

**Texas Commission on Environmental Quality  
New Technology Research & Development (NTRD) Program  
Monthly Project Status Report**

**Contract Number:** 582-11-12630-3264  
**Grantee:** EcoPower Hybrid Systems  
**Report for the Monthly period:** August 2012  
**Date Submitted:** September 10, 2012

**Section I. Accomplishments**

*Provide a bulleted list of project accomplishments as well as a description of their importance to the project.*

**Field testing:**

- Power monitoring system was installed on a rubber tire gantry crane (RTG) to measure power usage and to confirm and follow duty cycle. Tests are completed and results are under analysis to confirm that power of proposed hybrid power plant is sufficient.

**Electrical design:**

- Short circuit testing on a module 5p2S report was received. The test had to be repeated due to fusion of cables on the first test set-up. As expected at very high current, the cells burned but not exploded. The system will be fused accordingly based on results.
- A current crane hoist drive for in house preliminary testing was purchased and received. This will allow to test the interconnection of the Ecocrane to the existing RTG drive prior to install the hybrid equipment.
- Strategy to connect hybrid power plant directly on direct current (DC) bus of the crane drive is under review. Performance of the drive interfaced with hybrid power plant control will be evaluated for the next weeks or months with the drive.
- Electrical design and drawings are completed at 60%.

**BMS:**

- Communication protocol strategy between battery management system (BMS) and the hybrid power plant programmable logic control (PLC) interfacing with the RTG crane is established. Preliminary testing is completed. Further communication tests need to be done between PLC and BMS. Optimized final communication is to be designed and tested at pack level.
- Module balancing was tested using a single BMS in a configuration 4 X 5P2S at 3,6V. One 5P assembly was discharged to test a worst case configuration. Balancing was completed, confirming functionality of the system at module level.
- Electromagnetic interference (EMI) sensitivity of BMS communication tests are planned and will occur in the next weeks. The equipment and technical support are ready to proceed.
- Temperature accuracy of the BMS card mounted temperature sensor was compared with direct monitoring of cell temperature. System is accurate in operation. Temperature measurement is affected by resistor temperature during equalizing process. Results are under review.

## **Mechanical design and thermal monitoring & control:**

### Enclosure:

- Crane battery enclosure finite element analysis (mechanical analysis) is 90% completed.
- Preliminary module vibration testing was performed from 6Hz to 66Hz. The module was equipped with accelerometers and shown acceleration forces up to 30 g. tests confirmed robustness of the assembly and results are good enough to perform contracted tests on fully instrumented table to obtain full validation.
- Ventilation testing to validate computational fluid dynamics (CFD) thermal model for a single module is completed at 95%. The next step will be to test a full rack. The testing has shown that connection strategy within the module was not optimal. The cell connections were reorganized to minimize path length and resistive heating. All new modules were ordered in the new configuration.

### Module:

- Fabrication for 40 modules is started. 13 will be used for testing and 27 will be used for the crane hybrid power plant.

*Indicate which part of the Grant Activities as defined in the grant agreement, the above accomplishments are related to:*

All realizations are related to Task 2 of the project.

## **Section II: Problems/Solutions**

*Problem(s) Identified: Report anticipated or unanticipated problem(s) encountered and its effect on the progress of the project*

- No technical problems are identified at this point.
- Schedule remains very tight.

*Proposed Solution(s): Report any possible solution(s) to the problem(s) that were considered/encountered*

- NA

*Action(s) Conducted and Results: Describe the action(s) taken to resolve the problem(s) and its effect*

- We are still following carefully all activities to mitigate any potential delay on schedule.

### **Section III. Goals and Issues for Succeeding Period:**

*Provide a brief description of the goal(s) you hope to realize in the coming period and identify any notable challenges that can be foreseen*

#### **Electrical design:**

- To start analysis of crane drive interfaced with hybrid power plant control will be evaluated for the next weeks.
- Electrical design and drawings to be completed at 90%.

#### **BMS:**

- Optimized final communication and intercommunication is to be designed and tested at pack level. Preliminary strategy to be established in the next weeks.
- EMI sensitivity of BMS communication tests are planned and will occur in the next weeks. The equipment and technical support are ready to proceed.
- To design and test redundancy using a second BMS in parallel on one module. Second set of BMS will be delivered in September 2012.

#### **Thermal and mechanical design:**

- To validate final production completion date for the 40 modules.
- To plan immersion in salt water of one module for safety analysis, the test would be performed in October 2012.
- To complete a final version of drawings of the battery rack assembly including new connections strategy ready. To be used for fabrication.

*Date:* September 10, 2012

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*Authorized Project Representative's Signature*

**NOTE:** *Please attach any additional information that you feel should be a part of your report or that may be required to meet the deliverable requirements for tasks completed during this reporting period.*