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

Contract Number: 582-11-13472-2019

Grantee: Transportation Power, Inc. (TransPower)

Report for the Monthly period: 04/12/12 – 05/13/12

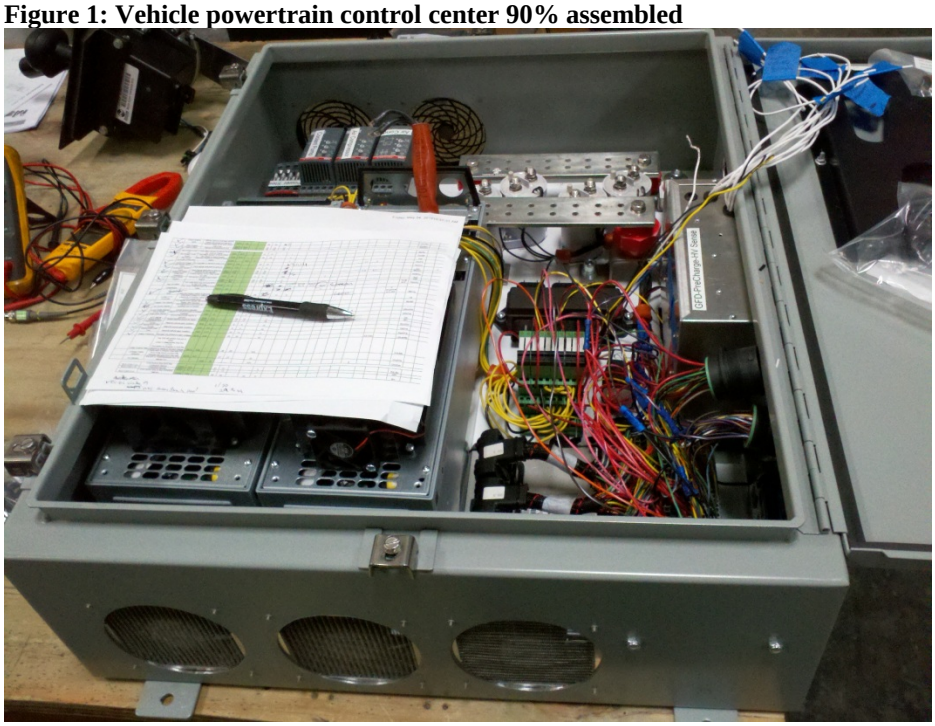
Date Submitted: 5/10/12

Section I. Accomplishments

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

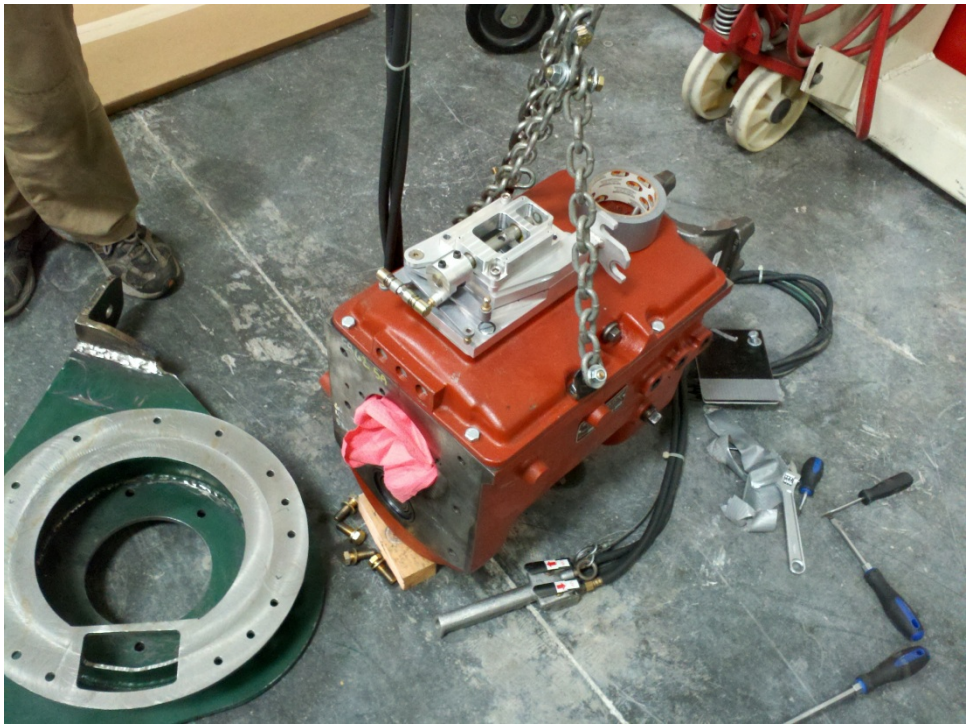
- Control system development continues to make significant progress towards a complete running powertrain on the bench and then in the vehicle. Next week the input/output (I/O) will be verified and logic checked for start-up and simple state functions.
    - The Vehicle Powertrain Control Center (VPCC) is 90% complete. This is the primary assembly of the electrical distribution subsystem. All components and controllers are in place with only a small amount of control wiring and the high power cabling to finish.

