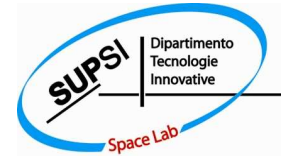


# Test of rechargeable batteries for space applications

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## Problem analysis

Designing a satellite with “Components Off The Shelf” (COTS) calls for thorough, long term testing. Secondary batteries are critical components to the electric power system of the satellite.

An automatic battery test and response reporting system had to be designed, implemented and run on several devices.

Being part of the lab program for EE-students at SUPSI-DTI, Agilent-VEE was chosen for the task.

## Design and specifications

- Charge and discharge Lithium-Ion and Lithium-Polymer batteries according to the expected sun to eclipse orbital periods.
- Implementation of time driven- and battery state driven cycles.
- Battery safety limits (End Of Charge/End Of Discharge) may never be exceeded.
- Temperature cycles are part of the test. Control of a refrigerated/heating circulator (-30°C to 120°C) must be provided.
- A set of instruments to monitor voltage and set current (source and sink) has to be set up.
- Test programs are described in simple, custom definable, external text files. A scripting system (rules) must be devised to write these test programs.
- No modification to the VEE program shall be needed for testing different devices and for different test sequences.
- Battery status is continuously collected, displayed and archived for post processing.



Figure 1

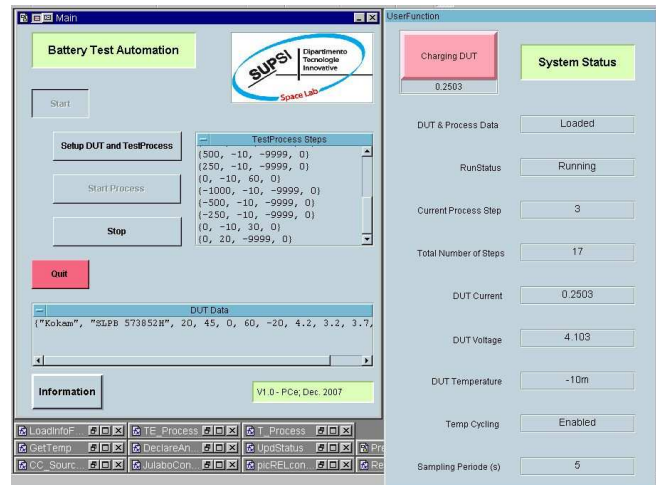


Figure 2

## Implementation

The test equipment (figure 1) features a set of multimeters, a programmable power supply also working as electronic load and the refrigerator / heating circulator.

The Agilent-VEE program allows comfortable control of the system, according to the specifications. The user interface (figure 2) provides access to process setup menus and to information about the current status of the running process step.

IEEE-488 and RS-232 are used to interface to the equipment.

## Results

The tests could be carried out efficiently providing key data (figure 3) for the project.

Agilent-VEE proved invaluable for this step.

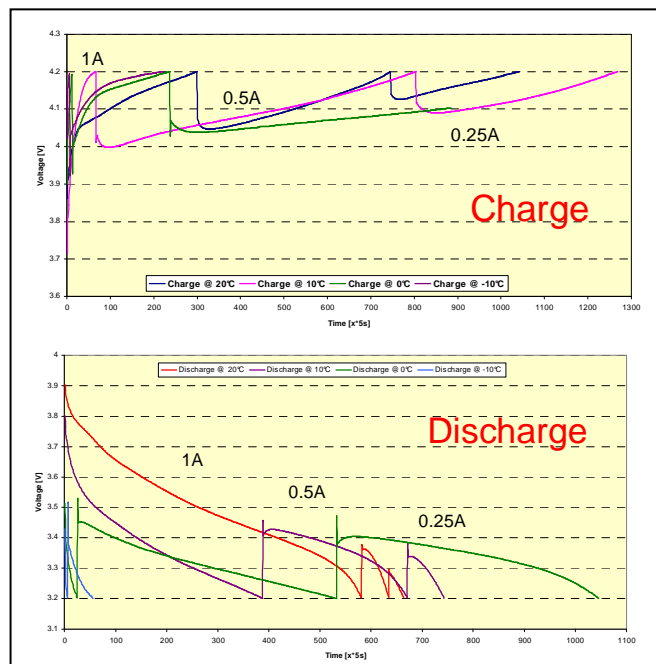


Figure 3