controlled test chambers within their new facility in Northampton, UK

ULTRA'S SOLUTION:

Ultra engineered and delivered three state-of-the-art test cell cooling systems, pushing the boundaries of precision and performance. The key features of the systems included:

- **Temperature Range and Precision:**
Capable of simulating temperatures ranging from -40 to +60°C with exceptional temperature precision of better than 0.2°C, ensuring accurate and reliable testing conditions.
- **Rapid Temperature Change:**
Unprecedented ability to change temperatures by 100°C within 30 minutes to provide rapid shock-test capabilities.
- **Refrigeration Plant:**
The fully enclosed housings feature 4 Bitzer reciprocating compressors utilising environmentally friendly CO² refrigerant, operating in pairs at different temperature ranges, or all together as a booster to achieve -40°C with inter-stage cooling.
- **Construction:**
The air handlers, designed to be air-tight yet serviceable, are constructed from polyurethane sandwich panels boast both rigidity and good insulation. Featuring removable panels to access the evaporator and heater bank.
- **Web-Enabled Controllers:**
The systems were equipped with RDM's TDB range of controllers, enhancing the reliability and efficiency of the control processes and featuring a web-enabled user friendly interface, remote connectivity and BACnet integration with the client's master control system. Our highly tailored control software, using both logic blocks and the LUA programming language, played a pivotal role in managing the complex controls of the cooling systems, ensuring seamless operation and precise temperature control.



Client's Requirements:

✓ Temperature Range:

To achieve a temperature range of -40 to + 60°C and be able to maintain a set-point anywhere in between

✓ Temperature Performance:

Capable of changing temperature by 100°C in 30 minutes

✓ Control software:

Must interface with the client's control system to synchronise control changes with other processes during testing

✓ Longevity:

Must utilise a low GWP refrigerant which will be available during and after the phase-down of F-Gas refrigerant

✓ Integrity:

Insulation must be suitable for temperatures of -40°C and must be pressure-tight to prevent ingress of external ambient air during use

CONCLUSION:

This case study showcases Ultra's capability to design, build and install innovative and sustainable solutions that meet the evolving needs of industry whilst demonstrating our commitment to pushing the boundaries of technology.

The systems not only met but exceeded the client's requirements, providing a robust and flexible platform for EV battery testing.

The success of the project underpins Ultra's position as a leader in the field specialised cooling solutions for advanced testing applications.

For inquiries about our refrigeration possibilities, please email Ultra at info@ultraref.co.uk or visit our website.

