

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

**Contract Number:** 582-11-11146-3264

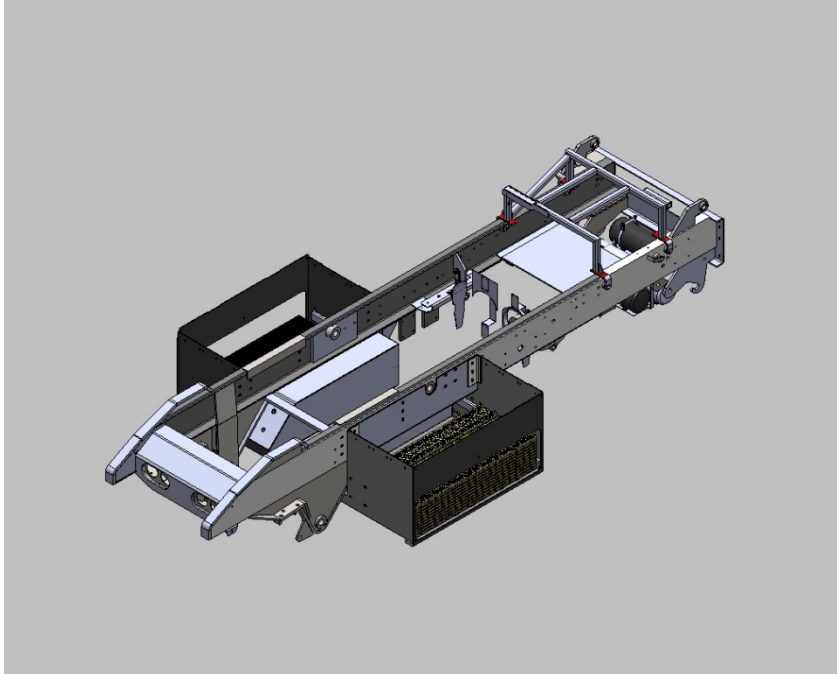
**Grantee:** Capacity of Texas, Inc.

**Report for the Monthly period:** June 2011      **Date Submitted:** July 10, 2011

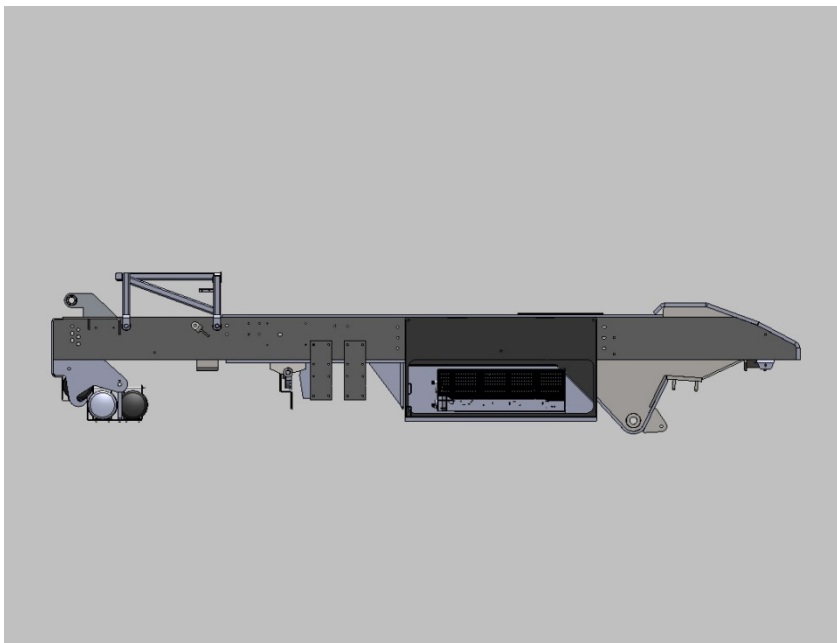
**Section I. Accomplishments**

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

- Research guidelines were established with regards to the (3) duty cycles seen in the terminal tractor industry. These duty cycles include inter-modal operations, port, and warehouse/distribution. The research consists of consulting with our extensive customer base and requesting data pertaining to idle time. Many of our customers monitor and record fuel consumption over a driver's shift. This will allow them to provide Capacity engineering the numbers necessary to calculate idle time.
- The main focus of this research will be to verify vehicle idle time versus utilization time in each of the respective duty cycles. The assumption is the warehouse and distribution application is the most rigorous. In the terminal tractor spotter market, the typical duty cycles in each market segment are fairly well documented. They are as follows:
  - Inter-modal: 50% idle time.
  - Port operations: 70% idle time.
  - Warehouse and distribution: 25% idle time.
- Through the verification of these assumptions within our customer base, the quantity of on-board hydrogen storage and the size of the hydrogen fuel cell can be determined. This is a critical step in determining how to best optimize the ZETT (Zero Emissions Terminal Tractor) for optimal use in all three duty cycles.
- Preliminary modeling was done of the base vehicle using SolidWorks 2011. By developing the baseline vehicle model, the space available for hydrogen storage tanks, hydrogen fuel cells, and Li-ion battery packs can be determined. The preliminary models can be seen in Figure 1 and Figure 2 below.



**Figure 1. Frame structure with preliminary battery boxes.**



**Figure 2. Left side of frame with preliminary fuel cell placement.**

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

- Under Task 1, The Development of a duty cycle is currently in process. Specifically item 2.1.1.
- Under Task 2, ZETT design, preliminary work was begun on task 2.2.1. in the form of solid model design.

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

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

- a) Due to the preliminary status of the design process, no challenges have been encountered. One possible problem could be extracting the necessary data from our customer base.

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

- a) A possible solution would be to let the Capacity sales department initiate the request with our customers as they have more frequent contact with our customer base and are less likely to misspeak than the typical engineer.

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

- a)

## **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*

The goals for the next month include the following:

- Verify the duty cycle assumptions with our customer base.
- Complete the solid model of the base vehicle.
- Determine the space available for on-board hydrogen storage and batteries.
- Begin to develop a selection matrix for the hydrogen fuel storage tanks.
- Begin to develop a decision matrix for on-board battery storage.

Date: July 10, 2011

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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.*