Figure 1: Vehicle powertrain control center 90% assembled



    - An extra 24 Pin controller has been sourced to handle some extra I/O duties. It is installed and programmed.
    - Procedures are being written to test each I/O and logic that drives it.
- The MasterShift adapter and shift flag are complete. These parts adapt the shifter mechanism to the transmission and actuate the shift forks. The shift cables are in house and ready for installation.

Figure 2: Shift hardware installed on transmission



- The pre-charge and voltage sensing circuits are complete and installed in the VPCC. This assembly also contains a bender ground fault detection device.
- The powertrain and powertrain mounting is complete. The assembly has been removed from the vehicle for dynamometer fit up.
- The dynamometer construction continues.
  - Shafts are in house and the frame is being fabricated.
  - The hardware and software required to operate the dynamometer and log the resulting data are being developed
- Electric accessories have arrived and most are installed or in testing.
  - Air conditioner Love-Joy coupler testing was successful and the assembly is being installed in the vehicle.
  - The power steering assembly is installed.
  - The 5th wheel pump and motor mounts are almost complete.
  - The air compressor is in the shop and in the queue to be installed.
- The ESS suitcase parts are in house and being fabricated.

Figure 3: Completed suitcases stacked up in the shop

- The battery monitoring harnesses have been manufactured and are ready for installation.
- Bus bars are on order.
- All other hardware is in house, except for the battery cells themselves, the first batch of which (sufficient for the first tractor) are due to be delivered the week of May 14-18.

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

- All of the accomplishments listed above relate to Task 2.2.2, "Tractor 1 Installation."
- While the construction of a dynamometer is not an explicitly defined task in the grant agreement, TransPower views dynamometer testing as an essential step in vehicle integration process. The dynamometer will allow TransPower engineers to validate the powertrain as a discrete subsystem before the components are integrated into either tractor. In the TransPower Integration Test Plan, this is referred to as subsystem level testing. Additionally, the dynamometer will allow TransPower engineers to fully calibrate the drive system software code required for successful shifting, as well as other software functionality, without having to wait for the tractor to be ready for road testing. This additional parallelization is part of the reason why the overall project remains on schedule despite several supply chain delays.

Section II: Problems/Solutions

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

a) The dynamometer input shaft took longer than expected to have fabricated which set back assembly and fabrication of the dynamometer.
b) Months ago TransPower ordered powertrain motor inverters. Due to resource issues from our suppliers these are taking longer to arrive than expected. They are now scheduled to be delivered on May 25, 2012.

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

a) Although TransPower has been experiencing delays, TransPower's engineers and technicians have invested the wait time into activities that will reduce the workload further down the road in the build process. This includes both fabricating mounts and brackets for the second truck as well as developing efficient procedures for components that will require repetitive assembly. One key example is the integration of batteries and BMS modules into the battery suitcases, something that will need to be done 14 times for each tractor. TransPower continues to streamline the battery pack assembly procedure.
b) The main challenges TransPower is experiencing are due to late battery and motor inverter deliveries. TransPower intends to use the dynamometer (built at company expense) to more rapidly advance powertrain vetting and calibration and will purchase a separate set of lead acid batteries to facilitate if necessary. TransPower has a second dynamometer being set up to support our partner EPC, the suppliers of our new inverter/charger. By accelerating their inverter development (we have successfully tested their charger functionality), we intend to have two inverter options to choose from: the Quantum supplied inverter previously tested with on our prototype on-road Navistar truck (for which we have been experiencing delays), or the EPC inverter charger unit (ICU).

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

a) TransPower has hired an additional electrical technician during the previous period to accelerate tasks involving both electrical hardware and software. This additional help will allow TransPower to keep up with the project schedule despite the major supply chain delays by reducing dynamometer setup time once the dynamometer input shaft and inverters arrive. This new technician will also allow TransPower to conduct additional tasks in parallel.

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

During the next period TransPower expects to fabricate the remaining battery suitcases and install the cells, BMS wiring, and HV cabling. The vehicle ESS mounting structure will be installed on Tractor 1. The suitcases themselves will be used to power the motors on the dynamometer then moved into the vehicle after the next report. Electrical accessory installation will be completed on the first tractor and then begun on the second vehicle. Vehicle 2 control system assembly will then begin. The VPCC external harnessing will be complete and connected to key components on the bench for dynamometer powertrain testing. The longer lead items will be acquired in the coming period, allowing dynamometer development and testing to proceed.

Date: 5/10/12

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.*